

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Chemistry 152**COURSE TITLE:**

Introduction to General Chemistry

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This is a one-semester preparatory course in chemistry consisting of an intensive study of the principles of inorganic and physical chemistry in preparation for General Chemistry. Topics include atomic structure, chemical nomenclature, periodicity, chemical equations, stoichiometry, solutions, and gas laws. Emphasis is placed on problem solving and chemical calculations. This course is intended for those students majoring in one of the natural sciences, engineering, or related curricula who need to take General Chemistry.

**REQUISITES:****Prerequisite:**

MATH 096 with a grade of "C" or better, or equivalent or Milestone M50

**Corequisite: Completion of or concurrent enrollment in:**

CHEM 152L with a grade of "C" or better, or equivalent

**Advisory:**

MATH 116 with a grade of "C" or better, or equivalent

or

MATH 104 with a grade of "C" or better, or equivalent

or

MATH 119 with a grade of "C" or better, or equivalent

**Limitation on Enrollment:**

This course is not open to students with previous credit for CHEM 151

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:****TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Diagram and explain the scientific method.
2. Use dimensional analysis to solve problems to the correct number of significant figures and with correct units.
3. Explain key concepts and terminology related to the properties and classification of matter.
4. Write formulas for ionic compounds, covalent compounds and acids from names and names of compounds from formulas.
5. Describe the model of the atom including subatomic particles, isotopes and electron configurations.
6. Describe the periodic table, including trends such as atomic radii, ionization energy, electronegativity and reactivity.
7. Perform mole, stoichiometric and concentration calculations.
8. Write balanced chemical equations from words and predict products of double replacement, single replacement, hydrocarbon combustion, and ionic equations.
9. Compare and contrast covalent and ionic bonds and compounds.
10. Draw Lewis structures of simple compounds.
11. Explain concepts and solve problems related to gases.
12. Explain concepts and solve problems related to acids and bases.

**SECTION II****1. COURSE OUTLINE AND SCOPE:****A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Scientific Method
  - A. Definition of science
  - B. Description of method
- II. Measurement
  - A. Scientific Notation
  - B. SI Units
  - C. Accuracy v. Precision
  - D. Significant Figures
- III. Problem solving
  - A. Dimensional Analysis
    1. Metric
    2. Cubic
    3. Squares
  - B. Algebra
- IV. Properties of Matter
  - A. Physical v. Chemical
  - B. Changes
  - C. Laws of Conservation
  - D. States of matter
  - E. Classification
    1. Elements

- 2. Compounds
- 3. Mixtures
- V. Inorganic Chemical Nomenclature
  - A. Ionic
  - B. Molecular
  - C. Acids
- VI. Model of the Atom
  - A. Subatomic particles
  - B. Isotopes
    - 1. Concept
    - 2. Calculations involving percent abundances
  - C. Rutherford experiment
  - D. Qualitative understanding of electromagnetic radiation
  - E. Electron configuration
  - F. Lewis Dot Structures
- VII. Periodic Table
  - A. Organization
  - B. Trends
    - 1. Atomic radii
    - 2. Ionization energy
    - 3. Electronegativity
- VIII. Mole Concept
  - A. Avogadro's Number
  - B. Molar mass
  - C. Conversions
    - 1. To and from mass
    - 2. To and from particles
- IX. Stoichiometry
  - A. Mass
  - B. Solutions
  - C. Limiting Reactant
- X. Solutions
  - A. Concentration
  - B. Preparation
  - C. Dilutions
  - D. Molarity of ions
- XI. Chemical Equations
  - A. Types
  - B. Balancing
  - C. Predicting products
    - 1. Combustion of hydrocarbons
    - 2. Single Replacement
    - 3. Double Replacement
  - D. Ionic Equations
- XII. Bonds
  - A. Ionic
  - B. Covalent
  - C. Polarity
- XIII. Lewis Structures of molecules
- XIV. Gases
  - A. Pressure
  - B. Gas Laws
    - 1. Boyle's
    - 2. Charles'
    - 3. Avogadro
    - 4. Ideal
- XV. Acids and Bases
  - A. Definitions
  - B. Strong v. Weak
  - C. pH Calculations

1. Strong acids
  2. Strong bases
- D. Buffers
1. Definition
  2. Function

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Preparatory chemistry textbook(s).
- II. Instructor packets containing Handouts and/or articles relating to topics, such as chemical nomenclature or stoichiometry.
- III. Internet articles related to topics in chemistry.

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Brief essays describing various chemical concepts
- II. Problem-solving exercises.

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Problem solving exercises dealing with advanced multi-step unit conversions, stoichiometry problems involving a limiting reagent, gas law problems using the ideal gas equation, and various types of concentration problems.
- II. Short answer homework assignments in which students are asked to describe chemical phenomena.

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Problem sets involving algebraic manipulation of variables and appropriate calculations; for example calorimetry or specific heat problems.
- II. Assignments requiring determination of quantitative relationships in chemical formulas, chemical equations, solutions, gases and acids and bases.
- III. Comparison of the physical properties of elements and their relationship to structure using the periodic table.
- IV. Comparison of the similarities and differences among elements, compounds and mixtures, as well as similarities among types of chemical bonds.

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Quizzes and exams.
- II. Midterm and final exams.
- III. Homework assignments.
- IV. Class participation.

**3. METHODS OF INSTRUCTION:**

Methods of instruction may include, but are not limited to, the following:

- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Distance Education (Partially online)

\* Lecture

#### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

##### TEXTBOOKS:

1. Cracolice, M. & E. Peters. Introduction to General Chemistry: An Active Learning Approach, 7th ed. Cengage Learning, 2021, ISBN: 9780357363669
2. Hein, Morris, Susan Arena and Cary Willard. Foundations of College Chemistry, 15th ed. Wiley, 2016, ISBN: 9781119083900
3. Tro, Nivaldo Jose. Introductory Chemistry, 6th ed. Pearson, 2018, ISBN: 9780134302386

##### MANUALS:

##### PERIODICALS:

##### SOFTWARE:

##### SUPPLIES:

1. Scientific calculator.

**ORIGINATOR:** Paula Gustin

**ORIGINATION DATE:** 02/25/2019

**PROPOSAL ORIGINATOR:** Paula Gustin

**CO-CONTRIBUTOR(S)** Donna Budzynski

**PROPOSAL DATE:** 09/15/2022

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
COURSE PROPOSAL IMPACT REPORT**

**COURSE TO BE PROPOSED:** CHEM 152  
Introduction to General Chemistry

**ACTIVE/APPROVED COURSES IMPACTED:**

CHEM 152 Introduction to General Chemistry (29310)

**Prerequisite**

BIOL 205 (Active)  
BIOL 210A (Active)  
CHEM 130 (Active)  
CHEM 130L (Active)  
CHEM 200 (Active)  
CHEM 200 (Approved)  
CHEM 200L (Active)  
CHEM 200L (Approved)  
FERM 140 (Active)  
FERM 150 (Active)  
MLTT 210 (Active)  
MLTT 211 (Active)  
MLTT 212 (Active)  
MLTT 213 (Active)  
NUTR 155 (Active)

**Corequisite**

CHEM 016 (Active)

Corequisite: Completion of or concurrent enrollment in  
CHEM 152L (Active)

**Advisory**

BIOL 132 (Active)  
BIOL 133 (Active)  
FERM 140 (Approved)  
FERM 150 (Approved)

**DISTRICT GENERAL EDUCATION:**

B2 Natural Sciences - Physical Sciences

**ACTIVE/APPROVED/PROPOSED PROGRAMS IMPACTED:**

**( Mesa )**

Allied Health Track \*Approved\*;  
**Associate of Science Degree**

Courses Required for the Major:

**( Miramar )**

Biotechnology \*Active\*;  
**Associate of Science Degree**

Courses Required for the Major:

( **Miramar** )

Earth Science Studies \*Active\*;

**Associate of Science Degree**

Select at least eight (8) units from the following physical science courses:

( **Miramar** )

Earth Science Studies \*Pending\*;

**Associate of Science Degree**

Select at least eight (8) units from the following physical science courses:

( **Mesa** )

Fermentation Management \*Active\*;

**Associate of Science Degree**

Select four (4) units from the following combination of courses:

( **Mesa** )

Liberal Arts & Sciences: Science Studies-Kinesiology & Nutrition \*Active\*;

**Associate of Arts Degree**

Major Courses

( **City** )

Liberal Arts and Sciences in Scientific Studies Physical and Earth Sciences Specialization \*Approved\*;

**Associate of Arts Degree**

Major Courses

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Psychology \*Active\*;

**Associate of Arts Degree**

Select a minimum of 5 units (total of 18 units):

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Psychology \*Pending\*;

**Associate of Arts Degree**

Select a minimum of 5 units (total of 18 units):

( **City** )

Liberal Arts and Sciences: Scientific Studies Physical and Earth Sciences Specialization \*Approved\*;

**Associate of Arts Degree**

Major Courses

( **City** )

Liberal Arts and Sciences: Scientific Studies Physical and Earth Sciences Specialization \*Pending\*;

**Associate of Arts Degree**

Major Courses

( **Mesa** )

Nutrition and Dietetics \*Active\*;

**Associate in Science for Transfer Degree**

CATEGORY B: SELECT A MINIMUM OF ONE COURSE FROM THE  
FOLLOWING OR ANY COURSE NOT SELECTED IN CATEGORY A (3-5 units)

( **Miramar** )

Nutrition and Dietetics \*Active\*;

**Associate in Science for Transfer Degree**

Select one of the following courses:

( **Miramar** )

Nutrition and Dietetics \*Approved\*;

**Associate in Science for Transfer Degree**

Select one of the following courses:

( **Mesa** )

Physical Sciences \*Active\*;

**Associate of Science Degree**

At least 8 units from the following:

( **Mesa** )

Physical Sciences \*Pending\*;

**Associate of Science Degree**

At least 8 units from the following:

( **Mesa** )

Physical Sciences \*Active\*;

**Certificate of Achievement**

At least 8 units from the following:

( **Mesa** )

Physical Sciences \*Pending\*;

**Certificate of Achievement**

At least 8 units from the following:



# SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

## Course Outline of Record: Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Chemistry
- II. **Course Number:** 152
- III. **Course Title:** Introduction to General Chemistry
- IV. **Disciplines (Instructor Minimum Qualifications):** Chemistry
- V.
- VI. **Family:**
- VII. **Current Short Title:** Intro to General Chemistry
- VIII. **Course Is Active/Where?** MESA , MIRAMAR AND CITY
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** City
- XII. **Proposal Originating Date:** 09/15/2022
- XIII. **Proposed Start Semester:** Fall 2024
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Intro to principles of inorganic and physical chemistry.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**
  - Prerequisite: MATH 096 with a grade of "C" or better, or equivalent. Required for articulation by a UC/CSU institution or Milestone M50
  - Corequisite: Completion of or concurrent enrollment in: CHEM 152L with a grade of "C" or better, or equivalent.
  - Advisory: MATH 116 with a grade of "C" or better, or equivalent.
  - or Advisory: MATH 104 with a grade of "C" or better, or equivalent.
  - or Advisory: MATH 119 with a grade of "C" or better, or equivalent.
  - Limitation on Enrollment:: This course is not open to students with previous credit for CHEM 151
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** Yes Taken with CHEM 152L, this course is equivalent to CHEM 151.
- VI. **Additional Information:**
- VII. **Additional Textbook Information:** Textbooks latest editions as of 9-2022.

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six yr review including: 1) addition of math advisories to improve student success post pandemic and provide better guidance to students. Data available from campus researcher, 2) update DE from Online Course to Partially Online and added Participants to Contact Types, and 3) texts reviewed and updated for currency. (Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. District general education 2. Major Requirement - Associate Degree 3. Major Requirement - Certificate of Achievement
- V. **Extraordinary Cost to the College:** None.
- VI. **Library Resource Materials:** No new resources required..

#### GENERAL EDUCATION ANALYSIS

##### **CSU General Education:**

B1 Area B. Scientific Inquiry and Quantitative Reasoning - Physical Science

**District General Education:**

B2 Natural Sciences - Physical Sciences

**IGETC:**

Area 5. Physical and Biological Sciences - 5A: Physical Science

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Working knowledge of data collection and analysis.

- I. Course: MATH 116 Analyze, graph, and evaluate linear functions related to application problems in business and the natural sciences.
- II. Course: MATH 119 Organize qualitative and quantitative data into meaningful charts and graphs.
- III. Course: MATH 116 Analyze and interpret the relationship between the properties and graphs of polynomial functions.
- IV. Course: MATH 116 Analyze and interpret the graphs of algebraic functions including square root, cube root, absolute value, piece-wise defined functions and rational functions.
- V. Course: MATH 104 Analyze and describe the graphs of trigonometric functions and their algebraic representation in terms of their properties including the phase shift, the period, vertical shifts, the amplitude, asymptotes, and the domain and range.
- VI. Course: MATH 104 Define, evaluate, describe, and graph inverse trigonometric functions including their domains and ranges.
- VII. Course: MATH 116 Solve and graph linear inequalities in one and two variables and non-linear inequalities in one variable.
- VIII. Course: MATH 119 Identify the standard methods of obtaining data and identify advantages and disadvantages of each.
- IX. Course: MATH 104 Perform arithmetic operations on complex numbers using both standard and trigonometric form including applications involving De Moivre's Theorem, and interpret those operations geometrically.

Knowledge of algebraic functions

- I. Course: MATH 116 Perform algebraic operations on functions and determine function inverses.
- II. Course: MATH 116 Determine all the exact zeros of a polynomial by applying root-finding techniques and theorems.
- III. Course: MATH 116 Analyze and interpret the graphs of algebraic functions including square root, cube root, absolute value, piece-wise defined functions and rational functions.
- IV. Course: MATH 116 Solve and graph linear inequalities in one and two variables and non-linear inequalities in one variable.
- V. Course: MATH 116 Analyze and apply rigid and non-rigid transformations to algebraic, exponential and logarithmic functions.
- VI. Course: MATH 104 Solve trigonometric and inverse trigonometric equations.
- VII. Course: MATH 116 Solve equations involving logarithmic and exponential functions, including application problems.
- VIII. Course: MATH 104 Apply the Pythagorean Theorem, the Law of Sines, and the Law of Cosines to solve right and oblique triangles, and application problems.
- IX. Course: MATH 116 Construct systems of equations from application problems and solve them using various techniques.
- X. Course: MATH 104 Apply vector algebra to problems involving vector quantities such as force, velocity and displacement.
- XI. Course: MATH 116 Use the above skills in various applications such as partial fraction decomposition or linear programming.
- XII. Course: MATH 104 Perform arithmetic operations on complex numbers using both standard and trigonometric form including applications involving De Moivre's Theorem, and interpret those operations geometrically.

- XIII. Course: MATH 119 Calculate confidence intervals using test statistics to determine the level of significance of the mean, the variance, and the sample proportion.
- XIV. Course: MATH 119 Formulate hypothesis tests discussing the differences between Type I and Type II errors.
- XV. Course: MATH 119 Perform hypothesis tests for various random variables including means, one and two-sample proportions, and variance.
- XVI. Course: MATH 119 Evaluate correlation to determine the corresponding linear regression between two sets of data.
- XVII. Course: MATH 119 Apply ANOVA analysis of estimation and inference, and interpret corresponding statistics.

### **SECTION III**

#### **COURSE DISTANCE EDUCATION INFORMATION**

- I. **MIRAMAR**
- II. **Distance Education Methods of Instruction:** 1. On-line course
- III. **Other Distance Education Methods:**
- IV. **Type and frequency of contact may include, but is not limited to:**
  - 1. Chat Rooms  
Once or twice a week
  - 2. E-mail  
As needed
  - 3. Individual Meetings  
On campus or online as required
  - 4. Telephone Contact  
As needed
  - 5. Threaded Conferencing  
Once or twice a week
- V. **List of Techniques:** Timed On-line quizzes and tests. Class participation through chats and threaded discussions. Problem solving homework assignments are required.
- VI. **How to Evaluate Students for Achieved Outcomes:** Performance on timed-online quizzes and tests. Performance on class participation through threaded discussions. Performance on written and problem solving assignments.
- VII. **Additional Resources/Materials/Information:** Provide text alternatives for any non-text content; Make it easier for users to see and hear content including separating foreground from background; Make text content readable and understandable. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. **Audio Visual Library Materials:** NO
- IX. **MESA**
- X. **Distance Education Methods of Instruction:** 1. Partially online only
- XI. **Other Distance Education Methods:** When offered online, this course will include scheduled exams in person.
- XII. **Type and frequency of contact may include, but is not limited to:**
  - 1. Announcements  
As needed  
**Participant/s:** Faculty to Student/s
  - 2. Announcements  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
  - 3. Announcements  
Once or twice a week  
**Participant/s:** Faculty to Student/s , Among Students
  - 4. Chat Rooms  
Once or twice a week  
**Participant/s:** Faculty to Student/s , Among Students
  - 5. Individual Meetings  
On campus or online as needed
  - 6. Telephone Contact  
As needed  
**Participant/s:** Faculty to Student/s , Among Students

- XIII. **List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication. Timed On-line quizzes and tests. Class participation through chats and threaded discussions. Problem solving homework assignments are required.
- XIV. **How to Evaluate Students for Achieved Outcomes:** Performance on timed-online quizzes and tests. Performance on class participation through threaded discussions. Performance on written and problem solving assignments.
- XV. **Additional Resources/Materials/Information:** SDCCD and DSPS personnel will provide all needed accommodations. DSPS will provide a student in an online classroom with the same level of support as an on-campus student. Provide text alternatives for any non-text content; Make it easier for users to see and hear content including separating foreground from background; Make text content readable and understandable. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XVI. **Audio Visual Library Materials:** NO
- XVII. **CITY**
- XVIII. **Distance Education Methods of Instruction:** 1. Fully Online
- XIX. **Other Distance Education Methods:**
- XX. **Type and frequency of contact may include, but is not limited to:**
1. Announcements  
weekly
  2. Chat Rooms  
as assigned
  3. Collaborative Web Documents  
as assigned
  4. Conferencing  
as assigned
  5. Discussion Board  
at least three times during the term
  6. Email/Message System  
as needed
  7. Field Trips  
as assigned
  8. Group Meetings  
as assigned
  9. Individual Meetings  
as needed
  10. Individualized Assignment Feedback  
as assigned
  11. Synchronous or Asynchronous Video  
as assigned
  12. Telephone Contact  
as needed
- XXI. **List of Techniques:** Students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.
- XXII. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- XXIII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XXIV. **Audio Visual Library Materials:** NO

#### **SECTION IV**

#### **COURSE STUDENT LEARNING OUTCOME(S)**

## CITY

- Students will use dimensional analysis to solve problems related to measurement, metric conversions, density and calorimetry and express the answer to the correct number of significant figures and with correct units.

## MESA

- Use current theories to describe atoms and compounds.
- Describe and/or write structure. Correlate the relationships between structure and properties.
- Understand and use nomenclature systems.
- Write and explain chemical pathways.
- Use and/or understand accepted standards in measuring, and analyzing data with the use of mathematical models and calculations.

## MIRAMAR

- After completing Chemistry 152, students will be able to demonstrate an understanding of the dimensional analysis method to perform a stoichiometric calculation from a balanced equation to find the number of grams of product formed, with the correct number of significant figures, given the volume and concentration of a reactant.
- After completing Chemistry 152, students will be able to write formulas for ionic compounds, covalent compounds, and acids from names and names of compounds from formulas.
- After completing Chemistry 152, students will be able to write balanced chemical equations from words and predict products of double- and single-replacement, hydrocarbon combustion, and ionic equations.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1905.00 Chemistry, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** Y = Not applicable

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units: 3.00**

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 09/15/2022

#### **IV. Last Outline Revision Date:** 05/09/2019

#### **V. CIC Approval:**

#### **VI. BOT Approval:**

#### **VII. State Approval:**

#### **VIII. Revised State Approval:**

#### **IX. Course Approval Effective Date:**

## SECTION VI

### CREDIT FOR PRIOR LEARNING



CHEM 152

**Previous Report**

CIC Approval: 05/09/2019  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM: Fall 2020

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Chemistry 152**COURSE TITLE:**

Introduction to General Chemistry

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This is a one-semester preparatory course in chemistry consisting of an intensive study of the principles of inorganic and physical chemistry in preparation for General Chemistry. Topics include atomic structure, chemical nomenclature, periodicity, chemical equations, stoichiometry, solutions, and gas laws. Emphasis is placed on problem solving and chemical calculations. This course is intended for those students majoring in one of the natural sciences, engineering, or related curricula who need to take General Chemistry.

**REQUISITES:****Prerequisite:**

MATH 096 with a grade of "C" or better, or equivalent or Milestone M50

**Corequisite: Completion of or concurrent enrollment in:**

CHEM 152L with a grade of "C" or better, or equivalent

**Limitation on Enrollment:**

This course is not open to students with previous credit for CHEM 151

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU IGETC UC Transfer Course List CSU General Education

**CID:****TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**Current Report**

CHEM 152

CIC Approval:  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM:

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

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**Advisory:**

MATH 116 with a grade of "C" or better, or equivalent

or

MATH 104 with a grade of "C" or better, or equivalent

or

MATH 119 with a grade of "C" or better, or equivalent

**Limitation on Enrollment:**

This course is not open to students with previous credit for CHEM 151

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:****TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

## STUDENT LEARNING OBJECTIVES:

Upon successful completion of the course the student will be able to:

1. Diagram and explain the scientific method.
2. Use dimensional analysis to solve problems to the correct number of significant figures and with correct units.
3. Explain key concepts and terminology related to the properties and classification of matter.
4. Write formulas for ionic compounds, covalent compounds and acids from names and names of compounds from formulas.
5. Describe the model of the atom including subatomic particles, isotopes and electron configurations.
6. Describe the periodic table, including trends such as atomic radii, ionization energy, electronegativity and reactivity.
7. Perform mole, stoichiometric and concentration calculations.
8. Write balanced chemical equations from words and predict products of double replacement, single replacement, hydrocarbon combustion, and ionic equations.
9. Compare and contrast covalent and ionic bonds and compounds.
10. Draw Lewis structures of simple compounds.
11. Explain concepts and solve problems related to gases.
12. Explain concepts and solve problems related to acids and bases.

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Scientific Method
  - A. Definition of science
  - B. Description of method
- II. Measurement
  - A. Scientific Notation
  - B. SI Units
  - C. Accuracy v. Precision
  - D. Significant Figures
- III. Problem solving
  - A. Dimensional Analysis
    1. Metric
    2. Cubic
    3. Squares
  - B. Algebra
- IV. Properties of Matter
  - A. Physical v. Chemical
  - B. Changes
  - C. Laws of Conservation
  - D. States of matter
  - E. Classification
    1. Elements
    2. Compounds
    3. Mixtures
- V. Inorganic Chemical Nomenclature
  - A. Ionic
  - B. Molecular
  - C. Acids
- VI. Model of the Atom
  - A. Subatomic particles
  - B. Isotopes
    1. Concept
    2. Calculations involving percent abundances
  - C. Rutherford experiment
  - D. Qualitative understanding of electromagnetic radiation
  - E. Electron configuration
  - F. Lewis Dot Structures
- VII. Periodic Table
  - A. Organization
  - B. Trends
    1. Atomic radii
    2. Ionization energy
    3. Electronegativity
- VIII. Mole Concept
  - A. Avogadro's Number

Upon successful completion of the course the student will be able to:

1. Diagram and explain the scientific method.
2. Use dimensional analysis to solve problems to the correct number of significant figures and with correct units.
3. Explain key concepts and terminology related to the properties and classification of matter.
4. Write formulas for ionic compounds, covalent compounds and acids from names and names of compounds from formulas.
5. Describe the model of the atom including subatomic particles, isotopes and electron configurations.
6. Describe the periodic table, including trends such as atomic radii, ionization energy, electronegativity and reactivity.
7. Perform mole, stoichiometric and concentration calculations.
8. Write balanced chemical equations from words and predict products of double replacement, single replacement, hydrocarbon combustion, and ionic equations.
9. Compare and contrast covalent and ionic bonds and compounds.
10. Draw Lewis structures of simple compounds.
11. Explain concepts and solve problems related to gases.
12. Explain concepts and solve problems related to acids and bases.

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

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  - D. Significant Figures
- III. Problem solving
  - A. Dimensional Analysis
    1. Metric
    2. Cubic
    3. Squares
  - B. Algebra
- IV. Properties of Matter
  - A. Physical v. Chemical
  - B. Changes
  - C. Laws of Conservation
  - D. States of matter
  - E. Classification
    1. Elements
    2. Compounds
    3. Mixtures
- V. Inorganic Chemical Nomenclature
  - A. Ionic
  - B. Molecular
  - C. Acids
- VI. Model of the Atom
  - A. Subatomic particles
  - B. Isotopes
    1. Concept
    2. Calculations involving percent abundances
  - C. Rutherford experiment
  - D. Qualitative understanding of electromagnetic radiation
  - E. Electron configuration
  - F. Lewis Dot Structures
- VII. Periodic Table
  - A. Organization
  - B. Trends
    1. Atomic radii
    2. Ionization energy
    3. Electronegativity
- VIII. Mole Concept
  - A. Avogadro's Number
  - B. Molar mass
  - C. Conversions



- B. Molar mass
- C. Conversions
  1. To and from mass
  2. To and from particles

#### IX. Stoichiometry

- A. Mass
- B. Solutions
- C. Limiting Reactant

#### X. Solutions

- A. Concentration
- B. Preparation
- C. Dilutions
- D. Molarity of ions

#### XI. Chemical Equations

- A. Types
- B. Balancing
- C. Predicting products
  1. Combustion of hydrocarbons
  2. Single Replacement
  3. Double Replacement
- D. Ionic Equations

#### XII. Bonds

- A. Ionic
- B. Covalent
- C. Polarity

#### XIII. Lewis Structures of molecules

#### XIV. Gases

- A. Pressure
- B. Gas Laws
  1. Boyle's
  2. Charles'
  3. Avogadro
  4. Ideal

#### XV. Acids and Bases

- A. Definitions
- B. Strong v. Weak
- C. pH Calculations
  1. Strong acids
  2. Strong bases
- D. Buffers
  1. Definition
  2. Function

#### B. Reading Assignments:

Reading assignments are required and may include, but are not limited to, the following:

- I. Preparatory chemistry textbook(s).
- II. Instructor packets containing Handouts and/or articles relating to topics, such as chemical nomenclature or stoichiometry.
- III. Internet articles related to topics in chemistry.

#### C. Writing Assignments:

Writing assignments are required and may include, but are not limited to, the following:

- I. Brief essays describing various chemical concepts
- II. Problem-solving exercises.

#### D. Appropriate Outside Assignments:

Outside assignments may include, but are not limited to, the following:

- I. Problem solving exercises dealing with advanced multi-step unit conversions, stoichiometry problems involving a limiting reagent, gas law problems using the ideal gas equation, and various types of concentration problems.
- II. Short answer homework assignments in which students are asked to describe chemical phenomena.

#### E. Appropriate Assignments that Demonstrate Critical Thinking:

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Problem sets involving algebraic manipulation of variables and appropriate calculations; for example calorimetry or specific heat problems.
- II. Assignments requiring determination of quantitative relationships in chemical formulas, chemical equations, solutions, gases and acids and bases.
- III. Comparison of the physical properties of elements and their relationship to structure using the periodic table.

1. To and from mass
2. To and from particles

#### IX. Stoichiometry

- A. Mass
- B. Solutions
- C. Limiting Reactant

#### X. Solutions

- A. Concentration
- B. Preparation
- C. Dilutions
- D. Molarity of ions

#### XI. Chemical Equations

- A. Types
- B. Balancing
- C. Predicting products
  1. Combustion of hydrocarbons
  2. Single Replacement
  3. Double Replacement
- D. Ionic Equations

#### XII. Bonds

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- B. Covalent
- C. Polarity

#### XIII. Lewis Structures of molecules

#### XIV. Gases

- A. Pressure
- B. Gas Laws
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  4. Ideal

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- A. Definitions
- B. Strong v. Weak
- C. pH Calculations
  1. Strong acids
  2. Strong bases
- D. Buffers
  1. Definition
  2. Function

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Reading assignments are required and may include, but are not limited to, the following:

- I. Preparatory chemistry textbook(s).
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- III. Internet articles related to topics in chemistry.

#### C. Writing Assignments:

Writing assignments are required and may include, but are not limited to, the following:

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- II. Problem-solving exercises.

#### D. Appropriate Outside Assignments:

Outside assignments may include, but are not limited to, the following:

- I. Problem solving exercises dealing with advanced multi-step unit conversions, stoichiometry problems involving a limiting reagent, gas law problems using the ideal gas equation, and various types of concentration problems.
- II. Short answer homework assignments in which students are asked to describe chemical phenomena.

#### E. Appropriate Assignments that Demonstrate Critical Thinking:

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Problem sets involving algebraic manipulation of variables and appropriate calculations; for example calorimetry or specific heat problems.
- II. Assignments requiring determination of quantitative relationships in chemical formulas, chemical equations, solutions, gases and acids and bases.
- III. Comparison of the physical properties of elements and their relationship to structure using the periodic table.
- IV. Comparison of the similarities and differences among elements, compounds and mixtures, as well as similarities among types of chemical bonds.

IV. Comparison of the similarities and differences among elements, compounds and mixtures, as well as similarities among types of chemical bonds.

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Quizzes and exams.
- II. Midterm and final exams.
- III. Homework assignments.
- IV. Class participation.

## 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Lecture

## 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

### TEXTBOOKS:

1. Cracolice, M & E. Peters. Introduction to General Chemistry: An Active Learning Approach, 6th ed. Cengage Learning, 2015, ISBN: 9781305079250
2. Hein, Morris and Susan Arena. Foundations of College Chemistry, 13th ed. Wiley, 2011, ISBN: 9780470460603
3. Tro, Nivaldo Jose. Introductory Chemistry, 6th ed. Prentice Hall, 2018, ISBN: 9780134302386

### MANUALS:

### PERIODICALS:

### SOFTWARE:

### SUPPLIES:

1. Scientific calculator.

ORIGINATOR: Paula Gustin

CO-CONTRIBUTOR(S)

DATE: 02/25/2019

Status: Active

Date Printed: 12/3/2022

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Quizzes and exams.
- II. Midterm and final exams.
- III. Homework assignments.
- IV. Class participation.

## 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Distance Education (Partially online)
- \* Lecture

## 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

### TEXTBOOKS:

1. Cracolice, M. & E. Peters. Introduction to General Chemistry: An Active Learning Approach, 7th ed. Cengage Learning, 2021, ISBN: 9780357363669
2. Hein, Morris, Susan Arena and Cary Willard. Foundations of College Chemistry, 15th ed. Wiley, 2016, ISBN: 9781119083900
3. Tro, Nivaldo Jose. Introductory Chemistry, 6th ed. Pearson, 2018, ISBN: 9780134302386

### MANUALS:

### PERIODICALS:

### SOFTWARE:

### SUPPLIES:

1. Scientific calculator.

ORIGINATOR: Paula Gustin

ORIGINATION DATE: 02/25/2019

PROPOSAL ORIGINATOR: Paula Gustin

CO-CONTRIBUTOR(S) Donna Budzynski

PROPOSAL DATE: 09/15/2022

Status: Launched

Date Printed: 12/3/2022

# Previous Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. **Subject Area:** Chemistry
- II. **Course Number:** 152
- III. **Course Title:** Introduction to General Chemistry
- IV. **Disciplines (Instructor Minimum Qualifications):** Chemistry
- V.
- VI. **Family:**
- VII. **Current Short Title:** Intro to General Chemistry
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** City
- XII. **Proposal Originating Date:** 02/25/2019
- XIII. **Proposed Start Semester:** Fall 2020
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Intro to principles of inorganic and physical chemistry.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: MATH 096 with a grade of "C" or better, or equivalent. Required for articulation by a UC/CSU institution or Milestone M50  
Corequisite: Completion of or concurrent enrollment in: CHEM 152L with a grade of "C" or better, or equivalent.  
Limitation on Enrollment:: This course is not open to students with previous credit for CHEM 151
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** Yes Taken with CHEM 152L, this course is equivalent to CHEM 151.
- VI. **Additional Information:**
- VII. **Additional Textbook Information:** Textbooks latest editions

### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six Year Review Compliance with AB 705 (Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. IGETC 2. UC Transfer Course List 3. CSU General Education
- IV. **Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Achievement 3. District general education
- V. **Extraordinary Cost to the College:** n/a.

# Current Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. **Subject Area:** Chemistry
- II. **Course Number:** 152
- III. **Course Title:** Introduction to General Chemistry
- IV. **Disciplines (Instructor Minimum Qualifications):** Chemistry
- V.
- VI. **Family:**
- VII. **Current Short Title:** Intro to General Chemistry
- VIII. **Course Is Active/Where?** MESA , MIRAMAR AND CITY
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** City
- XII. **Proposal Originating Date:** 09/15/2022
- XIII. **Proposed Start Semester:** Fall 2024
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Intro to principles of inorganic and physical chemistry.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: MATH 096 with a grade of "C" or better, or equivalent. Required for articulation by a UC/CSU institution or Milestone M50  
Corequisite: Completion of or concurrent enrollment in: CHEM 152L with a grade of "C" or better, or equivalent.  
Advisory: MATH 116 with a grade of "C" or better, or equivalent.  
or Advisory: MATH 104 with a grade of "C" or better, or equivalent.  
or Advisory: MATH 119 with a grade of "C" or better, or equivalent.  
Limitation on Enrollment:: This course is not open to students with previous credit for CHEM 151
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** Yes Taken with CHEM 152L, this course is equivalent to CHEM 151.
- VI. **Additional Information:**
- VII. **Additional Textbook Information:** Textbooks latest editions as of 9-2022.

### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six yr review including: 1) addition of math advisories to improve student success post pandemic and provide better guidance to students. Data available from campus researcher, 2) update DE from Online Course to Partially Online and added Participants to Contact Types, and 3) texts reviewed and updated for currency. (Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. District general education 2. Major Requirement - Associate Degree 3. Major Requirement - Certificate of Achievement
- V. **Extraordinary Cost to the College:** None.

**VI. Library Resource Materials:** No new resources required..  
**GENERAL EDUCATION ANALYSIS**

**CSU General Education:**

B1 Area B. Scientific Inquiry and Quantitative Reasoning - Physical Science

**District General Education:**

B2 Natural Sciences - Physical Sciences

**IGETC:**

Area 5. Physical and Biological Sciences - 5A: Physical Science

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Working knowledge of data collection and analysis.

- |       |                   |   |
|-------|-------------------|---|
| I.    | Course: CHEM 152L | Apply the principles of laboratory safety.  |
| II.   | Course: CHEM 152L | Use standard laboratory equipment, safety equipment and instruments properly.   |
| III.  | Course: CHEM 152L | Record and manipulate measurements using the correct number of significant figures.   |
| IV.   | Course: CHEM 152L | Analyze and critically discuss data.  |
| V.    | Course: CHEM 152L | Write a formal laboratory report.   |
| VI.   | Course: CHEM 152L | Perform standard chemical techniques such as: gravimetric analysis, separation, titration, and solution preparation                     |
| VII.  | Course: CHEM 152L | Determine if a chemical reaction has taken place and predict the reaction products.   |
| VIII. | Course: CHEM 152L | Draw and use graphs to analyze data.  |
| IX.   | Course: CHEM 152L | Perform standard chemical calculations such as: unit conversions, stoichiometry, mole calculations, molarity, and gas law calculations. |
| X.    | Course: CHEM 152L | Use chemical nomenclature   |

Knowledge of algebraic functions

- |      |                  |   |
|------|------------------|---|
| I.   | Course: MATH 096 | Solve systems of linear equations in three variables using a variety of methods, including matrices.                                      |
| II.  | Course: MATH 096 | Simplify and perform basic arithmetic operations on radical expressions in both radical and exponential form and solve radical equations. |
| III. | Course: MATH 096 | Create graphs of nonlinear functions using various methods, including transformations.  |
| IV.  | Course: MATH 096 | Perform basic arithmetic operations with complex numbers.   |
| V.   | Course: MATH 096 | Perform basic algebra with functions, determine whether a function is one-to-one and find the inverse of a one-to-one function.           |
| VI.  | Course: MATH 096 | Use the properties of and relationship between exponential and logarithmic functions to solve a variety of application problems.          |

**SECTION III**

**COURSE DISTANCE EDUCATION INFORMATION**

**I. MESA**

**II. Distance Education Methods of Instruction:** 1. On-line course

**III. Other Distance Education Methods:**

**IV. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms  
Once or twice a week
2. E-mail  
As needed
3. Individual Meetings  
On campus or online as needed
4. Telephone Contact  
As needed

**VI. Library Resource Materials:** No new resources required..

**GENERAL EDUCATION ANALYSIS**

**CSU General Education:**

B1 Area B. Scientific Inquiry and Quantitative Reasoning - Physical Science

**District General Education:**

B2 Natural Sciences - Physical Sciences

**IGETC:**

Area 5. Physical and Biological Sciences - 5A: Physical Science

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Working knowledge of data collection and analysis.

- |       |                  |   |
|-------|------------------|---|
| I.    | Course: MATH 116 | Analyze, graph, and evaluate linear functions related to application problems in business and the natural sciences.   |
| II.   | Course: MATH 119 | Organize qualitative and quantitative data into meaningful charts and graphs.   |
| III.  | Course: MATH 116 | Analyze and interpret the relationship between the properties and graphs of polynomial functions.   |
| IV.   | Course: MATH 116 | Analyze and interpret the graphs of algebraic functions including square root, cube root, absolute value, piece-wise defined functions and rational functions.  |
| V.    | Course: MATH 104 | Analyze and describe the graphs of trigonometric functions and their algebraic representation in terms of their properties including the phase shift, the period, vertical shifts, the amplitude, asymptotes, and the domain and range. |
| VI.   | Course: MATH 104 | Define, evaluate, describe, and graph inverse trigonometric functions including their domains and ranges.   |
| VII.  | Course: MATH 116 | Solve and graph linear inequalities in one and two variables and non-linear inequalities in one variable.   |
| VIII. | Course: MATH 119 | Identify the standard methods of obtaining data and identify advantages and disadvantages of each.  |
| IX.   | Course: MATH 104 | Perform arithmetic operations on complex numbers using both standard and trigonometric form including applications involving De Moivre's Theorem, and interpret those operations geometrically.   |

Knowledge of algebraic functions

- |       |                  |   |
|-------|------------------|---|
| I.    | Course: MATH 116 | Perform algebraic operations on functions and determine function inverses.  |
| II.   | Course: MATH 116 | Determine all the exact zeros of a polynomial by applying root-finding techniques and theorems.   |
| III.  | Course: MATH 116 | Analyze and interpret the graphs of algebraic functions including square root, cube root, absolute value, piece-wise defined functions and rational functions.                                  |
| IV.   | Course: MATH 116 | Solve and graph linear inequalities in one and two variables and non-linear inequalities in one variable.   |
| V.    | Course: MATH 116 | Analyze and apply rigid and non-rigid transformations to algebraic, exponential and logarithmic functions.  |
| VI.   | Course: MATH 104 | Solve trigonometric and inverse trigonometric equations.  |
| VII.  | Course: MATH 116 | Solve equations involving logarithmic and exponential functions, including application problems.  |
| VIII. | Course: MATH 104 | Apply the Pythagorean Theorem, the Law of Sines, and the Law of Cosines to solve right and oblique triangles, and application problems.   |
| IX.   | Course: MATH 116 | Construct systems of equations from application problems and solve them using various techniques.   |
| X.    | Course: MATH 104 | Apply vector algebra to problems involving vector quantities such as force, velocity and displacement.  |
| XI.   | Course: MATH 116 | Use the above skills in various applications such as partial fraction decomposition or linear programming.  |
| XII.  | Course: MATH 104 | Perform arithmetic operations on complex numbers using both standard and trigonometric form including applications involving De Moivre's Theorem, and interpret those operations geometrically. |

5. Threaded Conferencing  
Once or twice a week

- V. **List of Techniques:** Timed On-line quizzes and tests. Class participation through chats and threaded discussions. Problem solving homework assignments are required.
- VI. **How to Evaluate Students for Achieved Outcomes:** Performance on timed-online quizzes and tests. Performance on class participation through threaded discussions. Performance on written and problem solving assignments.
- VII. **Additional Resources/Materials/Information:** Provide text alternatives for any non-text content; Make it easier for users to see and hear content including separating foreground from background; Make text content readable and understandable. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**VIII. Audio Visual Library Materials:** NO

**IX. MIRAMAR**

- X. **Distance Education Methods of Instruction:** 1. On-line course

**XI. Other Distance Education Methods:**

**XII. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms  
Once or twice a week
2. E-mail  
As needed
3. Individual Meetings  
On campus or online as required
4. Telephone Contact  
As needed
5. Threaded Conferencing  
Once or twice a week

- XIII. **List of Techniques:** Timed On-line quizzes and tests. Class participation through chats and threaded discussions. Problem solving homework assignments are required.

- XIV. **How to Evaluate Students for Achieved Outcomes:** Performance on timed-online quizzes and tests. Performance on class participation through threaded discussions. Performance on written and problem solving assignments.

- XV. **Additional Resources/Materials/Information:** Provide text alternatives for any non-text content; Make it easier for users to see and hear content including separating foreground from background; Make text content readable and understandable. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. CITY**

**XVIII. Distance Education Methods of Instruction:** 1. Fully Online

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly
2. Chat Rooms  
as assigned
3. Collaborative Web Documents  
as assigned
4. Conferencing  
as assigned
5. Discussion Board  
at least three times during the term
6. Email/Message System  
as needed
7. Field Trips  
as assigned

- XIII. **Course: MATH 119** Calculate confidence intervals using test statistics to determine the level of significance of the mean, the variance, and the sample proportion.
- XIV. **Course: MATH 119** Formulate hypothesis tests discussing the differences between Type I and Type II errors.
- XV. **Course: MATH 119** Perform hypothesis tests for various random variables including means, one and two-sample proportions, and variance.
- XVI. **Course: MATH 119** Evaluate correlation to determine the corresponding linear regression between two sets of data.
- XVII. **Course: MATH 119** Apply ANOVA analysis of estimation and inference, and interpret corresponding statistics.

**SECTION III**

**COURSE DISTANCE EDUCATION INFORMATION**

**I. MIRAMAR**

- II. **Distance Education Methods of Instruction:** 1. On-line course

**III. Other Distance Education Methods:**

**IV. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms  
Once or twice a week
2. E-mail  
As needed
3. Individual Meetings  
On campus or online as required
4. Telephone Contact  
As needed
5. Threaded Conferencing  
Once or twice a week

- V. **List of Techniques:** Timed On-line quizzes and tests. Class participation through chats and threaded discussions. Problem solving homework assignments are required.
- VI. **How to Evaluate Students for Achieved Outcomes:** Performance on timed-online quizzes and tests. Performance on class participation through threaded discussions. Performance on written and problem solving assignments.
- VII. **Additional Resources/Materials/Information:** Provide text alternatives for any non-text content; Make it easier for users to see and hear content including separating foreground from background; Make text content readable and understandable. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**VIII. Audio Visual Library Materials:** NO

**IX. MESA**

- X. **Distance Education Methods of Instruction:** 1. Partially online only

**XI. Other Distance Education Methods:** When offered online, this course will include scheduled exams in person.

**XII. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
As needed  
**Participant/s:** Faculty to Student/s
2. Announcements  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
3. Announcements  
Once or twice a week  
**Participant/s:** Faculty to Student/s , Among Students
4. Chat Rooms  
Once or twice a week  
**Participant/s:** Faculty to Student/s , Among Students
5. Individual Meetings  
On campus or online as needed
6. Telephone Contact  
As needed  
**Participant/s:** Faculty to Student/s , Among Students

- XIII. **List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication. Timed On-line quizzes and tests. Class participation through chats and threaded discussions. Problem solving homework assignments are required.

- XIV. **How to Evaluate Students for Achieved Outcomes:** Performance on timed-online quizzes and tests. Performance

8. Group Meetings  
as assigned
9. Individual Meetings  
as needed
10. Individualized Assignment Feedback  
as assigned
11. Synchronous or Asynchronous Video  
as assigned
12. Telephone Contact  
as needed

**XXI. List of Techniques:** Students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

#### SECTION IV

**XXIV. Audio Visual Library Materials:** NO

#### COURSE STUDENT LEARNING OUTCOME(S)

##### CITY

- Students will use dimensional analysis to solve problems related to measurement, metric conversions, density and calorimetry and express the answer to the correct number of significant figures and with correct units.

##### MESA

- Use current theories to describe atoms and compounds.
- Describe and/or write structure. Correlate the relationships between structure and properties.
- Understand and use nomenclature systems.
- Write and explain chemical pathways.
- Use and/or understand accepted standards in measuring, and analyzing data with the use of mathematical models and calculations.

##### MIRAMAR

- After completing Chemistry 152, students will be able to demonstrate an understanding of the dimensional analysis method to perform a stoichiometric calculation from a balanced equation to find the number of grams of product formed, with the correct number of significant figures, given the volume and concentration of a reactant.
- After completing Chemistry 152, students will be able to write formulas for ionic compounds, covalent compounds, and acids from names and names of compounds from formulas.
- After completing Chemistry 152, students will be able to write balanced chemical equations from words and predict products of double- and single-replacement, hydrocarbon combustion, and ionic equations.

#### SECTION V

#### COURSE DATA ADMINISTRATION ELEMENTS

##### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1905.00 Chemistry, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):**

**Course Support Course Status (CB26):**

**Major Restriction Code:** NONE

##### **II. Lect Units:** 3.00

**Total Units:** 3

on class participation through threaded discussions. Performance on written and problem solving assignments.

**XV. Additional Resources/Materials/Information:** SDCCD and DSPS personnel will provide all needed accommodations. DSPS will provide a student in an online classroom with the same level of support as an on-campus student. Provide text alternatives for any non-text content; Make it easier for users to see and hear content including separating foreground from background; Make text content readable and understandable. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

#### **XVII. CITY**

**XVIII. Distance Education Methods of Instruction:** 1. Fully Online

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly
2. Chat Rooms  
as assigned
3. Collaborative Web Documents  
as assigned
4. Conferencing  
as assigned
5. Discussion Board  
at least three times during the term
6. Email/Message System  
as needed
7. Field Trips  
as assigned
8. Group Meetings  
as assigned
9. Individual Meetings  
as needed
10. Individualized Assignment Feedback  
as assigned
11. Synchronous or Asynchronous Video  
as assigned
12. Telephone Contact  
as needed

**XXI. List of Techniques:** Students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

#### SECTION IV

#### COURSE STUDENT LEARNING OUTCOME(S)

##### CITY

- Students will use dimensional analysis to solve problems related to measurement, metric conversions, density and calorimetry and express the answer to the correct number of significant figures and with correct units.

##### MESA

- Use current theories to describe atoms and compounds.
- Describe and/or write structure. Correlate the relationships between structure and properties.
- Understand and use nomenclature systems.



Lecture Hours Min: 48.00 Max: 54.00  
Lab Hours Min: 0.00 Max: 0.00  
Other Hours Min: 0.00 Max: 0.00  
Total Contact Hours Min: 48.00 Max: 54.00  
Outside-of-Class Hours Min: 96.00 Max: 108.00  
Total Student Learning Hours Min: 144.00 Max: 162.00  
FTEF Lecture Min: 0.2000 Max:  
FTEF Lab Min: 0.0000 Max:  
FTEF Total Min: 0.2000 Max:

III. Last Time Pre/Co Requisite Update: 02/25/2019

IV. Last Outline Revision Date: 05/09/2019

V. CIC Approval: 05/09/2019

VI. BOT Approval:

VII. State Approval:

VIII. Revised State Approval:

IX. Course Approval Effective Date: Fall 2020

## SECTION VI

### CREDIT FOR PRIOR LEARNING

- Write and explain chemical pathways.
- Use and/or understand accepted standards in measuring, and analyzing data with the use of mathematical models and calculations.

## MIRAMAR

- After completing Chemistry 152, students will be able to demonstrate an understanding of the dimensional analysis method to perform a stoichiometric calculation from a balanced equation to find the number of grams of product formed, with the correct number of significant figures, given the volume and concentration of a reactant.
- After completing Chemistry 152, students will be able to write formulas for ionic compounds, covalent compounds, and acids from names and names of compounds from formulas.
- After completing Chemistry 152, students will be able to write balanced chemical equations from words and predict products of double- and single-replacement, hydrocarbon combustion, and ionic equations.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### I. Codes:

California Classification: (Y Credit Course)

TOP Code: 1905.00 Chemistry, General

SAM Code: E - Non Occupational

Course Prior to College Level (CB21): Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

Funding Agency Category (CB23): Not Applicable (funding not used to develop course)

Course Program Status (CB24): Program-applicable

Course Gen Education Status (CB25): Y = Not applicable

Course Support Course Status (CB26): N = Course is not a support course

Major Restriction Code: NONE

#### II. Lect Units: 3.00

Total Units: 3

Lecture Hours Min: 48.00 Max: 54.00

Lab Hours Min: 0.00 Max: 0.00

Other Hours Min: 0.00 Max: 0.00

Total Contact Hours Min: 48.00 Max: 54.00

Outside-of-Class Hours Min: 96.00 Max: 108.00

Total Student Learning Hours Min: 144.00 Max: 162.00

FTEF Lecture Min: 0.2000 Max:

FTEF Lab Min: 0.0000 Max:

FTEF Total Min: 0.2000 Max:

III. Last Time Pre/Co Requisite Update: 09/15/2022

IV. Last Outline Revision Date: 05/09/2019

V. CIC Approval:

VI. BOT Approval:

VII. State Approval:

VIII. Revised State Approval:

IX. Course Approval Effective Date:

## SECTION VI

### CREDIT FOR PRIOR LEARNING

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Mathematics 151**COURSE TITLE:**

Calculus with Analytic Geometry II

**Units:**

4

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This is the second course in the calculus and analytic geometry sequence. This course covers more advanced topics in analytic geometry, differentiation and integration of algebraic and transcendental functions, infinite series, Taylor series, and parametric equations. This course also covers a general introduction to the theory and applications of power series, techniques of integration, and functions in polar coordinates, as it serves as a basis for multivariable calculus and differential equations, as well as most upper division courses in mathematics and engineering. This course is intended for the transfer student planning to major in mathematics, computer science, physics, chemistry, engineering or economics.

**REQUISITES:****Prerequisite:**

MATH 150 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:****TOTAL LECTURE HOURS:**

64 - 72

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

64 - 72

**OUTSIDE-OF-CLASS HOURS:**

128 - 144

**TOTAL STUDENT LEARNING HOURS:**

192 - 216

**STUDENT LEARNING OBJECTIVES:**



Upon successful completion of the course the student will be able to:

1. Solve first-order separable differential equations and initial value problems.
2. Solve application problems involving first-order separable differential equations, such as exponential growth and decay.
3. Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.
4. Apply integration to physics problems relating to mass, centers of mass, work, and fluid force.
5. Identify, analyze, and evaluate improper integrals.
6. Evaluate the limits of functions which have the indeterminate forms "zero/zero" and "infinity/infinity" using L'Hôpital's Rule.
7. Transform the other indeterminate forms into those which L'Hôpital's Rule can be implemented.
8. Define an infinite sequence; analyze and assess the monotonicity and convergence of a given sequence.
9. Identify some basic series, including the geometric series, harmonic series, and a telescoping sum.
10. Compare the different convergence tests, including the Integral Test, the Ratio Test, the Root Test, the Comparison Test, the Limit Comparison Test, the Alternating Series Test, and the Divergence Test.
11. Assess the convergence of a series by formulating the comparison of the given series to a known series.
12. Assess if an alternating series converges absolutely, converges conditionally, or diverges.
13. Analyze a series, assess which convergence tests can be applied in determining its behavior, and apply this test to show series convergence or divergence.
14. Derive the Taylor series of a given function using a variety of techniques.
15. Calculate the radius of convergence of a given power series.
16. Apply Taylor's Theorem and Taylor polynomials to approximate to a certain degree of accuracy, the values of functions at non-trivial points.
17. Apply the known power series expansions of important functions to generate the series expansion of other functions.
18. Express a given second degree equation in the form of its standard conic equation and sketch the standard conic sections.
19. Analyze a conic section by rotating it to a standard position.
20. Sketch the graphs of functions in polar coordinates, including cardioids, lemniscates, and limaçons.
21. Calculate the areas of polar regions.
22. Calculate the arc length of polar curves, and the surface area bounded by polar curves.
23. Calculate the equation of tangent lines to polar curves.
24. Express a curve with parametric equations.
25. Calculate the tangent lines and arc lengths of parametrized curves.

## **SECTION II**

### **1. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

#### **I. First-Order Separable Differential Equations**

- A. Separation of variables in an equation of the form:  $dy/dx = g(x) h(y)$
- B. Initial value problems
- C. Application problems involving exponential growth and decay

#### **II. Techniques of Integration**

- A. Integration by parts
- B. Trigonometric integrals
- C. Trigonometric substitution
- D. Partial fractions
- E. Miscellaneous substitutions

#### **III. Application of Integration in Physics**

- A. Mass
- B. Centers of mass
- C. Work

- D. Fluid force
- IV. Improper Integrals
  - A. Discontinuous functions at a specific point
  - B. Unbounded intervals
- V. L'Hôpital's Rule
  - A. Indeterminate form of  $0/0$  (zero/zero)
  - B. Indeterminate form of  $\infty/\infty$  (infinity/infinity)
  - C. Other indeterminate forms:
    - 1.  $0 \times \infty$
    - 2.  $0^0$
    - 3.  $\infty^0$
    - 4.  $1^\infty$
    - 5.  $\infty - \infty$
- VI. Sequences and Series
  - A. Infinite sequences
  - B. Monotone sequences
  - C. Series as a sequence of partial sums
  - D. Geometric series
  - E. Harmonic series
  - F. Telescoping sums
  - G. Convergence tests for series with non-negative terms
    - 1. Integral Test
    - 2. Ratio Test
    - 3. Root Test
    - 4. Comparison Test
    - 5. Limit Comparison Test
  - H. Alternating Series Test
    - I. Absolute Convergence and Conditional Convergence
- VII. Taylor Series
  - A. Power series expansions
  - B. Radius and interval of convergence
  - C. Taylor polynomials and Taylor series
  - D. Maclaurin series for standard functions
  - E. Derivatives and integrals of power series and their radii of convergence
- VIII. Conic Sections
  - A. Second degree equations
  - B. Parabola
  - C. Ellipses
  - D. Hyperbola
  - E. Rotation of axes
- IX. Polar Coordinates
  - A. Graphs of functions having the form  $r = f(\theta)$ 
    - 1. Cardioids
    - 2. Lemniscates
    - 3. Limaçons
  - B. Areas of polar regions
  - C. Arc length to polar graphs
  - D. Tangent lines to polar graphs
- X. Parametric Equations
  - A. Parametrization of curves
  - B. Tangent lines to parametrized curves
  - C. Arc length of parametrized curves

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned readings from various textbooks
- II. Assigned readings from periodicals, journals, or magazines
- III. Calculus related topics found on the internet

### **C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Solutions to problems using proper mathematical terminology involving but not limited to the calculation of limits, derivatives, and integrals of algebraic and transcendental functions
- II. Assessments of convergence or divergences of sequences and series
- III. Computations of power series expansions and their radii of convergence
- IV. Analyses of parametric curves and computations of area and arc length of functions written in polar form
- V. Journal entries with a focus on mathematical calculations, problem solving techniques, and applied problems
- VI. Reports analyzing some topic or person appropriate to mathematics
- VII. Formal proofs for mathematical statements related to the material covered in class

### **D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of single variable calculus. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Derive, MathCad, MPP, or Mathematica are strongly encouraged.

- I. Reading and writing assignments as specified in the course syllabus
- II. Reading and reviewing lecture notes
- III. Library, electronic and other archival research
- IV. Viewing of assigned/recommended media materials
- V. Observations, e.g. field trips to attend pertinent lectures/conferences
- VI. An analytical semester project
- VII. Developing problem solving techniques and analytical skills by solving problems from various texts, such as the Calculus Problem Solver
- VIII. Reviewing current periodicals such as Mathematics Magazine, or Math Horizons
- IX. Preparing collaborative projects focusing on expanding mathematical concepts presented in class.

### **E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- II. Analyzing and solving problems that are broader in scope than those present in class, or those introduced in the text
- III. Applying various mathematical concepts in interpreting applications and in solving applied problems
- IV. Investigating a greater variety of problems including applications of principles in a number of different contexts
- V. Reviewing current periodicals
- VI. Developing proofs for mathematical statement

## **2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Take home essay examinations
- II. Analytical semester projects
- III. Written reports on related subjects
- IV. Exploratory activities involving a graphing calculator or computer class participation, including:
  - A. Participation in classroom discussion
  - B. Participation in collaborative assignments

- C. Oral presentations on a variety of calculus subjects
- D. Group projects
- E. Field trips
- F. Classroom experiments and simulations
- V. Supplementary activities, including:
  - A. Library and on-line Internet research
  - B. Reviewing current periodicals

### 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Guest speakers
- \* Field observations and field trips

### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

#### TEXTBOOKS:

1. Anton. Calculus Early Transcendentals, 11th ed. Wiley, 2020, ISBN: 9781119503651
2. Larson, Ron and Bruce Edwards. Calculus, 11th ed. Cengage Learning, 2017, ISBN: 9781337275347
3. Spivak. Calculus, 4th ed. Publish or Perish, 2008, ISBN: 9780914098911
4. Stewart, et al. Calculus, 9th ed. Cengage Learning, 2020, ISBN: 9781137624183
5. Swokowski. Calculus: The Classic Edition, 5th ed. Brooks Cole, 2000, ISBN: 9780534435387
6. Tan, Soo Tang. Calculus, 1st ed. Cengage, 2010, ISBN: 9780534465797
7. Thomas, et al. Thomas' Calculus, 13th ed. Pearson, 2014, ISBN: 9780321878960

#### MANUALS:

#### PERIODICALS:

1. *Mathematics Magazine*,
2. *Math Horizons*,

#### SOFTWARE:

#### SUPPLIES:

1. Materials typically used in the course may include, but are not limited to the following: 1. graphing calculator, 2. graph paper, 3. diskettes, 4. journal.

**ORIGINATOR:** Toni Parsons

**ORIGINATION DATE:** 03/16/2016

**PROPOSAL ORIGINATOR:** Juan U. Bernal

**CO-CONTRIBUTOR(S)**

**PROPOSAL DATE:** 10/03/2022

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
COURSE PROPOSAL IMPACT REPORT**

**COURSE TO BE PROPOSED: MATH 151**  
Calculus with Analytic Geometry II

**ACTIVE/APPROVED COURSES IMPACTED:**

MATH 151 Calculus with Analytic Geometry II (29369)

Prerequisite

ENGE 260 (Active)  
MATH 245 (Active)  
MATH 252 (Active)  
MATH 254 (Active)  
PHYS 196 (Active)

Corequisite: Completion of or concurrent enrollment in

ENGE 116 (Active)  
ENGE 116 (Approved)  
ENGE 200 (Active)

Advisory: Completion of or concurrent enrollment in  
PHYS 195 (Active)

**DISTRICT GENERAL EDUCATION:**

A2 Language and Rationality - Communication & Analytical Thinking

**ACTIVE/APPROVED/PROPOSED PROGRAMS IMPACTED:**

( City )

Applied Mathematics \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( Mesa )

Applied Mathematics \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( City )

Applied Mathematics \*Approved\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( City )

Astronomy \*Active\*;  
**Associate of Science Degree**

Courses Required for the Major:

( Mesa )

Biochemistry \*Pending\*;

## **Associate of Science Degree**

Select 9 units from the following

( **Mesa** )

Biology \*Active\*;

**Associate in Science for Transfer Degree**

SELECT 3-5 UNITS FROM THE FOLLOWING:

( **Mesa** )

Biology \*Pending\*;

**Associate in Science for Transfer Degree**

SELECT 3-5 UNITS FROM THE FOLLOWING:

( **City** )

Biology \*Active\*;

**Associate in Science for Transfer Degree**

Select 3-5 units from the following:

( **Miramar** )

Biology Studies \*Active\*;

**Associate of Science Degree**

Select 5 to 10 or more units from the following:

( **Miramar** )

Biology Studies \*Pending\*;

**Associate of Science Degree**

Select 5 to 10 or more units from the following:

( **Miramar** )

Chemistry \*Approved\*;

**Associate in Science for Transfer Degree**

Major Courses

( **Mesa** )

Chemistry \*Approved\*;

**Associate in Science for Transfer Degree**

Major Courses

( **City** )

Chemistry \*Approved\*;

**Associate in Science for Transfer Degree**

Major Courses

( **Mesa** )

Chemistry \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( City )

Chemistry \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( Mesa )

Chemistry \*Active\*;

**Certificate of Achievement**

Plus fifteen units selected from the following:

( Miramar )

Chemistry Studies \*Active\*;

**Associate of Science Degree**

Select at least eight units from the following:

( Miramar )

Computer Science \*Active\*;

**Associate in Science for Transfer Degree**

Major Courses

( Mesa )

Computer Science \*Active\*;

**Associate in Science for Transfer Degree**

Major Courses

( Mesa )

Computer Science \*Pending\*;

**Associate in Science for Transfer Degree**

Major Courses

( Miramar )

Earth Science Studies \*Active\*;

**Associate of Science Degree**

Select at least three (3) units from the following mathematics courses:

( Miramar )

Earth Science Studies \*Pending\*;

**Associate of Science Degree**

Select at least three (3) units from the following mathematics courses:

( Mesa )

Economics \*Active\*;

**Associate in Arts for Transfer Degree**

Major Courses

( **Miramar** )

Economics \*Active\*;

**Associate in Arts for Transfer Degree**

Select at least 3 units from the following courses (not already selected above):

( **Miramar** )

Economics \*Active\*;

**Associate in Arts for Transfer Degree**

Select one of the following courses (3-5 units) not already selected above:

( **City** )

Economics \*Active\*;

**Associate in Arts for Transfer Degree**

Select one of the following courses (3-5 units):

( **City** )

Economics \*Active\*;

**Associate in Arts for Transfer Degree**

Select one of the following courses not already selected above (3-4 units):

( **Miramar** )

Economics \*Approved\*;

**Associate in Arts for Transfer Degree**

Select two of the following courses:

( **Miramar** )

Economics \*Launched\*;

**Associate in Arts for Transfer Degree**

Select two of the following courses:

( **City** )

Engineering \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( **City** )

Engineering \*Approved\*;

**Associate of Science Degree**

Courses Required for the Major:

( **Mesa** )

Engineering \*Active\*;

**Associate of Science Degree**

Select 24 units from the following:

( **Mesa** )

Engineering \*Pending\*;



## **Associate of Science Degree**

Select 24 units from the following:

( **Mesa** )

Engineering \*Active\*;

### **Certificate of Achievement**

Select 24 units from the following:

( **Mesa** )

Engineering \*Pending\*;

### **Certificate of Achievement**

Select 24 units from the following:

( **Mesa** )

Geology \*Active\*;

### **Associate in Science for Transfer Degree**

Major Courses

( **City** )

Geology \*Active\*;

### **Associate in Science for Transfer Degree**

Major Courses

( **Miramar** )

Geology \*Active\*;

### **Associate in Science for Transfer Degree**

Major Courses

( **City** )

Geology \*Active\*;

### **Associate of Science Degree**

Recommended Electives:

( **City** )

Liberal Arts and Sciences in Scientific Studies Physical and Earth Sciences Specialization \*Approved\*;

### **Associate of Arts Degree**

Major Courses

( **Mesa** )

Liberal Arts and Sciences: Social and Behavioral Sciences-Economics \*Active\*;

### **Associate of Arts Degree**

Select a minimum of 12 units:

( **Mesa** )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Computer Science \*Active\*;

### **Associate of Arts Degree**

## Major Courses

( **Mesa** )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Engineering \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 3 units:

( **Mesa** )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Mathematics \*Active\*;  
**Associate of Arts Degree**

## Major Courses

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Biological Science \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 10 units:

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Chemistry \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 8 units:

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Physics \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 3 units:

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Psychology \*Active\*;  
**Associate of Arts Degree**

## Major Courses

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Psychology \*Pending\*;  
**Associate of Arts Degree**

## Major Courses

( **City** )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Active\*;  
**Associate of Arts Degree**

## Major Courses

( **City** )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Launched\*;  
**Associate of Arts Degree**

## Major Courses

( City )

Liberal Arts and Sciences: Scientific Studies Physical and Earth Sciences Specialization \*Approved\*;  
**Associate of Arts Degree**

Major Courses

( City )

Liberal Arts and Sciences: Scientific Studies Physical and Earth Sciences Specialization \*Pending\*;  
**Associate of Arts Degree**

Major Courses

( City )

Liberal Arts and Sciences: Scientific Studies in Biological Science \*Active\*;  
**Associate of Arts Degree**

Major Courses

( Mesa )

Liberal Arts and Sciences: Social and Behavioral Sciences-Human Development \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 3-4 units to complete 18 units from:

( City )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( Mesa )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( Miramar )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( Mesa )

Mathematics \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( City )

Mathematics \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( City )

Mathematics \*Approved\*;

## **Associate of Arts Degree**

Courses Required for the Major:

( **Miramar** )

Mathematics Studies \*Active\*;  
**Associate of Arts Degree**

Major Courses

( **Mesa** )

Nutrition and Dietetics \*Active\*;  
**Associate in Science for Transfer Degree**

CATEGORY B: SELECT A MINIMUM OF ONE COURSE FROM THE  
FOLLOWING OR ANY COURSE NOT SELECTED IN CATEGORY A (3-5 units)

( **Mesa** )

Physical Sciences \*Active\*;  
**Associate of Science Degree**

At least 8 units from the following:

( **Mesa** )

Physical Sciences \*Pending\*;  
**Associate of Science Degree**

At least 8 units from the following:

( **Mesa** )

Physical Sciences \*Active\*;  
**Certificate of Achievement**

At least 8 units selected from the following:

( **Mesa** )

Physical Sciences \*Pending\*;  
**Certificate of Achievement**

At least 8 units selected from the following:

( **City** )

Physics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( **Mesa** )

Physics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( **Miramar** )

Physics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( **Mesa** )

Physics \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( **City** )

Physics \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( **Mesa** )

Physics \*Active\*;

**Certificate of Achievement**

Courses Required for the Major:

( **Miramar** )

Pre-Engineering Studies \*Active\*;

**Associate of Science Degree**

Major Courses

( **Miramar** )

Psychology \*Active\*;

**Associate in Arts for Transfer Degree**

Select at least 3 units from the following courses (not already selected above):

( **Mesa** )

Psychology \*Active\*;

**Associate in Arts for Transfer Degree**

Select one course from the following (not selected above):

( **Mesa** )

Psychology \*Active\*;

**Associate in Arts for Transfer Degree**

Select one of the following courses (not selected above):

# SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

## Course Outline of Record: Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Mathematics
- II. **Course Number:** 151
- III. **Course Title:** Calculus with Analytic Geometry II
- IV. **Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.
- VI. **Family:**
- VII. **Current Short Title:** Calculus/Analytic Geometry II
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** City , Mesa and Miramar
- XII. **Proposal Originating Date:** 10/03/2022
- XIII. **Proposed Start Semester:** Spring 2024
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Continuation of Mathematics 150 covering more advanced topics.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: MATH 150 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:** Texts are most current editions - 10/2022.

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six yr review including: 1) update to contact types in DE, and 2) review & update of texts. (Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?**
- III. **Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. District general education
- V. **Extraordinary Cost to the College:** N/A.
- VI. **Library Resource Materials:** Book selected by committee will be available at the library, including student solution manual when available..

#### GENERAL EDUCATION ANALYSIS

##### **CSU General Education:**

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

##### **District General Education:**

A2 Language and Rationality - Communication & Analytical Thinking

##### **IGETC:**

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

**Knowledge of limits of functions, construction and analysis of derivatives, and knowledge of indefinite and definite integrals.**

- I. Course: MATH 150** Evaluate various types of limits graphically, numerically, and algebraically, and analyze properties of functions applying limits including one-sided, two-sided, finite and infinite limits.
- II. Course: MATH 150** Recognize and evaluate the "limit" using the common limit theorems and properties.
- III. Course: MATH 150** Analyze the behavior of algebraic and transcendental functions by applying common continuity theorems, and investigate the continuity of such functions at a point, on an open or closed interval.
- IV. Course: MATH 150** Calculate the derivative of a function using the limit definition.
- V. Course: MATH 150** Calculate the slope and the equation of the tangent line of a function at a given point.
- VI. Course: MATH 150** Calculate derivatives using common differentiation theorems.
- VII. Course: MATH 150** Calculate the derivative of a function implicitly.
- VIII. Course: MATH 150** Apply derivatives to graph functions by calculating the critical points, the points of non-differentiability, the points of inflections, the vertical tangents, cusps or corners, and the extrema of a function.
- IX. Course: MATH 150** Calculate where a function is increasing, or decreasing, concave up or concave down by applying its first and second derivatives respectively, and apply the First and Second Derivative Tests to calculate and identify the function's relative extrema.
- X. Course: MATH 150** Apply Newton's method to find roots of functions.
- XI. Course: MATH 150** Calculate the anti-derivative of a wide class of functions, using substitution techniques when appropriate.
- XII. Course: MATH 150** Calculate the definite integral using the limit of a Riemann Sum and the Fundamental Theorem of Calculus. Apply the Fundamental Theorem of Calculus to investigate a broad class of functions.
- XIII. Course: MATH 150** Estimate the value of a definite integral using standard numerical integration techniques which may include the Left-Endpoint Rule, the Right-Endpoint Rule, the Midpoint Rule, the Trapezoidal Rule and Simpson's Rule.
- XIV. Course: MATH 150** Calculate derivatives of inverse trigonometric functions, and hyperbolic functions.
- XV. Course: MATH 150** Calculate integrals of hyperbolic functions and of functions whose anti-derivatives give inverse trigonometric functions.

**SECTION III**

**COURSE DISTANCE EDUCATION INFORMATION**

- I. CITY**
- II. Distance Education Methods of Instruction:** 1. Fully Online 2. Hybrid only 3. Partially online only
- III. Other Distance Education Methods:**
- IV. Type and frequency of contact may include, but is not limited to:**
  - 1. Announcements  
weekly
  - 2. Collaborative Web Documents  
as assigned
  - 3. Conferencing  
as assigned
  - 4. Discussion Board  
at least three times during the term
  - 5. Email/Message System  
as needed

- 6. Field Trips
  - as assigned
- 7. Group Meetings
  - as assigned
- 8. Individual Meetings
  - as needed
- 9. Individualized Assignment Feedback
  - as assigned
- 10. Synchronous or Asynchronous Video
  - as assigned
- 11. Telephone Contact
  - as needed
- V. **List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.
- VI. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- VII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. **Audio Visual Library Materials:** NO
- IX. **MESA**
- X. **Distance Education Methods of Instruction:** 1. Fully Online
- XI. **Other Distance Education Methods:**
- XII. **Type and frequency of contact may include, but is not limited to:**
  - 1. Announcements
    - as needed
    - Participant/s:** Faculty to Student/s
  - 2. Discussion Board
    - and/or Synchronous or Asynchronous Video - weekly
    - Participant/s:** Faculty to Student/s , Among Students
  - 3. Group Meetings
    - as appropriate
    - Participant/s:** Faculty to Student/s , Among Students
  - 4. Individual Meetings
    - as appropriate
    - Participant/s:** Faculty to Student/s
  - 5. Synchronous or Asynchronous Video
    - frequent
    - Participant/s:** Faculty to Student/s , Among Students
- XIII. **List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication. Telephone calls between students and the instructor may be used to discuss questions and concerns throughout the course. E-mail may be used for asynchronous instructor-to-student and student-to-student communication. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate for synchronous interaction between students and between the instructor and students. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Assignments and tests that will be used in the Distance Education course will be exactly the same as those in the traditional course. Students will submit all course work (tests and assignments) electronically to the instructor for grading.



- XIV. **How to Evaluate Students for Achieved Outcomes:** The evaluation methods will mirror the on-campus course as specified in the course outline. The feedback on assignments and tests will be submitted electronically to the student.
- XV. **Additional Resources/Materials/Information:** SDCCD and DSPS personnel will provide all needed accommodations. DSPS will provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XVI. **Audio Visual Library Materials:** NO
- XVII. **MIRAMAR**
- XVIII. **Distance Education Methods of Instruction:** 1. Other 2. On-line course 3. Point-to-point telecourse
- XIX. **Other Distance Education Methods:** Mixed Media
- XX. **Type and frequency of contact may include, but is not limited to:**
1. E-mail
  2. Group Meetings
  3. Individual Meetings
  4. Review Sessions
- XXI. **List of Techniques:**
- XXII. **How to Evaluate Students for Achieved Outcomes:**
- XXIII. **Additional Resources/Materials/Information:** Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XXIV. **Audio Visual Library Materials:** NO

## **SECTION IV**

### **COURSE STUDENT LEARNING OUTCOME(S)**

#### **CITY**

- Students will successfully apply computation techniques to a variety of application problems.
- Students will successfully perform computations with integration techniques, differential equations, and infinite sequences and series.

#### **MESA**

- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations
- Students will show the relationship between a function and its infinite series.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Students will use appropriate methods to calculate integrals.
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

#### **MIRAMAR**

- 1. Solve applications problems involving integration and utilize integration techniques including integration by substitution, parts, partial fractions, trigonometric, tables, and computer algebra systems, and apply these techniques to the evaluation of improper integrals and the determination of their convergence or divergence properties.
- 2. Analyze and solve single linear ordinary differential equations problems involving separation of variables and solve modeling problems involving these differential equations.
- 3. Identify and analyze infinite sequences of real numbers and series including the geometric series, harmonic series, and telescoping sums, and determine their convergence or divergence properties using different convergence tests, including the Integral Test, the Ratio Test, the Root Test, the Comparison Test, the Limit Comparison Test, the Alternating Series Test, and the Test for Divergence.
- Determine the radius of convergence of a power series and identify the Taylor series of a given function and use it in consultation with Taylor's Theorem to approximate values of functions.

## **SECTION V**

### **COURSE DATA ADMINISTRATION ELEMENTS**

#### **I. Codes:**

**California Classification:** (A Liberal Arts and Sciences)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units: 4.00**

**Total Units:** 4

**Lecture Hours Min:** 64.00 **Max:** 72.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 64.00 **Max:** 72.00

**Outside-of-Class Hours Min:** 128.00 **Max:** 144.00

**Total Student Learning Hours Min:** 192.00 **Max:** 216.00

**FTEF Lecture Min:** 0.2667 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2667 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 10/03/2022

#### **IV. Last Outline Revision Date:** 04/14/2016

#### **V. CIC Approval:**

#### **VI. BOT Approval:**

#### **VII. State Approval:**

#### **VIII. Revised State Approval:**

#### **IX. Course Approval Effective Date:**

## **SECTION VI**

### **CREDIT FOR PRIOR LEARNING**

**Previous Report**

CIC Approval: 04/14/2016  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM: Fall 2016

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I**

**SUBJECT AREA AND COURSE NUMBER:** Mathematics 151

**COURSE TITLE:**

Calculus with Analytic Geometry II

**Units:**

4

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This is the second course in the calculus and analytic geometry sequence. This course covers more advanced topics in analytic geometry, differentiation and integration of algebraic and transcendental functions, infinite series, Taylor series, and parametric equations. This course also covers a general introduction to the theory and applications of power series, techniques of integration, and functions in polar coordinates, as it serves as a basis for multivariable calculus and differential equations, as well as most upper division courses in mathematics and engineering. This course is intended for the transfer student planning to major in mathematics, computer science, physics, chemistry, engineering or economics.

**REQUISITES:**

**Prerequisite:**

MATH 150 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit & transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:**

**TOTAL LECTURE HOURS:**

64 - 72

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**

64 - 72

**OUTSIDE-OF-CLASS HOURS:**

128 - 144

**TOTAL STUDENT LEARNING HOURS:**

192 - 216

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Solve first-order separable differential equations and initial value problems.
2. Solve application problems involving first-order separable differential equations, such as exponential growth and decay.
3. Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.
4. Apply integration to physics problems relating to mass, centers of mass, work, and fluid force.

**Current Report**

CIC Approval:  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM:

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

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May be required

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3. Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.
4. Apply integration to physics problems relating to mass, centers of mass, work, and fluid force.
5. Identify, analyze, and evaluate improper integrals.
6. Evaluate the limits of functions which have the indeterminate forms "zero/zero" and "infinity/infinity" using L'Hôpital's Rule.

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6. Evaluate the limits of functions which have the indeterminate forms "zero/zero" and "infinity/infinity" using L'Hôpital's Rule.
7. Transform the other indeterminate forms into those which L'Hôpital's Rule can be implemented.
8. Define an infinite sequence; analyze and assess the monotonicity and convergence of a given sequence.
9. Identify some basic series, including the geometric series, harmonic series, and a telescoping sum.
10. Compare the different convergence tests, including the Integral Test, the Ratio Test, the Root Test, the Comparison Test, the Limit Comparison Test, the Alternating Series Test, and the Divergence Test.
11. Assess the convergence of a series by formulating the comparison of the given series to a known series.
12. Assess if an alternating series converges absolutely, converges conditionally, or diverges.
13. Analyze a series, assess which convergence tests can be applied in determining its behavior, and apply this test to show series convergence or divergence.
14. Derive the Taylor series of a given function using a variety of techniques.
15. Calculate the radius of convergence of a given power series.
16. Apply Taylor's Theorem and Taylor polynomials to approximate to a certain degree of accuracy, the values of functions at non-trivial points.
17. Apply the known power series expansions of important functions to generate the series expansion of other functions.
18. Express a given second degree equation in the form of its standard conic equation and sketch the standard conic sections.
19. Analyze a conic section by rotating it to a standard position.
20. Sketch the graphs of functions in polar coordinates, including cardioids, lemniscates, and limaçons.
21. Calculate the areas of polar regions.
22. Calculate the arc length of polar curves, and the surface area bounded by polar curves.
23. Calculate the equation of tangent lines to polar curves.
24. Express a curve with parametric equations.
25. Calculate the tangent lines and arc lengths of parametrized curves.

## SECTION II

### I. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. First-Order Separable Differential Equations
  - A. Separation of variables in an equation of the form:  $dy/dx = g(x) h(y)$
  - B. Initial value problems
  - C. Application problems involving exponential growth and decay
- II. Techniques of Integration
  - A. Integration by parts
  - B. Trigonometric integrals
  - C. Trigonometric substitution
  - D. Partial fractions
  - E. Miscellaneous substitutions
- III. Application of Integration in Physics
  - A. Mass
  - B. Centers of mass
  - C. Work
  - D. Fluid force
- IV. Improper Integrals
  - A. Discontinuous functions at a specific point
  - B. Unbounded intervals
- V. L'Hôpital's Rule
  - A. Indeterminate form of  $0/0$  (zero/zero)
  - B. Indeterminate form of  $\infty/\infty$  (infinity/infinity)
  - C. Other indeterminate forms:
    1.  $0 \times \infty$
    2.  $0^0$
    3.  $\infty^0$
    4.  $1^\infty$
    5.  $\infty - \infty$
- VI. Sequences and Series
  - A. Infinite sequences
  - B. Monotone sequences
  - C. Series as a sequence of partial sums
  - D. Geometric series
  - E. Harmonic series
  - F. Telescoping sums
  - G. Convergence tests for series with non-negative terms

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7. Transform the other indeterminate forms into those which L'Hôpital's Rule can be implemented.
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21. Calculate the areas of polar regions.
22. Calculate the arc length of polar curves, and the surface area bounded by polar curves.
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  - A. Integration by parts
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- III. Application of Integration in Physics
  - A. Mass
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  - A. Discontinuous functions at a specific point
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- V. L'Hôpital's Rule
  - A. Indeterminate form of  $0/0$  (zero/zero)
  - B. Indeterminate form of  $\infty/\infty$  (infinity/infinity)
  - C. Other indeterminate forms:
    1.  $0 \times \infty$
    2.  $0^0$
    3.  $\infty^0$
    4.  $1^\infty$
    5.  $\infty - \infty$
- VI. Sequences and Series
  - A. Infinite sequences
  - B. Monotone sequences
  - C. Series as a sequence of partial sums
  - D. Geometric series
  - E. Harmonic series
  - F. Telescoping sums
  - G. Convergence tests for series with non-negative terms
    1. Integral Test
    2. Ratio Test

1. Integral Test
2. Ratio Test
3. Root Test
4. Comparison Test
5. Limit Comparison Test
- H. Alternating Series Test
- I. Absolute Convergence and Conditional Convergence
- VII. Taylor Series
  - A. Power series expansions
  - B. Radius and interval of convergence
  - C. Taylor polynomials and Taylor series
  - D. Maclaurin series for standard functions
  - E. Derivatives and integrals of power series and their radii of convergence
- VIII. Conic Sections
  - A. Second degree equations
  - B. Parabola
  - C. Ellipses
  - D. Hyperbola
  - E. Rotation of axes
- IX. Polar Coordinates
  - A. Graphs of functions having the form  $r = f(\theta)$ 
    1. Cardioids
    2. Lemniscates
    3. Limaçons
  - B. Areas of polar regions
  - C. Arc length to polar graphs
  - D. Tangent lines to polar graphs
- X. Parametric Equations
  - A. Parametrization of curves
  - B. Tangent lines to parametrized curves
  - C. Arc length of parametrized curves

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned readings from various textbooks
- II. Assigned readings from periodicals, journals, or magazines
- III. Calculus related topics found on the internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Solutions to problems using proper mathematical terminology involving but not limited to the calculation of limits, derivatives, and integrals of algebraic and transcendental functions
- II. Assessments of convergence or divergences of sequences and series
- III. Computations of power series expansions and their radii of convergence
- IV. Analyses of parametric curves and computations of area and arc length of functions written in polar form
- V. Journal entries with a focus on mathematical calculations, problem solving techniques, and applied problems
- VI. Reports analyzing some topic or person appropriate to mathematics
- VII. Formal proofs for mathematical statements related to the material covered in class

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of single variable calculus. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Derive, MathCad, MPP, or Mathematica are strongly encouraged.

- I. Reading and writing assignments as specified in the course syllabus
- II. Reading and reviewing lecture notes
- III. Library, electronic and other archival research
- IV. Viewing of assigned/recommended media materials
- V. Observations, e.g. field trips to attend pertinent lectures/conferences
- VI. An analytical semester project
- VII. Developing problem solving techniques and analytical skills by solving problems from various texts, such as the Calculus Problem Solver
- VIII. Reviewing current periodicals such as Mathematics Magazine, or Math Horizons
- IX. Preparing collaborative projects focusing on expanding mathematical concepts presented in class.

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

3. Root Test
4. Comparison Test
5. Limit Comparison Test
- H. Alternating Series Test
- I. Absolute Convergence and Conditional Convergence
- VII. Taylor Series
  - A. Power series expansions
  - B. Radius and interval of convergence
  - C. Taylor polynomials and Taylor series
  - D. Maclaurin series for standard functions
  - E. Derivatives and integrals of power series and their radii of convergence
- VIII. Conic Sections
  - A. Second degree equations
  - B. Parabola
  - C. Ellipses
  - D. Hyperbola
  - E. Rotation of axes
- IX. Polar Coordinates
  - A. Graphs of functions having the form  $r = f(\theta)$ 
    1. Cardioids
    2. Lemniscates
    3. Limaçons
  - B. Areas of polar regions
  - C. Arc length to polar graphs
  - D. Tangent lines to polar graphs
- X. Parametric Equations
  - A. Parametrization of curves
  - B. Tangent lines to parametrized curves
  - C. Arc length of parametrized curves

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned readings from various textbooks
- II. Assigned readings from periodicals, journals, or magazines
- III. Calculus related topics found on the internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Solutions to problems using proper mathematical terminology involving but not limited to the calculation of limits, derivatives, and integrals of algebraic and transcendental functions
- II. Assessments of convergence or divergences of sequences and series
- III. Computations of power series expansions and their radii of convergence
- IV. Analyses of parametric curves and computations of area and arc length of functions written in polar form
- V. Journal entries with a focus on mathematical calculations, problem solving techniques, and applied problems
- VI. Reports analyzing some topic or person appropriate to mathematics
- VII. Formal proofs for mathematical statements related to the material covered in class

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of single variable calculus. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Derive, MathCad, MPP, or Mathematica are strongly encouraged.

- I. Reading and writing assignments as specified in the course syllabus
- II. Reading and reviewing lecture notes
- III. Library, electronic and other archival research
- IV. Viewing of assigned/recommended media materials
- V. Observations, e.g. field trips to attend pertinent lectures/conferences
- VI. An analytical semester project
- VII. Developing problem solving techniques and analytical skills by solving problems from various texts, such as the Calculus Problem Solver
- VIII. Reviewing current periodicals such as Mathematics Magazine, or Math Horizons
- IX. Preparing collaborative projects focusing on expanding mathematical concepts presented in class.

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques

- I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- II. Analyzing and solving problems that are broader in scope than those present in class, or those introduced in the text
- III. Applying various mathematical concepts in interpreting applications and in solving applied problems
- IV. Investigating a greater variety of problems including applications of principles in a number of different contexts
- V. Reviewing current periodicals
- VI. Developing proofs for mathematical statement

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Take home essay examinations
- II. Analytical semester projects
- III. Written reports on related subjects
- IV. Exploratory activities involving a graphing calculator or computer class participation, including:
  - A. Participation in classroom discussion
  - B. Participation in collaborative assignments
  - C. Oral presentations on a variety of calculus subjects
  - D. Group projects
  - E. Field trips
  - F. Classroom experiments and simulations
- V. Supplementary activities, including:
  - A. Library and on-line Internet research
  - B. Reviewing current periodicals

## 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Guest speakers
- \* Field observations and field trips

## 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

### TEXTBOOKS:

1. Anton. Calculus Early Transcendentals, 10th ed. Wiley, 2012, ISBN: 9780470647691
2. Larson, Ron; Edwards, Bruce. Calculus, 10th ed. Brooks Cole, 2013, ISBN: 9781285057095
3. Spivak. Calculus, 4th ed. Publish or Perish, 2008, ISBN: 9780914098911
4. Stewart. Calculus, 8th ed. Cengage, 2015, ISBN: 9781285740621
5. Swokowski. Calculus: The Classic Edition, 5th ed. Brooks Cole, 2000, ISBN: 9780534435387
6. Tan, Soo Tang. Calculus, 1st ed. Cengage, 2010, ISBN: 9780534465797
7. Thomas & Finney. Calculus, 13th ed. Pearson, 2014, ISBN: 9780321878960

### MANUALS:

### PERIODICALS:

1. *Mathematics Magazine*,
2. *Math Horizons*,

### SOFTWARE:

### SUPPLIES:

1. Materials typically used in the course may include, but are not limited to the following: 1. graphing calculator, 2. graph paper, 3. diskettes, 4. journal.

- II. Analyzing and solving problems that are broader in scope than those present in class, or those introduced in the text
- III. Applying various mathematical concepts in interpreting applications and in solving applied problems
- IV. Investigating a greater variety of problems including applications of principles in a number of different contexts
- V. Reviewing current periodicals
- VI. Developing proofs for mathematical statement

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Take home essay examinations
- II. Analytical semester projects
- III. Written reports on related subjects
- IV. Exploratory activities involving a graphing calculator or computer class participation, including:
  - A. Participation in classroom discussion
  - B. Participation in collaborative assignments
  - C. Oral presentations on a variety of calculus subjects
  - D. Group projects
  - E. Field trips
  - F. Classroom experiments and simulations
- V. Supplementary activities, including:
  - A. Library and on-line Internet research
  - B. Reviewing current periodicals

## 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Guest speakers
- \* Field observations and field trips

## 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

### TEXTBOOKS:

1. Anton. Calculus Early Transcendentals, 11th ed. Wiley, 2020, ISBN: 9781119503651
2. Larson, Ron and Bruce Edwards. Calculus, 11th ed. Cengage Learning, 2017, ISBN: 9781337275347
3. Spivak. Calculus, 4th ed. Publish or Perish, 2008, ISBN: 9780914098911
4. Stewart, et al. Calculus, 9th ed. Cengage Learning, 2020, ISBN: 9781137624183
5. Swokowski. Calculus: The Classic Edition, 5th ed. Brooks Cole, 2000, ISBN: 9780534435387
6. Tan, Soo Tang. Calculus, 1st ed. Cengage, 2010, ISBN: 9780534465797
7. Thomas, et al. Thomas' Calculus, 13th ed. Pearson, 2014, ISBN: 9780321878960

### MANUALS:

### PERIODICALS:

1. *Mathematics Magazine*,
2. *Math Horizons*,

### SOFTWARE:

### SUPPLIES:

1. Materials typically used in the course may include, but are not limited to the following: 1. graphing calculator, 2. graph paper, 3. diskettes, 4. journal.

ORIGINATOR: Toni Parsons

ORIGINATION DATE: 03/16/2016

ORIGINATOR: Toni Parsons

CO-CONTRIBUTOR(S)  
DATE: 03/16/2016

Status: Active

Date Printed: 12/3/2022

PROPOSAL ORIGINATOR: Juan U. Bernal  
CO-CONTRIBUTOR(S)  
PROPOSAL DATE: 10/03/2022

Status: Launched

Date Printed: 12/3/2022

# Previous Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 151
- III. Course Title:** Calculus with Analytic Geometry II
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Calculus/Analytic Geometry II
- VIII. Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. Originating Campus:** MESA
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** City , Mesa and Miramar
- XII. Proposal Originating Date:** 03/16/2016
- XIII. Proposed Start Semester:** Fall 2016
- XIV. Field Trip:** May be required
- XV. Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. Current Short Description:** Continuation of Mathematics 150 covering more advanced topics.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 150 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:**

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** Updated for C-ID approval. Textbooks are also updated. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?**
- III. Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. Proposed College/District Purpose:** 1. District general education
- V. Extraordinary Cost to the College:** N/A.
- VI. Library Resource Materials:** Book selected by committee will be available at the library, including student solution manual when available..

### GENERAL EDUCATION ANALYSIS

#### CSU General Education:

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

#### District General Education:

# Current Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 151
- III. Course Title:** Calculus with Analytic Geometry II
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Calculus/Analytic Geometry II
- VIII. Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. Originating Campus:** MESA
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** City , Mesa and Miramar
- XII. Proposal Originating Date:** 10/03/2022
- XIII. Proposed Start Semester:** Spring 2024
- XIV. Field Trip:** May be required
- XV. Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. Current Short Description:** Continuation of Mathematics 150 covering more advanced topics.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 150 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:** Texts are most current editions - 10/2022.

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** Six yr review including: 1) update to contact types in DE, and 2) review & update of texts. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?**
- III. Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. Proposed College/District Purpose:** 1. District general education
- V. Extraordinary Cost to the College:** N/A.
- VI. Library Resource Materials:** Book selected by committee will be available at the library, including student solution manual when available..

### GENERAL EDUCATION ANALYSIS

#### CSU General Education:

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

#### District General Education:



**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS****Interpret and evaluate limits of functions**

- I. Course: MATH 150 Evaluate various types of limits graphically, numerically, and algebraically, and analyze properties of functions applying limits including one-sided, two-sided, finite and infinite limits.
- II. Course: MATH 150 Develop a rigorous epsilon-delta limit proof for simple polynomials.
- III. Course: MATH 150 Recognize and evaluate the "limit" using the common limit theorems and properties.

**Define, construct, and interpret the derivative**

- I. Course: MATH 150 Calculate the derivative of a function using the limit definition.
- II. Course: MATH 150 Calculate derivatives using common differentiation theorems.
- III. Course: MATH 150 Calculate the derivative of a function implicitly.
- IV. Course: MATH 150 Solve applications using related rates of change.
- V. Course: MATH 150 Apply differentials to make linear approximations and analyze propagated errors.
- VI. Course: MATH 150 Apply derivatives to graph functions by calculating the critical points, the points of non-differentiability, the points of inflections, the vertical tangents, cusps or corners, and the extrema of a function.
- VII. Course: MATH 150 Calculate where a function is increasing, or decreasing, concave up or concave down by applying its first and second derivatives respectively, and apply the First and Second Derivative Tests to calculate and identify the function's relative extrema.
- VIII. Course: MATH 150 Solve optimization problems using differentiation techniques.
- IX. Course: MATH 150 Recognize and apply Rolle's Theorem and the Mean-Value Theorem where appropriate.

**Analyze the graphs of functions in the context of the derivative**

- I. Course: MATH 150 Analyze the behavior of algebraic and transcendental functions by applying common continuity theorems, and investigate the continuity of such functions at a point, on an open or closed interval.
- II. Course: MATH 150 Calculate the slope and the equation of the tangent line of a function at a given point.
- III. Course: MATH 150 Apply derivatives to graph functions by calculating the critical points, the points of non-differentiability, the points of inflections, the vertical tangents, cusps or corners, and the extrema of a function.
- IV. Course: MATH 150 Calculate where a function is increasing, or decreasing, concave up or concave down by applying its first and second derivatives respectively, and apply the First and Second Derivative Tests to calculate and identify the function's relative extrema.

**Construct, interpret, and analyze the integral**

- I. Course: MATH 150 Calculate the anti-derivative of a wide class of functions, using substitution techniques when appropriate.
- II. Course: MATH 150 Calculate the definite integral using the limit of a Riemann Sum and the Fundamental Theorem of Calculus. Apply the Fundamental Theorem of Calculus to investigate a broad class of functions.
- III. Course: MATH 150 Apply integration in a variety of application problems: including areas between curves, arclengths of a single variable function, and volumes.
- IV. Course: MATH 150 Estimate the value of a definite integral using standard numerical integration techniques which may include the Left-Endpoint Rule, the Right-Endpoint Rule, the Midpoint Rule, or the Trapezoidal Rule.
- V. Course: MATH 150 Calculate integrals of hyperbolic functions and of functions whose anti-derivatives give inverse trigonometric functions.

**SECTION III****IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS****Knowledge of limits of functions, construction and analysis of derivatives, and knowledge of indefinite and definite integrals.**

- I. Course: MATH 150 Evaluate various types of limits graphically, numerically, and algebraically, and analyze properties of functions applying limits including one-sided, two-sided, finite and infinite limits.
- II. Course: MATH 150 Recognize and evaluate the "limit" using the common limit theorems and properties.
- III. Course: MATH 150 Analyze the behavior of algebraic and transcendental functions by applying common continuity theorems, and investigate the continuity of such functions at a point, on an open or closed interval.
- IV. Course: MATH 150 Calculate the derivative of a function using the limit definition.
- V. Course: MATH 150 Calculate the slope and the equation of the tangent line of a function at a given point.
- VI. Course: MATH 150 Calculate derivatives using common differentiation theorems.
- VII. Course: MATH 150 Calculate the derivative of a function implicitly.
- VIII. Course: MATH 150 Apply derivatives to graph functions by calculating the critical points, the points of non-differentiability, the points of inflections, the vertical tangents, cusps or corners, and the extrema of a function.
- IX. Course: MATH 150 Calculate where a function is increasing, or decreasing, concave up or concave down by applying its first and second derivatives respectively, and apply the First and Second Derivative Tests to calculate and identify the function's relative extrema.
- X. Course: MATH 150 Apply Newton's method to find roots of functions.
- XI. Course: MATH 150 Calculate the anti-derivative of a wide class of functions, using substitution techniques when appropriate.
- XII. Course: MATH 150 Calculate the definite integral using the limit of a Riemann Sum and the Fundamental Theorem of Calculus. Apply the Fundamental Theorem of Calculus to investigate a broad class of functions.
- XIII. Course: MATH 150 Estimate the value of a definite integral using standard numerical integration techniques which may include the Left-Endpoint Rule, the Right-Endpoint Rule, the Midpoint Rule, the Trapezoidal Rule and Simpson's Rule.
- XIV. Course: MATH 150 Calculate derivatives of inverse trigonometric functions, and hyperbolic functions.
- XV. Course: MATH 150 Calculate integrals of hyperbolic functions and of functions whose anti-derivatives give inverse trigonometric functions.

**SECTION III****COURSE DISTANCE EDUCATION INFORMATION****I. CITY****II. Distance Education Methods of Instruction:** 1. Fully Online 2. Hybrid only 3. Partially online only**III. Other Distance Education Methods:****IV. Type and frequency of contact may include, but is not limited to:**

- 1. Announcements weekly
- 2. Collaborative Web Documents as assigned
- 3. Conferencing as assigned
- 4. Discussion Board at least three times during the term
- 5. Email/Message System as needed
- 6. Field Trips as assigned
- 7. Group Meetings

## COURSE DISTANCE EDUCATION INFORMATION

### **I. CITY**

### **II. Distance Education Methods of Instruction:** 1. Fully Online 2. Hybrid only 3. Partially online only

### **III. Other Distance Education Methods:**

### **IV. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly
2. Collaborative Web Documents  
as assigned
3. Conferencing  
as assigned
4. Discussion Board  
at least three times during the term
5. Email/Message System  
as needed
6. Field Trips  
as assigned
7. Group Meetings  
as assigned
8. Individual Meetings  
as needed
9. Individualized Assignment Feedback  
as assigned
10. Synchronous or Asynchronous Video  
as assigned
11. Telephone Contact  
as needed

**V. List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.

**VI. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**VII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

### **VIII. Audio Visual Library Materials:** NO

### **IX. MESA**

**X. Distance Education Methods of Instruction:** 1. On-line course 2. Other 3. Point-to-point telecourse

### **XI. Other Distance Education Methods:** Mixed Media

### **XII. Type and frequency of contact may include, but is not limited to:**

1. E-mail
2. Group Meetings
3. Individual Meetings
4. Review Sessions

as assigned

8. Individual Meetings

as needed

9. Individualized Assignment Feedback

as assigned

10. Synchronous or Asynchronous Video

as assigned

11. Telephone Contact

as needed

**V. List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.

**VI. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**VII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

### **VIII. Audio Visual Library Materials:** NO

### **IX. MESA**

**X. Distance Education Methods of Instruction:** 1. Fully Online

### **XI. Other Distance Education Methods:**

### **XII. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
as needed  
**Participant/s:** Faculty to Student/s
2. Discussion Board  
and/or Synchronous or Asynchronous Video - weekly  
**Participant/s:** Faculty to Student/s , Among Students
3. Group Meetings  
as appropriate  
**Participant/s:** Faculty to Student/s , Among Students
4. Individual Meetings  
as appropriate  
**Participant/s:** Faculty to Student/s
5. Synchronous or Asynchronous Video  
frequent  
**Participant/s:** Faculty to Student/s , Among Students

**XIII. List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication. Telephone calls between students and the instructor may be used to discuss questions and concerns throughout the course. E-mail may be used for asynchronous instructor-to-student and student-to-student communication. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate for synchronous interaction between students and between the instructor and students. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Assignments and tests that will be used in the Distance Education course will be exactly the same as those in the traditional course. Students will submit all course work (tests and assignments) electronically to the instructor for grading.

**XIV. How to Evaluate Students for Achieved Outcomes:** The evaluation methods will mirror the on-campus course as specified in the course outline. The feedback on assignments and tests will be submitted electronically to the student.

**XV. Additional Resources/Materials/Information:** SDCCD and DSPS personnel will provide all needed accommodations. DSPS will provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities

### XIII. List of Techniques:

### XIV. How to Evaluate Students for Achieved Outcomes:

**XV. Additional Resources/Materials/Information:** Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Other 2. On-line course 3. Point-to-point telecourse

**XIX. Other Distance Education Methods:** Mixed Media

**XX. Type and frequency of contact may include, but is not limited to:**

1. E-mail
2. Group Meetings
3. Individual Meetings
4. Review Sessions

**XXI. List of Techniques:**

**XXII. How to Evaluate Students for Achieved Outcomes:**

**XXIII. Additional Resources/Materials/Information:** Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**SECTION IV**

### COURSE STUDENT LEARNING OUTCOME(S)

#### CITY

- Students will successfully apply computation techniques to a variety of application problems.
- Students will successfully perform computations with integration techniques, differential equations, and infinite sequences and series.

#### MESA

- Students will show the relationship between a function and its infinite series.
- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations
- Students will use appropriate methods to calculate integrals.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

#### MIRAMAR

- 1. Solve applications problems involving integration and utilize integration techniques including integration by substitution, parts, partial fractions, trigonometric, tables, and computer algebra systems, and apply these techniques to the evaluation of improper integrals and the determination of their convergence or divergence properties.
- 2. Analyze and solve single linear ordinary differential equations problems involving separation of variables and solve modeling problems involving these differential equations.
- 3. Identify and analyze infinite sequences of real numbers and series including the geometric series, harmonic series, and telescoping sums, and determine their convergence or divergence properties using different convergence tests, including the Integral Test, the Ratio Test, the Root Test, the Comparison Test, the Limit Comparison Test, the

Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Other 2. On-line course 3. Point-to-point telecourse

**XIX. Other Distance Education Methods:** Mixed Media

**XX. Type and frequency of contact may include, but is not limited to:**

1. E-mail
2. Group Meetings
3. Individual Meetings
4. Review Sessions

**XXI. List of Techniques:**

**XXII. How to Evaluate Students for Achieved Outcomes:**

**XXIII. Additional Resources/Materials/Information:** Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

### SECTION IV

### COURSE STUDENT LEARNING OUTCOME(S)

#### CITY

- Students will successfully apply computation techniques to a variety of application problems.
- Students will successfully perform computations with integration techniques, differential equations, and infinite sequences and series.

#### MESA

- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations
- Students will show the relationship between a function and its infinite series.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Students will use appropriate methods to calculate integrals.
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

#### MIRAMAR

- 1. Solve applications problems involving integration and utilize integration techniques including integration by substitution, parts, partial fractions, trigonometric, tables, and computer algebra systems, and apply these techniques to the evaluation of improper integrals and the determination of their convergence or divergence properties.
- 2. Analyze and solve single linear ordinary differential equations problems involving separation of variables and solve modeling problems involving these differential equations.
- 3. Identify and analyze infinite sequences of real numbers and series including the geometric series, harmonic series, and telescoping sums, and determine their convergence or divergence properties using different convergence tests, including the Integral Test, the Ratio Test, the Root Test, the Comparison Test, the Limit Comparison Test, the Alternating Series Test, and the Test for Divergence.
- Determine the radius of convergence of a power series and identify the Taylor series of a given function and use it in consultation with Taylor's Theorem to approximate values of functions.

### SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (A Liberal Arts and Sciences)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

Alternating Series Test, and the Test for Divergence.

- Determine the radius of convergence of a power series and identify the Taylor series of a given function and use it in consultation with Taylor's Theorem to approximate values of functions.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (A Liberal Arts and Sciences)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units:** 4.00

**Total Units:** 4

**Lecture Hours Min:** 64.00 **Max:** 72.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 64.00 **Max:** 72.00

**Outside-of-Class Hours Min:** 128.00 **Max:** 144.00

**Total Student Learning Hours Min:** 192.00 **Max:** 216.00

**FTEF Lecture Min:** 0.2667 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2667 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 03/16/2016

#### **IV. Last Outline Revision Date:** 04/14/2016

#### **V. CIC Approval:** 04/14/2016

#### **VI. BOT Approval:**

#### **VII. State Approval:**

#### **VIII. Revised State Approval:**

#### **IX. Course Approval Effective Date:** Fall 2016

## SECTION VI

### CREDIT FOR PRIOR LEARNING

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units:** 4.00

**Total Units:** 4

**Lecture Hours Min:** 64.00 **Max:** 72.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 64.00 **Max:** 72.00

**Outside-of-Class Hours Min:** 128.00 **Max:** 144.00

**Total Student Learning Hours Min:** 192.00 **Max:** 216.00

**FTEF Lecture Min:** 0.2667 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2667 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 10/03/2022

#### **IV. Last Outline Revision Date:** 04/14/2016

#### **V. CIC Approval:**

#### **VI. BOT Approval:**

#### **VII. State Approval:**

#### **VIII. Revised State Approval:**

#### **IX. Course Approval Effective Date:**

## SECTION VI

### CREDIT FOR PRIOR LEARNING

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Mathematics 252**COURSE TITLE:**

Calculus with Analytic Geometry III

**Units:**

4

Grade Only

**CATALOG COURSE DESCRIPTION:**

This course includes the algebra and geometry of 2 and 3 dimensional Euclidean vectors, the algebra and calculus of multivariable functions including composition of functions, limits, continuity, partial differentiation, gradients, higher order derivatives, the chain rule, constrained and unconstrained optimization including Lagrange's theorem, multiple integrals, integrals over paths and surfaces, and integral theorems of vector analysis. This course is intended as a general introduction to the theory and applications of multivariable calculus. This course is essential for most upper division courses in mathematics and forms part of the foundation for engineering and physics. The course is intended for the students interested and/or planning to major in mathematics, physics, astronomy, engineering, computer science, physical chemistry, operational research, or economics.

**REQUISITES:****Prerequisite:**

MATH 151 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU IGETC UC Transfer Course List CSU General Education

**CID:**

MATH 230

**TOTAL LECTURE HOURS:**

64 - 72

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

64 - 72

**OUTSIDE-OF-CLASS HOURS:**

128 - 144

**TOTAL STUDENT LEARNING HOURS:**

192 - 216

## STUDENT LEARNING OBJECTIVES:

Upon successful completion of the course the student will be able to:

1. Extend and apply algebraic and geometric concepts of two dimensional vectors in the Cartesian plane to 3-dimensions, including the distance between vectors, vector algebra, and the Euclidean norm of a vector.
2. Apply operations involving the inner product, the cross product, and triple scalar product of 3-dimensional vectors and use these operations in geometric and physical applications.
3. Calculate the angle between vectors, and determine if two vectors are orthogonal.
4. Set up the equation of the line in both vector and parametric form, and the equation of a plane in 3-space, and calculate the distances between points, planes and lines.
5. Recognize, compare, contrast, and sketch the different quadric surfaces.
6. Implement changes of variables between rectangular, cylindrical, and spherical coordinates.
7. Sketch simple single variable vector-valued functions in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ .
8. Compute the limit, derivative, and integrals of vector-valued functions of one variable.
9. Determine and identify the continuity of a single variable vector-valued function at a single point and throughout a set.
10. Compute the unit tangent vector, principal unit normal vector, the arc length and the curvature of a vector-valued function.
11. Design and apply some elementary concepts in point set topology as they relate to sets in multi-dimensions.
12. Describe and apply the formal definitions of limits, and continuity from single variable calculus to functions of 2, 3 and n-variables.
13. Calculate first as well as higher order partial derivatives of multivariable functions.
14. Define the derivative and the concept of the differentials of multivariable functions, and calculate linear and quadratic approximations to multivariable scalar functions.
15. Apply the Chain Rule to a composition of multivariable functions.
16. Calculate the directional derivative of a multivariable function at a point in a given direction; and the gradient of such a function, applying the properties of the gradient to describe the behavior of the function.
17. Calculate the critical points of a differentiable multivariable function in an open ball, and applying the second derivative test, determine if these points are relative maxima, relative minima or saddle points.
18. Calculate the derivative of multivariable functions expressed implicitly by an equation, as well as the derivative of inverse functions.
19. Demonstrate use of Lagrange's Theorem to compute the extrema of a multivariable function subject to given constraints.
20. Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
21. Determine areas, volumes, surface area, mass, centers of mass, and moments of inertia.
22. Sketch a vector field and compute its curl and divergence.
23. Compute the line integral of a vector-valued function over a piecewise smooth contour.
24. Calculate the work done by a vector-valued multivariable function over a piecewise smooth contour.
25. Apply the concept of path independence and determine if a vector field is conservative, and if so, calculate its potential energy function.
26. Apply Green's, Stokes' and the Divergence Theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Geometry in 3-space
  - A. Distance
  - B. Norm of a vector

- C. Unit vectors
- D. Vector arithmetic
- E. Angle between vectors
- F. Orthogonality
- G. Projections
- II. Inner and Cross Products
  - A. Computing inner and cross products
  - B. Triple scalar product
  - C. Area of a parallelogram
  - D. Volume of a parallelepiped
- III. Lines and Planes in 3-Space
  - A. Equations of lines in parametric form
  - B. Equations of lines in vector form
  - C. Equations of planes in 3 variables
  - D. Distance between a line and a point
  - E. Distance between a point and a plane
  - F. Distance between parallel planes
  - G. Distance between skew lines
- IV. Quadric Surfaces
  - A. Quadrics as second degree equations
  - B. Ellipsoids, paraboloids, hyperboloids, cones
- V. Coordinate Systems
  - A. Rectangular coordinate systems
  - B. Cylindrical coordinate systems
  - C. Spherical coordinate systems
- VI. Vector-Valued Functions
  - A. Graphing vector-valued functions of one variable
  - B. Limits
  - C. Continuity at a point and in a set
  - D. Derivatives
  - E. Integrals
  - F. Arc length
  - G. The unit tangent vector
  - H. The principal unit normal vector
  - I. Binormal Vectors
  - J. Curvature
  - K. Finding Velocity and Acceleration
- VII. Multivariable Functions
  - A. Elementary definitions of point set topology
  - B. Domains
  - C. Level curves and surfaces
  - D. Continuity
  - E. First order partial derivatives
  - F. Higher order partial derivatives
- VIII. The Definition of the Derivative of a Multivariable Function
  - A. Differentiability of multivariate function at an initial point
  - B. Differentials
- IX. Implicit Function Theorem
- X. The Geometry of Multivariable Functions
  - A. The gradient and its geometric interpretation
  - B. The directional derivative
  - C. Equations of tangent planes at a point
  - D. Critical points
  - E. Extrema
- XI. Optimization
  - A. The second derivative test
  - B. Relative extrema
  - C. Constrained optimization
  - D. Lagrange's Theorem
  - E. Lagrange multipliers

- XII. Multiple Integration
  - A. Double iterated integrals
  - B. Double integrals over non-rectangular regions
  - C. Triple iterated integral
  - D. Triple integrals over non-rectangular regions
  - E. Fubini's Theorem and changing the order of integration
- XIII. Applications of Multiple Integrals
  - A. Area and volumes
  - B. Centers of mass and centroids
  - C. Moments of inertia
  - D. Change of Variable Theorem
  - E. Integral in polar, cylindrical and spherical coordinates
- XIV. Vector Fields
  - A. Sketching vector fields
  - B. Gradient vector fields
  - C. The divergence and its geometric interpretation
- XV. Vector Analysis
  - A. Piecewise smooth contours
  - B. Closed contours
  - C. Line integrals over piecewise smooth contours
  - D. Line integrals over closed contours
- XVI. Work Done by Vector Valued Multivariable Function
  - A. Path independence and a conservative vector field
  - B. The potential energy function of a conservative field
  - C. Green's Theorem
  - D. Parametrized surfaces
  - E. Surface integrals
  - F. The Divergence Theorem
  - G. Stokes' Theorem

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned readings from other calculus text books
- II. Assigned readings from periodicals, journals, or mathematical magazines
- III. Vector Calculus related topics found on the Internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Writing work requiring, applications of critical analytical skills. A substantial portion of this course is dedicated to reading and applying mathematical concepts. The students will be required to follow the proofs presented in lecture as well as in the reading. They must be able to formulate logical arguments and will be expected to apply mathematical theorems and definitions using proper logic techniques and analytical reasoning as part of the written homework assignments.
- II. Written solutions to problems using proper mathematical terminology
- III. Journal writing with a focus on mathematical calculations, problem solving techniques, and applied problems.
- IV. Essay homework or test questions which may describe in complete sentences and using proper mathematical terminology proofs of mathematical statements, procedures for performing complicated computations, or the solutions to applied problems.
- V. Writing a formal report analyzing some topic or person appropriate to mathematics.
- VI. Developing proofs for mathematical statements related to the material covered in class.

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of multivariable



calculus. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Maxima, Freemat, Matlab, or Mathematica are strongly encouraged.

II. Reading and writing assignments as specified in the course syllabus

III. Reading and reviewing lecture notes

IV. Using Library, electronic and other archival research

V. Viewing of assigned/recommended media materials

VI. Observations, e.g. field trips to attend pertinent lectures/conferences

VII. Completing an analytical semester project

VIII. Developing problem solving techniques and analytical skills by solving problems from various texts, such as the Schaum's Outline Vector Analysis

IX. Reviewing current periodicals such as Mathematics Magazine or Math Horizons

X. Preparing collaborative projects focusing on expanding mathematical concepts presented in class

XI. Exploratory activities involving a graphing calculator or computer.

#### **E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques

II. Analyzing and solving problems that are broader in scope than those presented in class, or those introduced in the text

III. Applying various mathematical concepts in interpreting applications and in solving applied problems

IV. Investigating a greater variety of problems including applications of principles in a number of different contexts

V. Analyzing and interpreting articles in current periodicals

VI. Developing proofs for mathematical statement

## **2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

I. In-class objective quizzes

II. In-class chapter(s) exams

III. A comprehensive final examination

IV. Take home essay examinations

V. Analytical semester projects

VI. Written reports on related subjects

VII. Exploratory activities involving a graphing calculator or computer

VIII. Participation in classroom discussion

IX. Participation in collaborative assignments

X. Oral presentations on a variety of multivariable calculus ideas

XI. Group projects

XII. Classroom experiments and simulations

XIII. Library and on-line Internet research

XIV. Reviewing current periodicals

## **3. METHODS OF INSTRUCTION:**

Methods of instruction may include, but are not limited to, the following:

\* Collaborative Learning

\* Computer Assisted Instruction

\* Distance Education (Fully online)

\* Learning Modules

\* Lecture

\* Lecture Discussion

- \* Other (Specify)
- \* Lecture and demonstrations using visual aids including but not limited to the computer, the graphing calculator, or videos
- \* Group discussions and problem solving performed in class
- \* Quiz and examination review performed in class
- \* Homework and extended projects
- \* Collaborative projects
- \* Calculator and/or computer assignments
- \* Optional materials available at the Independent Learning Center
- \* Field observation and field trips
- \* Guest speakers
- \* When this course is offered in a distance learning modality, no additional or special requirements in the areas of Course Content and Scope, Methods of Evaluation, and Required Texts will be necessitated except as specified in each of these sections of the course outline. Each student will receive suitable means for instructor contact, and equal access to all required course materials. All methods of instruction, when used in conjunction with distance learning modality, will be implemented in an equivalent manner as in a traditional classroom setting.

#### **4. REQUIRED TEXTS AND SUPPLIES:**

Textbooks may include, but are not limited to:

##### **TEXTBOOKS:**

1. Anton, Bivens & Davis. Calculus, 12th ed. Wiley, 2021, ISBN: 9781119778127
2. Larson & Edwards. Calculus, 12th ed. Cengage Learning, 2022, ISBN: 9780357749135
3. Marsden & Weinstein. Calculus III, 2nd ed. Springer, 1998, ISBN: 9780387909851
4. Marsden and Tromba. Vector Calculus, 6th ed. Freeman, 2012, ISBN: 9781429294119
5. McCallum, Hughes-Hallet, Gleason. Calculus Multivariable, 6th ed. Wiley and Sons, Inc., 2013, ISBN: 9780470888674
6. Stewart, et al. Calculus, 9th ed. Cengage Learning, 2020, ISBN: 9781337624183
7. Swokowski. Calculus: Classic Edition, 5th ed. Brooks/Cole Cengage, 2000, ISBN: 9780534435387
8. Tan, Soo Tang. Calculus, 1st ed. Cengage, 2010, ISBN: 9780534465797

##### **MANUALS:**

##### **PERIODICALS:**

1. *Current periodicals, such as: Mathematics Magazine and Math Horizons,*

##### **SOFTWARE:**

##### **SUPPLIES:**

1. graph paper
2. graphing calculator

**ORIGINATOR:** Toni Parsons

**ORIGINATION DATE:** 03/16/2016

**PROPOSAL ORIGINATOR:** Juan U. Bernal

**CO-CONTRIBUTOR(S)**

**PROPOSAL DATE:** 10/03/2022

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
COURSE PROPOSAL IMPACT REPORT**

**COURSE TO BE PROPOSED: MATH 252**  
Calculus with Analytic Geometry III

**ACTIVE/APPROVED COURSES IMPACTED:**

MATH 252 Calculus with Analytic Geometry III (29370)

Prerequisite

MATH 255 (Active)

Corequisite: Completion of or concurrent enrollment in

ENGE 250 (Active)

Advisory

PHYS 196 (Active)

**DISTRICT GENERAL EDUCATION:**

A2 Language and Rationality - Communication & Analytical Thinking

**ACTIVE/APPROVED/PROPOSED PROGRAMS IMPACTED:**

( City )

Applied Mathematics \*Active\*;

**Associate of Arts Degree**

Courses Required for the Major:

( Mesa )

Applied Mathematics \*Active\*;

**Associate of Arts Degree**

Courses Required for the Major:

( City )

Applied Mathematics \*Approved\*;

**Associate of Arts Degree**

Courses Required for the Major:

( City )

Astronomy \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( Mesa )

Biochemistry \*Pending\*;

**Associate of Science Degree**

Select 9 units from the following

( City )

Chemistry \*Active\*;

## **Associate of Science Degree**

Complete a minimum of 5 units from the following:

( **Mesa** )

Chemistry \*Active\*;

### **Associate of Science Degree**

Courses Required for the Major:

( **Mesa** )

Chemistry \*Active\*;

### **Certificate of Achievement**

Plus fifteen units selected from the following:

( **Miramar** )

Chemistry Studies \*Active\*;

### **Associate of Science Degree**

Select at least eight units from the following:

( **Miramar** )

Earth Science Studies \*Active\*;

### **Associate of Science Degree**

Select at least three (3) units from the following mathematics courses:

( **Miramar** )

Earth Science Studies \*Pending\*;

### **Associate of Science Degree**

Select at least three (3) units from the following mathematics courses:

( **Mesa** )

Economics \*Approved\*;

### **Associate in Arts for Transfer Degree**

CATEGORY A: SELECT TWO COURSES FROM THE FOLLOWING COURSES.  
RECOMMEND SELECTING COURSES WHICH MEET THE LOWER DIVISION  
MAJOR PREPARATION REQUIREMENTS OF YOUR PROSPECTIVE TRANSFER  
UNIVERSITY (6-9 UNITS):

( **Mesa** )

Economics \*Pending\*;

### **Associate in Arts for Transfer Degree**

CATEGORY A: SELECT TWO COURSES FROM THE FOLLOWING COURSES.  
RECOMMEND SELECTING COURSES WHICH MEET THE LOWER DIVISION  
MAJOR PREPARATION REQUIREMENTS OF YOUR PROSPECTIVE TRANSFER  
UNIVERSITY (6-9 UNITS):

( **Mesa** )

Economics \*Active\*;

### **Associate in Arts for Transfer Degree**

CATEGORY B: SELECT ONE COURSE FROM THE FOLLOWING COURSES OR ANY COURSE(S) NOT SELECTED IN CATEGORY A (3-4 UNITS):

( **Miramar** )

Economics \*Active\*;

**Associate in Arts for Transfer Degree**

Select at least 3 units from the following courses (not already selected above):

( **Miramar** )

Economics \*Active\*;

**Associate in Arts for Transfer Degree**

Select one of the following courses (3-5 units) not already selected above:

( **Miramar** )

Economics \*Approved\*;

**Associate in Arts for Transfer Degree**

Select two of the following courses:

( **Miramar** )

Economics \*Launched\*;

**Associate in Arts for Transfer Degree**

Select two of the following courses:

( **City** )

Engineering \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( **City** )

Engineering \*Approved\*;

**Associate of Science Degree**

Courses Required for the Major:

( **Mesa** )

Engineering \*Active\*;

**Associate of Science Degree**

Select 24 units from the following:

( **Mesa** )

Engineering \*Pending\*;

**Associate of Science Degree**

Select 24 units from the following:

( **Mesa** )

Engineering \*Active\*;

**Certificate of Achievement**

Select 24 units from the following:

( Mesa )

Engineering \*Pending\*;

**Certificate of Achievement**

Select 24 units from the following:

( City )

Geology \*Active\*;

**Associate of Science Degree**

Recommended Electives:

( City )

Liberal Arts and Sciences in Scientific Studies Physical and Earth Sciences Specialization \*Approved\*;

**Associate of Arts Degree**

Major Courses

( Mesa )

Liberal Arts and Sciences: Social and Behavioral Sciences-Economics \*Active\*;

**Associate of Arts Degree**

Select a minimum of 12 units:

( Mesa )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Computer Science \*Active\*;

**Associate of Arts Degree**

Major Courses

( Mesa )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Engineering \*Active\*;

**Associate of Arts Degree**

Select a minimum of 3 units:

( Mesa )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Mathematics \*Active\*;

**Associate of Arts Degree**

Major Courses

( Mesa )

Liberal Arts and Sciences: Science Studies-Chemistry \*Active\*;

**Associate of Arts Degree**

Select a minimum of 8 units:

( Mesa )

Liberal Arts and Sciences: Science Studies-Physics \*Active\*;

**Associate of Arts Degree**

Select a minimum of 3 units:

( Mesa )

Liberal Arts and Sciences: Science Studies-Psychology \*Active\*;  
**Associate of Arts Degree**

Major Courses

( Mesa )

Liberal Arts and Sciences: Science Studies-Psychology \*Pending\*;  
**Associate of Arts Degree**

Major Courses

( City )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Active\*;  
**Associate of Arts Degree**

Major Courses

( City )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Launched\*;  
**Associate of Arts Degree**

Major Courses

( City )

Liberal Arts and Sciences: Scientific Studies Physical and Earth Sciences Specialization \*Approved\*;  
**Associate of Arts Degree**

Major Courses

( City )

Liberal Arts and Sciences: Scientific Studies Physical and Earth Sciences Specialization \*Pending\*;  
**Associate of Arts Degree**

Major Courses

( Mesa )

Liberal Arts and Sciences: Social and Behavioral Sciences-Human Development \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 3-4 units to complete 18 units from:

( City )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( Mesa )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( Miramar )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

## Major Courses

( **Mesa** )

Mathematics \*Active\*;

### **Associate of Arts Degree**

Courses Required for the Major:

( **City** )

Mathematics \*Active\*;

### **Associate of Arts Degree**

Courses Required for the Major:

( **City** )

Mathematics \*Approved\*;

### **Associate of Arts Degree**

Courses Required for the Major:

( **Miramar** )

Mathematics Studies \*Active\*;

### **Associate of Arts Degree**

## Major Courses

( **Mesa** )

Physical Sciences \*Active\*;

### **Associate of Science Degree**

At least 8 units from the following:

( **Mesa** )

Physical Sciences \*Pending\*;

### **Associate of Science Degree**

At least 8 units from the following:

( **Mesa** )

Physical Sciences \*Active\*;

### **Certificate of Achievement**

At least 8 units selected from the following:

( **Mesa** )

Physical Sciences \*Pending\*;

### **Certificate of Achievement**

At least 8 units selected from the following:

( **City** )

Physics \*Active\*;

### **Associate in Science for Transfer Degree**

## Major Courses



( **Mesa** )

Physics \*Active\*;

**Associate in Science for Transfer Degree**

Major Courses

( **Miramar** )

Physics \*Active\*;

**Associate in Science for Transfer Degree**

Major Courses

( **Mesa** )

Physics \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( **City** )

Physics \*Active\*;

**Associate of Science Degree**

Courses Required for the Major:

( **Mesa** )

Physics \*Active\*;

**Certificate of Achievement**

Courses Required for the Major:

( **Miramar** )

Pre-Engineering Studies \*Active\*;

**Associate of Science Degree**

Select at least four (4) units from the following:

# SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

## Course Outline of Record: Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Mathematics
- II. **Course Number:** 252
- III. **Course Title:** Calculus with Analytic Geometry III
- IV. **Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.
- VI. **Family:**
- VII. **Current Short Title:** Calculus W/ Analytic Geometry
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** Miramar , Mesa and City
- XII. **Proposal Originating Date:** 10/03/2022
- XIII. **Proposed Start Semester:** Spring 2024
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Grade Only
- XVI. **Current Short Description:** Introduces the theory and applications of multivariable calculus.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: MATH 151 with a grade of "C" or better, or equivalent. Closely related Lecture/Lab paired within the same discipline
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:** All textbooks are latest editions.

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six yr review including: 1) update DE verbiage, and 2) review & update texts.  
(Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. IGETC 2. UC Transfer Course List 3. CSU General Education
- IV. **Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Achievement
- V. **Extraordinary Cost to the College:** None.
- VI. **Library Resource Materials:** No special library resources are necessary.

#### GENERAL EDUCATION ANALYSIS

##### **CSU General Education:**

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

##### **District General Education:**

A2 Language and Rationality - Communication & Analytical Thinking

##### **IGETC:**

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Intermediate knowledge of calculus with analytic geometry including conic sections, intermediate and advanced integration techniques, and polar and parametric curves.

- I. Course: MATH 151 Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.
- II. Course: MATH 151 Apply integration to physics problems relating to mass, centers of mass, work, and fluid force.
- III. Course: MATH 151 Identify, analyze, and evaluate improper integrals.
- IV. Course: MATH 151 Evaluate the limits of functions which have the indeterminate forms "zero/zero" and "infinity/infinity" using L'Hôpital's Rule.
- V. Course: MATH 151 Transform the other indeterminate forms into those which L'Hôpital's Rule can be implemented.
- VI. Course: MATH 151 Express a given second degree equation in the form of its standard conic equation and sketch the standard conic sections.
- VII. Course: MATH 151 Analyze a conic section by rotating it to a standard position.
- VIII. Course: MATH 151 Sketch the graphs of functions in polar coordinates, including cardioids, lemniscates, and limaçons.
- IX. Course: MATH 151 Sketch the graphs of functions in polar coordinates, including cardioids, lemniscates, and limaçons.
- X. Course: MATH 151 Calculate the areas of polar regions.
- XI. Course: MATH 151 Calculate the areas of polar regions.
- XII. Course: MATH 151 Calculate the arc length of polar curves, and the surface area bounded by polar curves.
- XIII. Course: MATH 151 Calculate the arc length of polar curves, and the surface area bounded by polar curves.
- XIV. Course: MATH 151 Calculate the equation of tangent lines to polar curves.
- XV. Course: MATH 151 Express a curve with parametric equations.
- XVI. Course: MATH 151 Calculate the tangent lines and arc lengths of parametrized curves.
- XVII. Course: MATH 151 Calculate the tangent lines and arc lengths of parametrized curves.

**SECTION III**

**COURSE DISTANCE EDUCATION INFORMATION**

- I. **CITY**
- II. **Distance Education Methods of Instruction:** 1. Fully Online
- III. **Other Distance Education Methods:**
- IV. **Type and frequency of contact may include, but is not limited to:**
  - 1. Announcements  
weekly
  - 2. Collaborative Web Documents  
as assigned
  - 3. Conferencing  
as assigned
  - 4. Discussion Board  
at least three times during the term
  - 5. Email/Message System  
as needed
  - 6. Field Trips  
as assigned
  - 7. Group Meetings  
as assigned

- 8. Individual Meetings  
as needed
- 9. Individualized Assignment Feedback  
as assigned
- 10. Synchronous or Asynchronous Video  
as assigned
- 11. Telephone Contact  
as needed
- V. **List of Techniques:** Students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.
- VI. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- VII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. **Audio Visual Library Materials:** NO
- IX. **MESA**
- X. **Distance Education Methods of Instruction:** 1. Fully Online
- XI. **Other Distance Education Methods:**
- XII. **Type and frequency of contact may include, but is not limited to:**
  - 1. Announcements  
weekly  
**Participant/s:** Faculty to Student/s
  - 2. Collaborative Web Documents  
as assigned  
**Participant/s:** Faculty to Student/s , Among Students
  - 3. Conferencing  
as assigned  
**Participant/s:** Faculty to Student/s
  - 4. Discussion Board  
and/or Synchronous or Asynchronous Video - weekly  
**Participant/s:** Faculty to Student/s , Among Students
  - 5. Email/Message System  
as needed  
**Participant/s:** Faculty to Student/s , Among Students
  - 6. Field Trips  
as assigned  
**Participant/s:** Faculty to Student/s , Among Students
  - 7. Group Meetings  
as assigned  
**Participant/s:** Faculty to Student/s , Among Students
  - 8. Individual Meetings  
as needed  
**Participant/s:** Faculty to Student/s
  - 9. Individualized Assignment Feedback  
as assigned
  - 10. Synchronous or Asynchronous Video  
and/or Discussion Board - weekly  
**Participant/s:** Faculty to Student/s , Among Students
  - 11. Telephone Contact  
as needed

**Participant/s:** Faculty to Student/s , Among Students

- XIII. **List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.
- XIV. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- XV. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XVI. **Audio Visual Library Materials:** NO
- XVII. **MIRAMAR**
- XVIII. **Distance Education Methods of Instruction:** 1. Fully Online
- XIX. **Other Distance Education Methods:**
- XX. **Type and frequency of contact may include, but is not limited to:**
1. Announcements  
weekly
  2. Collaborative Web Documents  
as assigned
  3. Conferencing  
as assigned
  4. Discussion Board  
at least four times during the term with the instructor and with other students
  5. Email/Message System  
as needed
  6. Group Meetings  
as assigned
  7. Individual Meetings  
as needed
  8. Individualized Assignment Feedback  
as assigned
  9. Synchronous or Asynchronous Video  
as assigned
  10. Telephone Contact  
as needed
- XXI. **List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.
- XXII. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- XXIII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus-based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XXIV. **Audio Visual Library Materials:** NO

#### **SECTION IV**

#### **COURSE STUDENT LEARNING OUTCOME(S)**

## CITY

- Students will successfully apply the computation techniques to a variety of application problems.
- Upon completion of course, students will compute limits, derivatives and integrals in the multivariate setting.

## MESA

- Student will solve a double integral by reversing the order of integration.
- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Student will find the work done by a given force field in moving an object along a given curve.
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

## MIRAMAR

- Calculate the critical points of a differentiable multivariable function in an open ball, and applying the second derivative test, determine if these points are relative maxima, relative minima, or saddle points.
- Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
- Apply Green's Theorems, Stokes's Theorems, and the Divergence theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units: 4.00**

**Total Units:** 4

**Lecture Hours Min:** 64.00 **Max:** 72.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 64.00 **Max:** 72.00

**Outside-of-Class Hours Min:** 128.00 **Max:** 144.00

**Total Student Learning Hours Min:** 192.00 **Max:** 216.00

**FTEF Lecture Min:** 0.2667 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2667 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 10/03/2022

#### **IV. Last Outline Revision Date:** 04/14/2016

#### **V. CIC Approval:**

#### **VI. BOT Approval:**

#### **VII. State Approval:**

#### **VIII. Revised State Approval:**

#### **IX. Course Approval Effective Date:**

## SECTION VI

**CREDIT FOR PRIOR LEARNING**

MATH 252

**Previous Report**

CIC Approval: 04/14/2016  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM: Fall 2016

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Mathematics 252**COURSE TITLE:**

Calculus with Analytic Geometry III

**Units:**

4

Grade Only

**CATALOG COURSE DESCRIPTION:**

This course includes the algebra and geometry of 2 and 3 dimensional Euclidean vectors, the algebra and calculus of multivariable functions including composition of functions, limits, continuity, partial differentiation, gradients, higher order derivatives, the chain rule, constrained and unconstrained optimization including Lagrange's theorem, multiple integrals, integrals over paths and surfaces, and integral theorems of vector analysis. This course is intended as a general introduction to the theory and applications of multivariable calculus. This course is essential for most upper division courses in mathematics and forms part of the foundation for engineering and physics. The course is intended for the students interested and/or planning to major in mathematics, physics, astronomy, engineering, computer science, physical chemistry, operational research, or economics.

**REQUISITES:****Prerequisite:**

MATH 151 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:**

MATH 230

**TOTAL LECTURE HOURS:**

64 - 72

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

64 - 72

**OUTSIDE-OF-CLASS HOURS:**

128 - 144

**TOTAL STUDENT LEARNING HOURS:**

192 - 216

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Extend and apply algebraic and geometric concepts of two dimensional vectors in the Cartesian plane to 3-dimensions, including the distance between vectors, vector algebra, and the Euclidean norm of a vector.
2. Apply operations involving the inner product, the cross product, and triple scalar product of 3-dimensional vectors and use these operations in geometric and physical applications.

**Current Report**

MATH 252

CIC Approval:  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM:

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

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4

Grade Only

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**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU IGETC UC Transfer Course List CSU General Education

**CID:**

MATH 230

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64 - 72

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192 - 216

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Upon successful completion of the course the student will be able to:

1. Extend and apply algebraic and geometric concepts of two dimensional vectors in the Cartesian plane to 3-dimensions, including the distance between vectors, vector algebra, and the Euclidean norm of a vector.
2. Apply operations involving the inner product, the cross product, and triple scalar product of 3-dimensional vectors and use these operations in geometric and physical applications.
3. Calculate the angle between vectors, and determine if two vectors are orthogonal.
4. Set up the equation of the line in both vector and parametric form, and the equation of a plane in 3-space, and



3. Calculate the angle between vectors, and determine if two vectors are orthogonal.
4. Set up the equation of the line in both vector and parametric form, and the equation of a plane in 3-space, and calculate the distances between points, planes and lines.
5. Recognize, compare, contrast, and sketch the different quadric surfaces.
6. Implement changes of variables between rectangular, cylindrical, and spherical coordinates.
7. Sketch simple single variable vector-valued functions in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ .
8. Compute the limit, derivative, and integrals of vector-valued functions of one variable.
9. Determine and identify the continuity of a single variable vector-valued function at a single point and throughout a set.
10. Compute the unit tangent vector, principal unit normal vector, the arc length and the curvature of a vector-valued function.
11. Design and apply some elementary concepts in point set topology as they relate to sets in multi-dimensions.
12. Describe and apply the formal definitions of limits, and continuity from single variable calculus to functions of 2, 3 and n-variables.
13. Calculate first as well as higher order partial derivatives of multivariable functions.
14. Define the derivative and the concept of the differentials of multivariable functions, and calculate linear and quadratic approximations to multivariable scalar functions.
15. Apply the Chain Rule to a composition of multivariable functions.
16. Calculate the directional derivative of a multivariable function at a point in a given direction; and the gradient of such a function, applying the properties of the gradient to describe the behavior of the function.
17. Calculate the critical points of a differentiable multivariable function in an open ball, and applying the second derivative test, determine if these points are relative maxima, relative minima or saddle points.
18. Calculate the derivative of multivariable functions expressed implicitly by an equation, as well as the derivative of inverse functions.
19. Demonstrate use of Lagrange's Theorem to compute the extrema of a multivariable function subject to given constraints.
20. Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
21. Determine areas, volumes, surface area, mass, centers of mass, and moments of inertia.
22. Sketch a vector field and compute its curl and divergence.
23. Compute the line integral of a vector-valued function over a piecewise smooth contour.
24. Calculate the work done by a vector-valued multivariable function over a piecewise smooth contour.
25. Apply the concept of path independence and determine if a vector field is conservative, and if so, calculate its potential energy function.
26. Apply Green's, Stokes' and the Divergence Theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Geometry in 3-space
  - A. Distance
  - B. Norm of a vector
  - C. Unit vectors
  - D. Vector arithmetic
  - E. Angle between vectors
  - F. Orthogonality
  - G. Projections
- II. Inner and Cross Products
  - A. Computing inner and cross products
  - B. Triple scalar product
  - C. Area of a parallelogram
  - D. Volume of a parallelepiped
- III. Lines and Planes in 3-Space
  - A. Equations of lines in parametric form
  - B. Equations of lines in vector form
  - C. Equations of planes in 3 variables
  - D. Distance between a line and a point
  - E. Distance between a point and a plane
  - F. Distance between parallel planes
  - G. Distance between skew lines
- IV. Quadric Surfaces
  - A. Quadrics as second degree equations
  - B. Ellipsoids paraboloids hyperboloids cones
- V. Coordinate Systems
  - A. Rectangular coordinate systems
  - B. Cylindrical coordinate systems

- calculate the distances between points, planes and lines.
5. Recognize, compare, contrast, and sketch the different quadric surfaces.
6. Implement changes of variables between rectangular, cylindrical, and spherical coordinates.
7. Sketch simple single variable vector-valued functions in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ .
8. Compute the limit, derivative, and integrals of vector-valued functions of one variable.
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10. Compute the unit tangent vector, principal unit normal vector, the arc length and the curvature of a vector-valued function.
11. Design and apply some elementary concepts in point set topology as they relate to sets in multi-dimensions.
12. Describe and apply the formal definitions of limits, and continuity from single variable calculus to functions of 2, 3 and n-variables.
13. Calculate first as well as higher order partial derivatives of multivariable functions.
14. Define the derivative and the concept of the differentials of multivariable functions, and calculate linear and quadratic approximations to multivariable scalar functions.
15. Apply the Chain Rule to a composition of multivariable functions.
16. Calculate the directional derivative of a multivariable function at a point in a given direction; and the gradient of such a function, applying the properties of the gradient to describe the behavior of the function.
17. Calculate the critical points of a differentiable multivariable function in an open ball, and applying the second derivative test, determine if these points are relative maxima, relative minima or saddle points.
18. Calculate the derivative of multivariable functions expressed implicitly by an equation, as well as the derivative of inverse functions.
19. Demonstrate use of Lagrange's Theorem to compute the extrema of a multivariable function subject to given constraints.
20. Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
21. Determine areas, volumes, surface area, mass, centers of mass, and moments of inertia.
22. Sketch a vector field and compute its curl and divergence.
23. Compute the line integral of a vector-valued function over a piecewise smooth contour.
24. Calculate the work done by a vector-valued multivariable function over a piecewise smooth contour.
25. Apply the concept of path independence and determine if a vector field is conservative, and if so, calculate its potential energy function.
26. Apply Green's, Stokes' and the Divergence Theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

## SECTION II

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  - B. Norm of a vector
  - C. Unit vectors
  - D. Vector arithmetic
  - E. Angle between vectors
  - F. Orthogonality
  - G. Projections
- II. Inner and Cross Products
  - A. Computing inner and cross products
  - B. Triple scalar product
  - C. Area of a parallelogram
  - D. Volume of a parallelepiped
- III. Lines and Planes in 3-Space
  - A. Equations of lines in parametric form
  - B. Equations of lines in vector form
  - C. Equations of planes in 3 variables
  - D. Distance between a line and a point
  - E. Distance between a point and a plane
  - F. Distance between parallel planes
  - G. Distance between skew lines
- IV. Quadric Surfaces
  - A. Quadrics as second degree equations
  - B. Ellipsoids paraboloids hyperboloids cones
- V. Coordinate Systems
  - A. Rectangular coordinate systems
  - B. Cylindrical coordinate systems
  - C. Spherical coordinate systems

- C. Spherical coordinate systems
- VI. Vector-Valued Functions
  - A. Graphing vector-valued functions of one variable
  - B. Limits
  - C. Continuity at a point and in a set
  - D. Derivatives
  - E. Integrals
  - F. Arc length
  - G. The unit tangent vector
  - H. The principal unit normal vector
  - I. Binormal Vectors
  - J. Curvature
  - K. Finding Velocity and Acceleration
- VII. Multivariable Functions
  - A. Elementary definitions of point set topology
  - B. Domains
  - C. Level curves and surfaces
  - D. Continuity
  - E. First order partial derivatives
  - F. Higher order partial derivatives
- VIII. The Definition of the Derivative of a Multivariable Function
  - A. Differentiability of multivariate function at an initial point
  - B. Differentials
- IX. Implicit Function Theorem
- X. The Geometry of Multivariable Functions
  - A. The gradient and its geometric interpretation
  - B. The directional derivative
  - C. Equations of tangent planes at a point
  - D. Critical points
  - E. Extrema
- XI. Optimization
  - A. The second derivative test
  - B. Relative extrema
  - C. Constrained optimization
  - D. Lagrange's Theorem
  - E. Lagrange multipliers
- XII. Multiple Integration
  - A. Double iterated integrals
  - B. Double integrals over non-rectangular regions
  - C. Triple iterated integral
  - D. Triple integrals over non-rectangular regions
  - E. Fubini's Theorem and changing the order of integration
- XIII. Applications of Multiple Integrals
  - A. Area and volumes
  - B. Centers of mass and centroids
  - C. Moments of inertia
  - D. Change of Variable Theorem
  - E. Integral in polar cylindrical and spherical coordinates
- XIV. Vector Fields
  - A. Sketching vector fields
  - B. Gradient vector fields
  - C. The divergence and its geometric interpretation
- XV. Vector Analysis
  - A. Piecewise smooth contours
  - B. Closed contours
  - C. Line integrals over piecewise smooth contours
  - D. Line integrals over closed contours
- XVI. Work Done by Vector Valued Multivariable Function
  - A. Path independence and a conservative vector field
  - B. The potential energy function of a conservative field
  - C. Green's Theorem
  - D. Parametrized surfaces
  - E. Surface integrals
  - F. The Divergence Theorem
  - G. Stokes' Theorem

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned readings from other calculus text books
- II. Assigned readings from periodicals, journals, or mathematical magazines
- III. Vector Calculus related topics found on the Internet

**VI. Vector-Valued Functions**

- A. Graphing vector-valued functions of one variable
- B. Limits
- C. Continuity at a point and in a set
- D. Derivatives
- E. Integrals
- F. Arc length
- G. The unit tangent vector
- H. The principal unit normal vector
- I. Binormal Vectors
- J. Curvature
- K. Finding Velocity and Acceleration

**VII. Multivariable Functions**

- A. Elementary definitions of point set topology
- B. Domains
- C. Level curves and surfaces
- D. Continuity
- E. First order partial derivatives
- F. Higher order partial derivatives

**VIII. The Definition of the Derivative of a Multivariable Function**

- A. Differentiability of multivariate function at an initial point
- B. Differentials

**IX. Implicit Function Theorem**

**X. The Geometry of Multivariable Functions**

- A. The gradient and its geometric interpretation
- B. The directional derivative
- C. Equations of tangent planes at a point
- D. Critical points
- E. Extrema

**XI. Optimization**

- A. The second derivative test
- B. Relative extrema
- C. Constrained optimization
- D. Lagrange's Theorem
- E. Lagrange multipliers

**XII. Multiple Integration**

- A. Double iterated integrals
- B. Double integrals over non-rectangular regions
- C. Triple iterated integral
- D. Triple integrals over non-rectangular regions
- E. Fubini's Theorem and changing the order of integration

**XIII. Applications of Multiple Integrals**

- A. Area and volumes
- B. Centers of mass and centroids
- C. Moments of inertia
- D. Change of Variable Theorem
- E. Integral in polar cylindrical and spherical coordinates

**XIV. Vector Fields**

- A. Sketching vector fields
- B. Gradient vector fields
- C. The divergence and its geometric interpretation

**XV. Vector Analysis**

- A. Piecewise smooth contours
- B. Closed contours
- C. Line integrals over piecewise smooth contours
- D. Line integrals over closed contours

**XVI. Work Done by Vector Valued Multivariable Function**

- A. Path independence and a conservative vector field
- B. The potential energy function of a conservative field
- C. Green's Theorem
- D. Parametrized surfaces
- E. Surface integrals
- F. The Divergence Theorem
- G. Stokes' Theorem

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned readings from other calculus text books
- II. Assigned readings from periodicals, journals, or mathematical magazines
- III. Vector Calculus related topics found on the Internet

### C. Writing Assignments:

Writing assignments are required and may include, but are not limited to, the following:

- I. Writing work requiring, applications of critical analytical skills. A substantial portion of this course is dedicated to reading and applying mathematical concepts. The students will be required to follow the proofs presented in lecture as well as in the reading. They must be able to formulate logical arguments and will be expected to apply mathematical theorems and definitions using proper logic techniques and analytical reasoning as part of the written homework assignments.
- II. Written solutions to problems using proper mathematical terminology
- III. Journal writing with a focus on mathematical calculations, problem solving techniques, and applied problems.
- IV. Essay homework or test questions which may describe in complete sentences and using proper mathematical terminology proofs of mathematical statements, procedures for performing complicated computations, or the solutions to applied problems.
- V. Writing a formal report analyzing some topic or person appropriate to mathematics.
- VI. Developing proofs for mathematical statements related to the material covered in class.

### D. Appropriate Outside Assignments:

Outside assignments may include, but are not limited to, the following:

- I. Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of multivariable calculus. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Maxima, Freemat, Matlab, or Mathematica are strongly encouraged.
- II. Reading and writing assignments as specified in the course syllabus
- III. Reading and reviewing lecture notes
- IV. Using Library, electronic and other archival research
- V. Viewing of assigned/recommended media materials
- VI. Observations, e.g. field trips to attend pertinent lectures/conferences
- VII. Completing an analytical semester project
- VIII. Developing problem solving techniques and analytical skills by solving problems from various texts, such as the Schaum's Outline Vector Analysis
- IX. Reviewing current periodicals such as Mathematics Magazine or Math Horizons
- X. Preparing collaborative projects focusing on expanding mathematical concepts presented in class
- XI. Exploratory activities involving a graphing calculator or computer.

### E. Appropriate Assignments that Demonstrate Critical Thinking:

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- II. Analyzing and solving problems that are broader in scope than those presented in class, or those introduced in the text
- III. Applying various mathematical concepts in interpreting applications and in solving applied problems
- IV. Investigating a greater variety of problems including applications of principles in a number of different contexts
- V. Analyzing and interpreting articles in current periodicals
- VI. Developing proofs for mathematical statement

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. In-class objective quizzes
- II. In-class chapter(s) exams
- III. A comprehensive final examination
- IV. Take home essay examinations
- V. Analytical semester projects
- VI. Written reports on related subjects
- VII. Exploratory activities involving a graphing calculator or computer
- VIII. Participation in classroom discussion
- IX. Participation in collaborative assignments
- X. Oral presentations on a variety of multivariable calculus ideas
- XI. Group projects
- XII. Classroom experiments and simulations
- XIII. Library and on-line Internet research
- XIV. Reviewing current periodicals

## 3. METHODS OF INSTRUCTION:

### C. Writing Assignments:

Writing assignments are required and may include, but are not limited to, the following:

- I. Writing work requiring, applications of critical analytical skills. A substantial portion of this course is dedicated to reading and applying mathematical concepts. The students will be required to follow the proofs presented in lecture as well as in the reading. They must be able to formulate logical arguments and will be expected to apply mathematical theorems and definitions using proper logic techniques and analytical reasoning as part of the written homework assignments.
- II. Written solutions to problems using proper mathematical terminology
- III. Journal writing with a focus on mathematical calculations, problem solving techniques, and applied problems.
- IV. Essay homework or test questions which may describe in complete sentences and using proper mathematical terminology proofs of mathematical statements, procedures for performing complicated computations, or the solutions to applied problems.
- V. Writing a formal report analyzing some topic or person appropriate to mathematics.
- VI. Developing proofs for mathematical statements related to the material covered in class.

### D. Appropriate Outside Assignments:

Outside assignments may include, but are not limited to, the following:

- I. Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of multivariable calculus. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Maxima, Freemat, Matlab, or Mathematica are strongly encouraged.
- II. Reading and writing assignments as specified in the course syllabus
- III. Reading and reviewing lecture notes
- IV. Using Library, electronic and other archival research
- V. Viewing of assigned/recommended media materials
- VI. Observations, e.g. field trips to attend pertinent lectures/conferences
- VII. Completing an analytical semester project
- VIII. Developing problem solving techniques and analytical skills by solving problems from various texts, such as the Schaum's Outline Vector Analysis
- IX. Reviewing current periodicals such as Mathematics Magazine or Math Horizons
- X. Preparing collaborative projects focusing on expanding mathematical concepts presented in class
- XI. Exploratory activities involving a graphing calculator or computer.

### E. Appropriate Assignments that Demonstrate Critical Thinking:

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- II. Analyzing and solving problems that are broader in scope than those presented in class, or those introduced in the text
- III. Applying various mathematical concepts in interpreting applications and in solving applied problems
- IV. Investigating a greater variety of problems including applications of principles in a number of different contexts
- V. Analyzing and interpreting articles in current periodicals
- VI. Developing proofs for mathematical statement

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. In-class objective quizzes
- II. In-class chapter(s) exams
- III. A comprehensive final examination
- IV. Take home essay examinations
- V. Analytical semester projects
- VI. Written reports on related subjects
- VII. Exploratory activities involving a graphing calculator or computer
- VIII. Participation in classroom discussion
- IX. Participation in collaborative assignments
- X. Oral presentations on a variety of multivariable calculus ideas
- XI. Group projects
- XII. Classroom experiments and simulations
- XIII. Library and on-line Internet research
- XIV. Reviewing current periodicals

## 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

Methods of instruction may include, but are not limited to, the following:

- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Lecture and demonstrations using visual aids including but not limited to the computer, the graphing calculator, or videos
- \* Group discussions and problem solving performed in class
- \* Quiz and examination review performed in class
- \* Homework and extended projects
- \* Collaborative projects
- \* Calculator and/or computer assignments
- \* Optional materials available at the Independent Learning Center
- \* Field observation and field trips
- \* Guest speakers
- \* When this course is offered in a distance learning modality, no additional or special requirements in the areas of Course Content and Scope, Methods of Evaluation, and Required Texts will be necessitated except as specified in each of these sections of the course outline. Each student will receive suitable means for instructor contact, and equal access to all required course materials. All methods of instruction, when used in conjunction with distance learning modality, will be implemented in an equivalent manner as in a traditional classroom setting.

4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

TEXTBOOKS:

1. Anton, Bivens & Davis. Calculus, 10th ed. John Wiley & Sons Inc., 2012, ISBN: 9780470647721
2. Larson & Edwards. Calculus, 10th ed. Brooks/Cole Cengage, 2014, ISBN: 9781285057095
3. Marsden & Weinstein. Calculus III, 2nd ed. Springer, 1998, ISBN: 9780387909851
4. Marsden and Tromba. Vector Calculus, 6th ed. Freeman, 2012, ISBN: 9781429294119
5. McCallum, Hughes-Hallet, Gleason. Calculus Multivariable, 6th ed. Wiley and Sons, Inc., 2013, ISBN: 9780470888674
6. Stewart. Calculus, 8th ed. Cengage, 2015, ISBN: 9781285740621
7. Swokowski. Calculus: Classic Edition, 5th ed. Brooks/Cole Cengage, 2000, ISBN: 9780534435387
8. Tan, Soo Tang. Calculus, 1st ed. Cengage, 2010, ISBN: 9780534465797

MANUALS:

PERIODICALS:

1. *Current periodicals, such as: Mathematics Magazine and Math Horizons,*

SOFTWARE:

SUPPLIES:

1. graph paper
2. graphing calculator

ORIGINATOR: Toni Parsons

CO-CONTRIBUTOR(S)  
DATE: 03/16/2016

Status: Active

Date Printed: 12/3/2022

- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Lecture and demonstrations using visual aids including but not limited to the computer, the graphing calculator, or videos
- \* Group discussions and problem solving performed in class
- \* Quiz and examination review performed in class
- \* Homework and extended projects
- \* Collaborative projects
- \* Calculator and/or computer assignments
- \* Optional materials available at the Independent Learning Center
- \* Field observation and field trips
- \* Guest speakers
- \* When this course is offered in a distance learning modality, no additional or special requirements in the areas of Course Content and Scope, Methods of Evaluation, and Required Texts will be necessitated except as specified in each of these sections of the course outline. Each student will receive suitable means for instructor contact, and equal access to all required course materials. All methods of instruction, when used in conjunction with distance learning modality, will be implemented in an equivalent manner as in a traditional classroom setting.

4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

TEXTBOOKS:

1. Anton, Bivens & Davis. Calculus, 12th ed. Wiley, 2021, ISBN: 9781119778127
2. Larson & Edwards. Calculus, 12th ed. Cengage Learning, 2022, ISBN: 9780357749135
3. Marsden & Weinstein. Calculus III, 2nd ed. Springer, 1998, ISBN: 9780387909851
4. Marsden and Tromba. Vector Calculus, 6th ed. Freeman, 2012, ISBN: 9781429294119
5. McCallum, Hughes-Hallet, Gleason. Calculus Multivariable, 6th ed. Wiley and Sons, Inc., 2013, ISBN: 9780470888674
6. Stewart, et al. Calculus, 9th ed. Cengage Learning, 2020, ISBN: 9781337624183
7. Swokowski. Calculus: Classic Edition, 5th ed. Brooks/Cole Cengage, 2000, ISBN: 9780534435387
8. Tan, Soo Tang. Calculus, 1st ed. Cengage, 2010, ISBN: 9780534465797

MANUALS:

PERIODICALS:

1. *Current periodicals, such as: Mathematics Magazine and Math Horizons,*

SOFTWARE:

SUPPLIES:

1. graph paper
2. graphing calculator

ORIGINATOR: Toni Parsons  
ORIGINATION DATE: 03/16/2016  
PROPOSAL ORIGINATOR: Juan U. Bernal  
CO-CONTRIBUTOR(S)  
PROPOSAL DATE: 10/03/2022

Status: Launched

Date Printed: 12/3/2022

# Previous Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 252
- III. Course Title:** Calculus with Analytic Geometry III
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Calculus W/ Analytic Geometry
- VIII. Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. Originating Campus:** MESA
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** City , Mesa and Miramar
- XII. Proposal Originating Date:** 03/16/2016
- XIII. Proposed Start Semester:** Fall 2016
- XIV. Field Trip:** May be required
- XV. Grading Option:** Grade Only
- XVI. Current Short Description:** Introduces the theory and applications of multivariable calculus.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 151 with a grade of "C" or better, or equivalent. Closely related Lecture/Lab paired within the same discipline
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:** All textbooks are latest editions.

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** Update outline for C-ID approval. Also update textbooks. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?** 1. Transfer
- III. Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Achievement
- V. Extraordinary Cost to the College:** None.
- VI. Library Resource Materials:** No special library resources are necessary.

### GENERAL EDUCATION ANALYSIS

#### **CSU General Education:**

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

#### **District General Education:**

# Current Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 252
- III. Course Title:** Calculus with Analytic Geometry III
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Calculus W/ Analytic Geometry
- VIII. Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. Originating Campus:** MESA
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** Miramar , Mesa and City
- XII. Proposal Originating Date:** 10/03/2022
- XIII. Proposed Start Semester:** Spring 2024
- XIV. Field Trip:** May be required
- XV. Grading Option:** Grade Only
- XVI. Current Short Description:** Introduces the theory and applications of multivariable calculus.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 151 with a grade of "C" or better, or equivalent. Closely related Lecture/Lab paired within the same discipline
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:** All textbooks are latest editions.

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** Six yr review including: 1) update DE verbiage, and 2) review & update texts. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?** 1. Transfer
- III. Current Transfer Options:** 1. IGETC 2. UC Transfer Course List 3. CSU General Education
- IV. Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Achievement
- V. Extraordinary Cost to the College:** None.
- VI. Library Resource Materials:** No special library resources are necessary.

### GENERAL EDUCATION ANALYSIS

#### **CSU General Education:**

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

#### **District General Education:**

**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Solve first-order separable differential equations.

- I. Course: MATH 151 Solve first-order separable differential equations and initial value problems.
- II. Course: MATH 151 Solve application problems involving first-order separable differential equations, such as exponential growth and decay.

Solve variable kinds of integrals including improper integrals, using techniques of integration and apply integration techniques and concepts to applied problems involving work, area, pressure.

- I. Course: MATH 151 Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.
- II. Course: MATH 151 Apply integration to physics problems relating to mass, centers of mass, work, and fluid force.

Evaluate limits including those having indeterminate forms.

- I. Course: MATH 151 Evaluate the limits of functions which have the indeterminate forms "zero/zero" and "infinity/infinity" using L'Hôpital's Rule.
- II. Course: MATH 151 Transform the other indeterminate forms into those which L'Hôpital's Rule can be implemented.

Determine the convergence and monotonicity of sequences.

- I. Course: MATH 151 Define an infinite sequence; analyze and assess the monotonicity and convergence of a given sequence.

Determine the convergence of series using different tests.

- I. Course: MATH 151 Compare the different convergence tests, including the Integral Test, the Ratio Test, the Root Test, the Comparison Test, the Limit Comparison Test, the Alternating Series Test, and the Divergence Test.
- II. Course: MATH 151 Assess the convergence of a series by formulating the comparison of the given series to a known series.
- III. Course: MATH 151 Assess if an alternating series converges absolutely, converges conditionally, or diverges.
- IV. Course: MATH 151 Analyze a series, assess which convergence tests can be applied in determining its behavior, and apply this test to show series convergence or divergence.

Calculate power series expansions of special functions.

- I. Course: MATH 151 Apply the known power series expansions of important functions to generate the series expansion of other functions.

Apply Taylor's Theorem and Taylor polynomials to approximate the values of functions at non-trivial points.

- I. Course: MATH 151 Derive the Taylor series of a given function using a variety of techniques.
- II. Course: MATH 151 Apply Taylor's Theorem and Taylor polynomials to approximate to a certain degree of accuracy, the values of functions at non-trivial points.

Graph and analyze the different conic sections.

- I. Course: MATH 151 Express a given second degree equation in the form of its standard conic equation and sketch the standard conic sections.
- II. Course: MATH 151 Analyze a conic section by rotating it to a standard position.

Sketch the graphs of polar and calculate the areas of polar regions.

**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Intermediate knowledge of calculus with analytic geometry including conic sections, intermediate and advanced integration techniques, and polar and parametric curves.

- I. Course: MATH 151 Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.
- II. Course: MATH 151 Apply integration to physics problems relating to mass, centers of mass, work, and fluid force.
- III. Course: MATH 151 Identify, analyze, and evaluate improper integrals.
- IV. Course: MATH 151 Evaluate the limits of functions which have the indeterminate forms "zero/zero" and "infinity/infinity" using L'Hôpital's Rule.
- V. Course: MATH 151 Transform the other indeterminate forms into those which L'Hôpital's Rule can be implemented.
- VI. Course: MATH 151 Express a given second degree equation in the form of its standard conic equation and sketch the standard conic sections.
- VII. Course: MATH 151 Analyze a conic section by rotating it to a standard position.
- VIII. Course: MATH 151 Sketch the graphs of functions in polar coordinates, including cardioids, lemniscates, and limaçons.
- IX. Course: MATH 151 Sketch the graphs of functions in polar coordinates, including cardioids, lemniscates, and limaçons.
- X. Course: MATH 151 Calculate the areas of polar regions.
- XI. Course: MATH 151 Calculate the areas of polar regions.
- XII. Course: MATH 151 Calculate the arc length of polar curves, and the surface area bounded by polar curves.
- XIII. Course: MATH 151 Calculate the arc length of polar curves, and the surface area bounded by polar curves.
- XIV. Course: MATH 151 Calculate the equation of tangent lines to polar curves.
- XV. Course: MATH 151 Express a curve with parametric equations.
- XVI. Course: MATH 151 Calculate the tangent lines and arc lengths of parametrized curves.
- XVII. Course: MATH 151 Calculate the tangent lines and arc lengths of parametrized curves.

**SECTION III****COURSE DISTANCE EDUCATION INFORMATION****I. CITY****II. Distance Education Methods of Instruction:** 1. Fully Online**III. Other Distance Education Methods:****IV. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly
2. Collaborative Web Documents  
as assigned
3. Conferencing  
as assigned
4. Discussion Board  
at least three times during the term
5. Email/Message System  
as needed
6. Field Trips  
as assigned
7. Group Meetings  
as assigned
8. Individual Meetings  
as needed
9. Individualized Assignment Feedback

- I. Course: MATH 151 Sketch the graphs of functions in polar coordinates, including cardioids, lemniscates, and limaçons.
- II. Course: MATH 151 Calculate the areas of polar regions.

Calculate the arclength of polar curves, and tangent lines to such curves.

- I. Course: MATH 151 Calculate the arc length of polar curves, and the surface area bounded by polar curves.
- II. Course: MATH 151 Calculate the equation of tangent lines to polar curves.
- III. Course: MATH 151 Calculate the tangent lines and arc lengths of parametrized curves.

### SECTION III

#### COURSE DISTANCE EDUCATION INFORMATION

- I. CITY
- II. Distance Education Methods of Instruction: 1. Fully Online
- III. Other Distance Education Methods:
- IV. Type and frequency of contact may include, but is not limited to:
  1. Announcements weekly
  2. Collaborative Web Documents as assigned
  3. Conferencing as assigned
  4. Discussion Board at least three times during the term
  5. Email/Message System as needed
  6. Field Trips as assigned
  7. Group Meetings as assigned
  8. Individual Meetings as needed
  9. Individualized Assignment Feedback as assigned
  10. Synchronous or Asynchronous Video as assigned
  11. Telephone Contact as needed
- V. List of Techniques: Students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.
- VI. How to Evaluate Students for Achieved Outcomes: Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- VII. Additional Resources/Materials/Information: Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. Audio Visual Library Materials: NO
- IX. MESA
- X. Distance Education Methods of Instruction: 1. Fully Online
- XI. Other Distance Education Methods:
- XII. Type and frequency of contact may include, but is not limited to:
  1. Announcements weekly
  2. Collaborative Web Documents

- as assigned
10. Synchronous or Asynchronous Video as assigned
11. Telephone Contact as needed
- V. List of Techniques: Students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.
- VI. How to Evaluate Students for Achieved Outcomes: Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- VII. Additional Resources/Materials/Information: Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. Audio Visual Library Materials: NO
- IX. MESA
- X. Distance Education Methods of Instruction: 1. Fully Online
- XI. Other Distance Education Methods:
- XII. Type and frequency of contact may include, but is not limited to:
  1. Announcements weekly  
Participant/s: Faculty to Student/s
  2. Collaborative Web Documents as assigned  
Participant/s: Faculty to Student/s , Among Students
  3. Conferencing as assigned  
Participant/s: Faculty to Student/s
  4. Discussion Board and/or Synchronous or Asynchronous Video - weekly  
Participant/s: Faculty to Student/s , Among Students
  5. Email/Message System as needed  
Participant/s: Faculty to Student/s , Among Students
  6. Field Trips as assigned  
Participant/s: Faculty to Student/s , Among Students
  7. Group Meetings as assigned  
Participant/s: Faculty to Student/s , Among Students
  8. Individual Meetings as needed  
Participant/s: Faculty to Student/s
  9. Individualized Assignment Feedback as assigned
  10. Synchronous or Asynchronous Video and/or Discussion Board - weekly  
Participant/s: Faculty to Student/s , Among Students
  11. Telephone Contact as needed  
Participant/s: Faculty to Student/s , Among Students
- XIII. List of Techniques: Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.
- XIV. How to Evaluate Students for Achieved Outcomes: Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- XV. Additional Resources/Materials/Information: Materials posted online are consistent with those required for



- as assigned
- 3. Conferencing
  - as assigned
- 4. Discussion Board
  - at least three times during the term
- 5. Email/Message System
  - as needed
- 6. Field Trips
  - as assigned
- 7. Group Meetings
  - as assigned
- 8. Individual Meetings
  - as needed
- 9. Individualized Assignment Feedback
  - as assigned
- 10. Synchronous or Asynchronous Video
  - as assigned
- 11. Telephone Contact
  - as needed

**XIII. List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.

**XIV. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XV. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Fully Online

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements
  - weekly
2. Collaborative Web Documents
  - as assigned
3. Conferencing
  - as assigned
4. Discussion Board
  - at least four times during the term with the instructor and with other students
5. Email/Message System
  - as needed
6. Group Meetings
  - as assigned
7. Individual Meetings
  - as needed
8. Individualized Assignment Feedback
  - as assigned
9. Synchronous or Asynchronous Video
  - as assigned
10. Telephone Contact

campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act).

Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Fully Online

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements
  - weekly
2. Collaborative Web Documents
  - as assigned
3. Conferencing
  - as assigned
4. Discussion Board
  - at least four times during the term with the instructor and with other students
5. Email/Message System
  - as needed
6. Group Meetings
  - as assigned
7. Individual Meetings
  - as needed
8. Individualized Assignment Feedback
  - as assigned
9. Synchronous or Asynchronous Video
  - as assigned
10. Telephone Contact
  - as needed

**XXI. List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus-based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

## SECTION IV

### COURSE STUDENT LEARNING OUTCOME(S)

#### CITY

- Students will successfully apply the computation techniques to a variety of application problems.
- Upon completion of course, students will compute limits, derivatives and integrals in the multivariate setting.

#### MESA

- Student will solve a double integral by reversing the order of integration.
- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Student will find the work done by a given force field in moving an object along a given curve.
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.



as needed

**XXI. List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus-based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

## SECTION IV

### COURSE STUDENT LEARNING OUTCOME(S)

#### CITY

- Students will successfully apply the computation techniques to a variety of application problems.
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- Student will solve a double integral by reversing the order of integration.
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- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Student will find the work done by a given force field in moving an object along a given curve.
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

#### MIRAMAR

- Calculate the critical points of a differentiable multivariable function in an open ball, and applying the second derivative test, determine if these points are relative maxima, relative minima, or saddle points.
- Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
- Apply Green's Theorems, Stokes's Theorems, and the Divergence theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units:** 4.00

**Total Units:** 4

**Lecture Hours Min:** 64.00 **Max:** 72.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

## MIRAMAR

- Calculate the critical points of a differentiable multivariable function in an open ball, and applying the second derivative test, determine if these points are relative maxima, relative minima, or saddle points.
- Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
- Apply Green's Theorems, Stokes's Theorems, and the Divergence theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units:** 4.00

**Total Units:** 4

**Lecture Hours Min:** 64.00 **Max:** 72.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 64.00 **Max:** 72.00

**Outside-of-Class Hours Min:** 128.00 **Max:** 144.00

**Total Student Learning Hours Min:** 192.00 **Max:** 216.00

**FTEF Lecture Min:** 0.2667 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2667 **Max:**

**III. Last Time Pre/Co Requisite Update:** 10/03/2022

**IV. Last Outline Revision Date:** 04/14/2016

**V. CIC Approval:**

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:**

## SECTION VI

### CREDIT FOR PRIOR LEARNING

**Total Contact Hours Min:** 64.00 **Max:**72.00  
**Outside-of-Class Hours Min:** 128.00 **Max:**144.00  
**Total Student Learning Hours Min:** 192.00 **Max:** 216.00  
**FTEF Lecture Min:** 0.2667 **Max:**  
**FTEF Lab Min:** 0.0000 **Max:**  
**FTEF Total Min:** 0.2667 **Max:**

**III. Last Time Pre/Co Requisite Update:** 03/16/2016

**IV. Last Outline Revision Date:** 04/14/2016

**V. CIC Approval:** 04/14/2016

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:** Fall 2016

#### SECTION VI

#### CREDIT FOR PRIOR LEARNING

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Mathematics 254**COURSE TITLE:**

Introduction to Linear Algebra

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course serves as an introduction to the theory and applications of elementary linear algebra, and is the basis for most upper division courses in mathematics. The topics covered in this course include matrix algebra, Gaussian Elimination, systems of equations, determinants, Euclidean and general vector spaces, linear transformations, orthogonality and inner product spaces, bases of vector spaces, the Change of Basis Theorem, eigenvalues, eigenvectors, the rank and nullity of matrices and introduction to linear transformations. This course is intended for the transfer student planning to major in mathematics, physics, engineering, computer science, operational research, economics, or other sciences.

**REQUISITES:****Prerequisite:**

MATH 151 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:**

MATH 250

**TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

## STUDENT LEARNING OBJECTIVES:

Upon successful completion of the course the student will be able to:

1. Solve systems of linear equations using several algebraic methods.
2. Construct and apply special matrices, such as symmetric, skew-symmetric, diagonal, upper triangular or lower triangular matrices.
3. Apply all the algebraic matrix operations, including multiplication of matrices, transposes, and traces.
4. Calculate the inverse of a matrix using various methods, and perform application problems involving the inverse.
5. Compute the determinant of square matrices and use the determinant to assess invertibility.
6. Derive and apply algebraic properties of determinants.
7. Perform vector operations on vectors from Euclidean Vector Spaces including vectors from  $\mathbb{R}^n$ .
8. Compute the equations of lines and planes and express them in vector form.
9. Perform linear transformations in Euclidean vector spaces, including basic linear operators, and determine the standard matrix of the linear transformation.
10. Derive whether a given structure is a vector space and identify whether a given subset of a vector space is itself a vector space.
11. Analyze whether a set of vectors spans a space, and if such a set is linearly dependent or independent.
12. Assess if a set of functions is linearly independent using various techniques including calculating the determinant of the Wronskian.
13. Solve for the basis and the dimension of a vector space.
14. Determine the rank, the nullity, the column space and the row space of a matrix.
15. Identify orthogonality between vectors in an abstract vector space by means of an inner product, and compute the inner product between vectors of any inner product space.
16. Calculate the QR-decomposition of a matrix using the Gram-Schmidt process.
17. Express a vector space via change of base, including computation of the transition matrix and determining an orthonormal basis for the space.
18. Compute all the eigenvalues of a square matrix, including any complex eigenvalues, and determine their corresponding eigenvectors.
19. Assess if a square matrix is diagonalizable and derive the diagonalization of a matrix whose eigenvalues are easily calculated.
20. Apply linear transformations among abstract general vector spaces, and derive the rank, the nullity and the associated matrix of the transformation.
21. Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Linear Systems of Equations
  - A. Elementary row operations,
  - B. Row Echelon Form and Reduced Row Echelon Form of matrices
  - C. Gaussian and Gauss-Jordan elimination
  - D. Homogeneous systems, and nonsquare systems of equations
- II. Special Matrices
  - A. Symmetric and skew-symmetric matrices
  - B. Diagonal matrices
  - C. Upper and lower triangular matrices
- III. Matrix Algebra
  - A. Linear combinations and multiplications
  - B. The transpose and trace of a matrix
  - C. The Identity Matrix and Elementary matrices
- IV. Invertibility of a Matrix

- A. The inverse of a matrix
  - B. Relationship between invertibility of a coefficient matrix and the existence of unique solutions to a square system of linear equations and using the inverse matrix to find this solution
  - C. Relationship between coefficient matrix invertibility and solutions to a system of linear equations and the inverse matrices
  - D. Invertibility of a product of matrices
- V. Determinants
  - A. Methods of evaluating the determinant
    - 1. Expansion by minors
    - 2. Row reduction
    - 3. The sum of elementary products
  - B. Invertible matrices and their determinants
  - C. Properties of the determinant
  - D. The determinant as a function
  - E. The adjoint of a matrix
  - F. Cramer's Rule
- VI. Euclidean Vector Spaces
  - A. Euclidean vectors spaces
  - B. Algebraic and geometric vector arithmetic
  - C. Vector algebra
    - 1. Vector norms and unit vectors
    - 2. Directional vectors
    - 3. The Dot Product
    - 4. The Cross Product
  - D. Vector form of lines and of planes in  $\mathbb{R}^3$  and  $\mathbb{R}^n$
  - E. Properties of the Dot Product
  - F. Orthogonality of vectors and orthogonal projections
  - G. Properties of the Cross Product
  - H. Distance between parallel planes, between skew lines, between a point and any line, and between a point and any plane
- VII. The Cauchy-Schwarz and Triangle Inequalities
- VIII. Linear Transformations Among Euclidean Vector Spaces
  - A. Linear transformation as a function
  - B. The standard matrix for a linear transformation
  - C. Linear Operators
    - 1. Identity operators
    - 2. Rotational operators
    - 3. Dilation or contraction operators
- IX. Abstract Vector Spaces
  - A. Definition of a vector space
  - B. Vector subspaces
  - C. The span of a set of vectors
  - D. Linear independence and dependence
  - E. The basis of a vector space
  - F. The dimension of a vector space
  - G. Finite-dimensional vs. infinite-dimensional
  - H. The Wronskian of a set of  $n$ -times differentiable functions
- X. Spaces Spanned by Matrices
  - A. The row space
  - B. The column space
  - C. The rank of a matrix
  - D. The nullity of a matrix
  - E. The nullspace generated by a matrix
- XI. Inner products on a real vector space
  - A. Inner products
  - B. Weighted inner products
  - C. Distance between vectors
  - D. The norm of a vector
  - E. Generalized geometric concepts:

1. Angle between vectors in  $\mathbb{R}^n$  and general vector spaces
  2. The Cauchy-Schwarz Inequality
  3. The Triangle Inequality
  4. Orthogonality
- F. The orthogonal complement of a subspace
- XII. Orthonormal Bases
- A. Orthonormal bases
  - B. The Gram-Schmidt Process
  - C. The QR-decomposition of an  $m \times n$  matrix
  - D. Orthogonal Matrices
  - E. Change of bases for a vector space
  - F. The transition matrix between the two sets of bases
  - G. The coordinate matrix relative to the old basis and the coordinate matrix relative to the new basis
- XIII. Eigenvalues and Eigenvectors
- A. The Characteristic Polynomial
  - B. The Characteristic equation
  - C. Eigenvalues of diagonal and triangular matrices
  - D. Eigenvalues and invertibility
  - E. Eigenspace
- XIV. Diagonalization
- A. Diagonalizable matrices
  - B. The multiplicity of an eigenvalue
  - C. Orthogonal Diagonalization
  - D. Distribution and output effects of inflation
  - E. Global considerations
- XV. General Linear Transformations
- A. The Rank
  - B. The Nullity
  - C. The Range
  - D. The Kernel
  - E. Matrices of general linear transformations
- XVI. Proofs and proof-writing techniques.

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned textbook(s)
- II. Other math books or journals such as The College Math Journal, Math Horizons, or Mathematics Magazine
- III. Linear Algebra-related topics found on the internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

A substantial portion of this course is dedicated to reading and proving mathematical statements. The students will be required to follow the proofs presented in lecture as well as in the reading, and be able to formulate logical arguments as part of the written homework assignments. The students are also expected to prove simple elementary mathematical statements using proper logic techniques and analytical reasoning.

- I. Written solutions to problems using proper mathematical terminology involving but not limited to:
  - A. Solving systems of equations using a variety of techniques
  - B. Solving problems involving matrix algebra including the inverse of a matrix
  - C. Calculating determinants of matrices and solving problems involving applications of determinants
  - D. Solving problems involving general Euclidean vector spaces that develop the theory of vectors in  $\mathbb{R}^n$
  - E. Solving problems involving linear transformations in Euclidean and abstract vector spaces
  - F. Solving problems that develop the theory of abstract vector spaces
  - G. Calculating the rank, nullity, and nullspace of a matrix
  - H. Solving problems that develop the theory of inner product spaces

- I. Applying the Gram-Schmidt process to calculate an orthonormal set of vectors from a linearly independent set of vectors
- J. Calculating the eigenvalues and eigenvectors of a matrix
- K. Calculating the rank, nullity, kernel, and associated matrix of a general linear transformation
- II. Journal writing with a focus on mathematical calculations, problem solving techniques, and applied problems
- III. Essay homework or test questions that may include but are not limited to describing in complete sentences and using proper mathematical terminology proofs of mathematical statements, procedures for performing complicated computations, or the solutions to applied problems
- IV. A formal report analyzing some topic or person appropriate to mathematics
- V. Proving basic results in linear algebra using appropriate proof-writing techniques

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of linear algebra. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Derive, MathCad, MPP, Matlab, or Mathematica are strongly encouraged.

- I. Reading and writing assignments as specified in the course syllabus
- II. Reading and reviewing lecture notes
- III. Conducting library, electronic and other archival research
- IV. Viewing assigned/recommended media materials
- V. Attending pertinent lectures/conferences
- VI. Completing an analytical semester project
- VII. Developing problem solving techniques and analytical skills by solving problems found in research papers.
- VIII. Preparing collaborative projects focusing on expanding mathematical concepts presented in class

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- II. Analyzing and solving problems
- III. Applying various mathematical concepts in interpreting applications and in solving applied problems
- IV. Investigating a greater variety of problems including applications of principles in a number of different contexts
- V. Developing proofs for mathematical statements

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. In-class objective quizzes
- II. In-class examinations
- III. Comprehensive final examination that tests for definitions, analytical thinking, problem solving techniques, and major mathematical concepts
- IV. Take-home essay examinations
- V. Analytical semester projects
- VI. Written reports on related subjects
- VII. Exploratory activities involving a graphing calculator or computer
- VIII. Class participation, including: A. Participation in classroom discussion; B. Participation in collaborative assignments; and C. Oral presentations on a variety of linear algebra subjects
- IX. Group projects

X. Field trips

XI. Supplementary activities, including: A. Library and internet research; B. Current periodical reviews

### 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Lecture-Lab Combination
- \* Other (Specify)
- \* A. Guest speakers
- \* B. Field observations or field trips.

### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

#### TEXTBOOKS:

1. Anton, Howard and Chris Rorres. Elementary Linear Algebra with Applications, Student Solutions Manual, 10th ed. Wiley, 2010, ISBN: 9780470458228
2. Anton, Howard, et al. Elementary Linear Algebra: Applications Version, 12th ed. Wiley, 2019, ISBN: 9781119666141
3. Bretscher, Otto. Linear Algebra with Applications, 5th ed. Pearson, 2013, ISBN: 9780321796974
4. Hill, David and David Zitarelli. Linear Algebra Labs with MATLAB, 3rd ed. Pearson, 2004, ISBN: 9780131432741
5. Johnson, Lee W., R. Dean Riess, and Jimmy T. Arnold. Introduction to Linear Algebra, 5th ed. Pearson, 2002, ISBN: 9780201658590
6. Kolman, Bernard and David Hill. Elementary Linear Algebra with Applications, 9th ed. Pearson, 2007, ISBN: 9780132296540
7. Larson, Ron. Elementary Linear Algebra, 8th ed. Cengage Learning, 2016, ISBN: 9781305658004
8. Lay, David C., Steven R. Lay, and Judi J. McDonald. Linear Algebra and Its Applications, 5th ed. Pearson, 2015, ISBN: 9780321982384
9. Leon, Steven J. and Lisette de Pillis. Linear Algebra with Applications, 10th ed. Pearson, 2021, ISBN: 9781292354866
10. Lipschutz, Seymour and Marc Lipson. Schaums Outline Series, Linear Algebra, 6th ed. McGraw-Hill, 2017, ISBN: 9781260011449

#### MANUALS:

#### PERIODICALS:

1. *Math Horizons*,
2. *Mathematics Magazine*, Volume 1-12,

#### SOFTWARE:

#### SUPPLIES:

1. Graphing calculator
2. Graph paper
3. USB flash drive
4. Journal



**ORIGINATOR:** Shayne Vargo  
**ORIGINATION DATE:** 11/03/2015  
**PROPOSAL ORIGINATOR:** Juan U. Bernal  
**CO-CONTRIBUTOR(S)**  
**PROPOSAL DATE:** 10/03/2022

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
COURSE PROPOSAL IMPACT REPORT**

**COURSE TO BE PROPOSED: MATH 254**  
Introduction to Linear Algebra

**ACTIVE/APPROVED COURSES IMPACTED:**

MATH 254 Introduction to Linear Algebra (29371)

Prerequisite

MATH 255 (Active)

**DISTRICT GENERAL EDUCATION:**

A2 Language and Rationality - Communication & Analytical Thinking

**ACTIVE/APPROVED/PROPOSED PROGRAMS IMPACTED:**

( City )

Applied Mathematics \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( Mesa )

Applied Mathematics \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( City )

Applied Mathematics \*Approved\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( Mesa )

Liberal Arts and Sciences: Social and Behavioral Sciences-Economics \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 12 units:

( Mesa )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Computer Science \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 5 units:

( Mesa )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Engineering \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 3 units:

( **Mesa** )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Mathematics \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 5 units:

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Chemistry \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 8 units:

( **City** )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Active\*;  
**Associate of Arts Degree**

Major Courses

( **City** )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Launched\*;  
**Associate of Arts Degree**

Major Courses

( **Mesa** )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Category A: Select one course from the following (3 units):

( **Miramar** )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Major Courses

( **City** )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Select one of the following courses if not selected above: (It is recommended that students select courses that meet lower division major preparation requirements for their transfer university.)

( **City** )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Select one of the following courses:

( **Mesa** )

Mathematics \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( City )

Mathematics \*Active\*;

**Associate of Arts Degree**

Courses Required for the Major:

( City )

Mathematics \*Approved\*;

**Associate of Arts Degree**

Courses Required for the Major:

( Miramar )

Mathematics Studies \*Active\*;

**Associate of Arts Degree**

Select at least 5 units from the following:

# SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

## Course Outline of Record: Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Mathematics
- II. **Course Number:** 254
- III. **Course Title:** Introduction to Linear Algebra
- IV. **Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.
- VI. **Family:**
- VII. **Current Short Title:** Introduction to Linear Algebra
- VIII. **Course Is Active/Where?** MESA , MIRAMAR AND CITY
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** City
- XII. **Proposal Originating Date:** 10/03/2022
- XIII. **Proposed Start Semester:** Spring 2024
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Covers matrix algebra, Gaussian elimination, determinants, vector spaces, and linear transformations.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: MATH 151 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:** Texts are most current editions - 10/2022.

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six yr review including: 1) update DE from online course to fully online, and update verbiage, and 2) review & update texts (Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. District general education
- V. **Extraordinary Cost to the College:** None.
- VI. **Library Resource Materials:** Copy of current textbook available at the library.

#### GENERAL EDUCATION ANALYSIS

##### **CSU General Education:**

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

##### **District General Education:**

A2 Language and Rationality - Communication & Analytical Thinking

##### **IGETC:**

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

**Solve first-order separable differential equations and initial value problems.**

- I. Course: MATH 151 Solve first-order separable differential equations and initial value problems.**

**Solve application problems involving first-order separable differential equations, such as exponential growth and decay.**

- I. Course: MATH 151 Solve application problems involving first-order separable differential equations, such as exponential growth and decay.**

**Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.**

- I. Course: MATH 151 Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.**

**SECTION III**

**COURSE DISTANCE EDUCATION INFORMATION**

**I. MESA**

**II. Distance Education Methods of Instruction:** 1. Fully Online

**III. Other Distance Education Methods:**

**IV. Type and frequency of contact may include, but is not limited to:**

1. Announcements

as needed

**Participant/s:** Faculty to Student/s

2. Discussion Board

and/or Synchronous or Asynchronous Video - weekly

**Participant/s:** Faculty to Student/s , Among Students

3. Email/Message System

as needed

**Participant/s:** Faculty to Student/s , Among Students

4. Synchronous or Asynchronous Video

and/or Discussion Board - weekly

**Participant/s:** Faculty to Student/s , Among Students

5. Telephone Contact

as needed

**Participant/s:** Faculty to Student/s , Among Students

**V. List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication.

1. Frequent online homework via a course management system published by publishing companies. 2. Systematic and frequent review of students' participation and activity with the use of a course management software, like WebCT, or BlackBoard. 3. Periodic communication via email and correspondence will be required from the part of the students. 4. All online material will come from the same text as the regular lecture courses. 5. Testing will be done on a timed basis, where students have a very limited time to complete the posted exams.

**VI. How to Evaluate Students for Achieved Outcomes:** 1. The students will be required to turn in homework online, as well as submit via fax, or scanned pdf file assignments and exams. 2. Regular participation demonstrated by the course management software log will be required by the students. 3. Online group projects will be required from all students. 4. Students will be required to submit homework assignments on a regular basis as is delineated by the course schedule developed by the instructor.

**VII. Additional Resources/Materials/Information:** Students taking a class that is delivered online will be required to have access to appropriate technology to meet their needs. All materials, with the exception of the text, will disseminated via the technology. SDCCD and DSPS personnel will provide all needed accommodations. DSPS will

provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**VIII. Audio Visual Library Materials: NO**

**IX. MIRAMAR**

**X. Distance Education Methods of Instruction:** 1. On-line/Web Based 2. On-line course 3. Other

**XI. Other Distance Education Methods:** Hybrid - traditional with online components.

**XII. Type and frequency of contact may include, but is not limited to:**

1. E-mail  
weekly
2. Field Trips  
as assigned
3. Group Meetings  
as assigned
4. Individual Meetings  
as needed
5. Telephone Contact  
as needed
6. Threaded Conferencing  
at least twice during the term
7. Voice Mail  
as needed

**XIII. List of Techniques:** 1. Frequent online homework via a course management system published by publishing companies. 2. Systematic and frequent review of students' participation and activity with the use of a course management software such as BlackBoard. 3. Periodic communication via email and correspondence will be required from the part of the students. 4. All online material will come from the same text as the regular lecture courses. 5. Testing will be done on a timed basis, where students have a very limited time to complete the posted exams.

**XIV. How to Evaluate Students for Achieved Outcomes:** 1. The students will be required to turn in homework online, as well as submit via fax, or scanned pdf file assignments and exams. 2. Regular participation demonstrated by the course management software log will be required by the students. 3. Online group projects will be required from all students. 4. Students will be required to submit homework assignments on a regular basis as is delineated by the course schedule developed by the instructor.

**XV. Additional Resources/Materials/Information:** Students taking a class that is delivered online will be required to have access to appropriate technology to meet their needs. All materials, with the exception of the text, will disseminated via the technology. Additional resources and/or materials will not be necessary. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials: NO**

**XVII. CITY**

**XVIII. Distance Education Methods of Instruction:** 1. Fully Online 2. Hybrid only 3. Partially online only

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly
2. Collaborative Web Documents  
as assigned
3. Conferencing  
as assigned
4. Discussion Board  
at least three times during the term
5. Email/Message System  
as needed
6. Field Trips  
as assigned
7. Group Meetings  
as assigned
8. Individual Meetings

as needed

9. Individualized Assignment Feedback

as assigned

10. Synchronous or Asynchronous Video

as assigned

11. Telephone Contact

as needed

**XXI. List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

## **SECTION IV**

### **COURSE STUDENT LEARNING OUTCOME(S)**

#### **CITY**

- Students will solve problems involving systems of equations, vectors, matrices, and general linear transformations by using standard techniques of linear algebra.

#### **MESA**

- Students will be able to orthogonally diagonalize a 3x3 symmetric matrix.
- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Students will be able to find bases for the three fundamental subspaces of a matrix (row space, col space, and nullspace).
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

#### **MIRAMAR**

- Solve dependent systems of linear equations using Gaussian elimination and state their solutions parametrically; solve independent systems using Gaussian eliminations or the inverse of the coefficient matrix; identify systems of linear equations which are inconsistent.
- Solve applications involving several variables and several linear equations by solving the corresponding system of linear equations.
- Compute the eigenvalues and corresponding eigenvectors of a square matrix, and diagonalize the matrix if possible.

## **SECTION V**

### **COURSE DATA ADMINISTRATION ELEMENTS**



**I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

**II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

**III. Last Time Pre/Co Requisite Update:** 10/03/2022

**IV. Last Outline Revision Date:** 04/14/2016

**V. CIC Approval:**

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:**

**SECTION VI**

**CREDIT FOR PRIOR LEARNING**

MATH 254

**Previous Report**

CIC Approval: 04/14/2016  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM: Spring 2017

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Mathematics 254**COURSE TITLE:**

Introduction to Linear Algebra

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course serves as an introduction to the theory and applications of elementary linear algebra, and is the basis for most upper division courses in mathematics. The topics covered in this course include matrix algebra, Gaussian Elimination, systems of equations, determinants, Euclidean and general vector spaces, linear transformations, orthogonality and inner product spaces, bases of vector spaces, the Change of Basis Theorem, eigenvalues, eigenvectors, the rank and nullity of matrices and introduction to linear transformations. This course is intended for the transfer student planning to major in mathematics, physics, engineering, computer science, operational research, economics, or other sciences.

**REQUISITES:****Prerequisite:**

MATH 151 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:**

MATH 250

**TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Solve systems of linear equations using several algebraic methods.
2. Construct and apply special matrices, such as symmetric, skew-symmetric, diagonal, upper triangular or lower triangular matrices.
3. Apply all the algebraic matrix operations, including multiplication of matrices, transposes, and traces.
4. Calculate the inverse of a matrix using various methods, and perform application problems involving the inverse.

**Current Report**

MATH 254

CIC Approval:  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM:

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
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**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Mathematics 254**COURSE TITLE:**

Introduction to Linear Algebra

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This course serves as an introduction to the theory and applications of elementary linear algebra, and is the basis for most upper division courses in mathematics. The topics covered in this course include matrix algebra, Gaussian Elimination, systems of equations, determinants, Euclidean and general vector spaces, linear transformations, orthogonality and inner product spaces, bases of vector spaces, the Change of Basis Theorem, eigenvalues, eigenvectors, the rank and nullity of matrices and introduction to linear transformations. This course is intended for the transfer student planning to major in mathematics, physics, engineering, computer science, operational research, economics, or other sciences.

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3. Apply all the algebraic matrix operations, including multiplication of matrices, transposes, and traces.
4. Calculate the inverse of a matrix using various methods, and perform application problems involving the inverse.
5. Compute the determinant of square matrices and use the determinant to assess invertibility.
6. Derive and apply algebraic properties of determinants.

5. Compute the determinant of square matrices and use the determinant to assess invertibility.
6. Derive and apply algebraic properties of determinants.
7. Perform vector operations on vectors from Euclidean Vector Spaces including vectors from  $\mathbb{R}^n$ .
8. Compute the equations of lines and planes and express them in vector form.
9. Perform linear transformations in Euclidean vector spaces, including basic linear operators, and determine the standard matrix of the linear transformation.
10. Derive whether a given structure is a vector space and identify whether a given subset of a vector space is itself a vector space.
11. Analyze whether a set of vectors spans a space, and if such a set is linearly dependent or independent.
12. Assess if a set of functions is linearly independent using various techniques including calculating the determinant of the Wronskian.
13. Solve for the basis and the dimension of a vector space.
14. Determine the rank, the nullity, the column space and the row space of a matrix.
15. Identify orthogonality between vectors in an abstract vector space by means of an inner product, and compute the inner product between vectors of any inner product space.
16. Calculate the QR-decomposition of a matrix using the Gram-Schmidt process.
17. Express a vector space via change of base, including computation of the transition matrix and determining an orthonormal basis for the space.
18. Compute all the eigenvalues of a square matrix, including any complex eigenvalues, and determine their corresponding eigenvectors.
19. Assess if a square matrix is diagonalizable and derive the diagonalization of a matrix whose eigenvalues are easily calculated.
20. Apply linear transformations among abstract general vector spaces, and derive the rank, the nullity and the associated matrix of the transformation.
21. Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Linear Systems of Equations
  - A. Elementary row operations
  - B. Row Echelon Form and Reduced Row Echelon Form of matrices
  - C. Gaussian and Gauss-Jordan elimination
  - D. Homogeneous systems and nonsquare systems of equations
- II. Special Matrices
  - A. Symmetric and skew-symmetric matrices
  - B. Diagonal matrices
  - C. Upper and lower triangular matrices
- III. Matrix Algebra
  - A. Linear combinations and multiplications
  - B. The transpose and trace of a matrix
  - C. The Identity Matrix and Elementary matrices
- IV. Invertibility of a Matrix
  - A. The inverse of a matrix
  - B. Relationship between invertibility of a coefficient matrix and the existence of unique solutions to a square system of linear equations and using the inverse matrix to find this solution
  - C. Relationship between coefficient matrix invertibility and solutions to a system of linear equations and the inverse matrices
  - D. Invertibility of a product of matrices
- V. Determinants
  - A. Methods of evaluating the determinant
    1. Expansion by minors
    2. Row reduction
    3. The sum of elementary products
  - B. Invertible matrices and their determinants
  - C. Properties of the determinant
  - D. The determinant as a function
  - E. The adjoint of a matrix
  - F. Cramer's Rule
- VI. Euclidean Vector Spaces
  - A. Euclidean vectors spaces
  - B. Algebraic and geometric vector arithmetic
  - C. Vector algebra
    1. Vector norms and unit vectors
    2. Directional vectors

7. Perform vector operations on vectors from Euclidean Vector Spaces including vectors from  $\mathbb{R}^n$ .
8. Compute the equations of lines and planes and express them in vector form.
9. Perform linear transformations in Euclidean vector spaces, including basic linear operators, and determine the standard matrix of the linear transformation.
10. Derive whether a given structure is a vector space and identify whether a given subset of a vector space is itself a vector space.
11. Analyze whether a set of vectors spans a space, and if such a set is linearly dependent or independent.
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  - A. Linear combinations and multiplications
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  - A. The inverse of a matrix
  - B. Relationship between invertibility of a coefficient matrix and the existence of unique solutions to a square system of linear equations and using the inverse matrix to find this solution
  - C. Relationship between coefficient matrix invertibility and solutions to a system of linear equations and the inverse matrices
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  - A. Euclidean vectors spaces
  - B. Algebraic and geometric vector arithmetic
  - C. Vector algebra
    1. Vector norms and unit vectors
    2. Directional vectors
    3. The Dot Product

- 3. The Dot Product
- 4. The Cross Product
- D. Vector form of lines and of planes in  $\mathbb{R}^3$  and  $\mathbb{R}^n$
- E. Properties of the Dot Product
- F. Orthogonality of vectors and orthogonal projections
- G. Properties of the Cross Product
- H. Distance between parallel planes between skew lines between a point and any line and between a point and any plane
- VII. The Cauchy-Schwarz and Triangle Inequalities
- VIII. Linear Transformations Among Euclidean Vector Spaces
  - A. Linear transformation as a function
  - B. The standard matrix for a linear transformation
  - C. Linear Operators
    - 1. Identity operators
    - 2. Rotational operators
    - 3. Dilation or contraction operators
- IX. Abstract Vector Spaces
  - A. Definition of a vector space
  - B. Vector subspaces
  - C. The span of a set of vectors
  - D. Linear independence and dependence
  - E. The basis of a vector space
  - F. The dimension of a vector space
  - G. Finite-dimensional vs. infinite-dimensional
  - H. The Wronskian of a set of  $n$ -times differentiable functions
- X. Spaces Spanned by Matrices
  - A. The row space
  - B. The column space
  - C. The rank of a matrix
  - D. The nullity of a matrix
  - E. The nullspace generated by a matrix
- XI. Inner products on a real vector space
  - A. Inner products
  - B. Weighted inner products
  - C. Distance between vectors
  - D. The norm of a vector
  - E. Generalized geometric concepts:
    - 1. Angle between vectors in  $\mathbb{R}^n$  and general vector spaces
    - 2. The Cauchy-Schwarz Inequality
    - 3. The Triangle Inequality
    - 4. Orthogonality
  - F. The orthogonal complement of a subspace
- XII. Orthonormal Bases
  - A. Orthonormal bases
  - B. The Gram-Schmidt Process
  - C. The QR-decomposition of an  $m \times n$  matrix
  - D. Orthogonal Matrices
  - E. Change of bases for a vector space
  - F. The transition matrix between the two sets of bases
  - G. The coordinate matrix relative to the old basis and the coordinate matrix relative to the new basis
- XIII. Eigenvalues and Eigenvectors
  - A. The Characteristic Polynomial
  - B. The Characteristic equation
  - C. Eigenvalues of diagonal and triangular matrices
  - D. Eigenvalues and invertibility
  - E. Eigenspace
- XIV. Diagonalization
  - A. Diagonalizable matrices
  - B. The multiplicity of an eigenvalue
  - C. Orthogonal Diagonalization
  - D. Distribution and output effects of inflation
  - E. Global considerations
- XV. General Linear Transformations
  - A. The Rank
  - B. The Nullity
  - C. The Range
  - D. The Kernel
  - E. Matrices of general linear transformations
- XVI. Proofs and proof-writing techniques.

## B. Reading Assignments:

- 4. The Cross Product
- D. Vector form of lines and of planes in  $\mathbb{R}^3$  and  $\mathbb{R}^n$
- E. Properties of the Dot Product
- F. Orthogonality of vectors and orthogonal projections
- G. Properties of the Cross Product
- H. Distance between parallel planes between skew lines between a point and any line and between a point and any plane
- VII. The Cauchy-Schwarz and Triangle Inequalities
- VIII. Linear Transformations Among Euclidean Vector Spaces
  - A. Linear transformation as a function
  - B. The standard matrix for a linear transformation
  - C. Linear Operators
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  - A. Definition of a vector space
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  - D. Linear independence and dependence
  - E. The basis of a vector space
  - F. The dimension of a vector space
  - G. Finite-dimensional vs. infinite-dimensional
  - H. The Wronskian of a set of  $n$ -times differentiable functions
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  - A. The row space
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  - C. The rank of a matrix
  - D. The nullity of a matrix
  - E. The nullspace generated by a matrix
- XI. Inner products on a real vector space
  - A. Inner products
  - B. Weighted inner products
  - C. Distance between vectors
  - D. The norm of a vector
  - E. Generalized geometric concepts:
    - 1. Angle between vectors in  $\mathbb{R}^n$  and general vector spaces
    - 2. The Cauchy-Schwarz Inequality
    - 3. The Triangle Inequality
    - 4. Orthogonality
  - F. The orthogonal complement of a subspace
- XII. Orthonormal Bases
  - A. Orthonormal bases
  - B. The Gram-Schmidt Process
  - C. The QR-decomposition of an  $m \times n$  matrix
  - D. Orthogonal Matrices
  - E. Change of bases for a vector space
  - F. The transition matrix between the two sets of bases
  - G. The coordinate matrix relative to the old basis and the coordinate matrix relative to the new basis
- XIII. Eigenvalues and Eigenvectors
  - A. The Characteristic Polynomial
  - B. The Characteristic equation
  - C. Eigenvalues of diagonal and triangular matrices
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- XIV. Diagonalization
  - A. Diagonalizable matrices
  - B. The multiplicity of an eigenvalue
  - C. Orthogonal Diagonalization
  - D. Distribution and output effects of inflation
  - E. Global considerations
- XV. General Linear Transformations
  - A. The Rank
  - B. The Nullity
  - C. The Range
  - D. The Kernel
  - E. Matrices of general linear transformations
- XVI. Proofs and proof-writing techniques.

## B. Reading Assignments:

Reading assignments are required and may include, but are not limited to, the following:

Reading assignments are required and may include, but are not limited to, the following:

- I. Assigned textbook(s)
- II. Other math books or journals such as The College Math Journal, Math Horizons, or Mathematics Magazine
- III. Linear Algebra-related topics found on the internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

A substantial portion of this course is dedicated to reading and proving mathematical statements. The students will be required to follow the proofs presented in lecture as well as in the reading, and be able to formulate logical arguments as part of the written homework assignments. The students are also expected to prove simple elementary mathematical statements using proper logic techniques and analytical reasoning.

**I. Written solutions to problems using proper mathematical terminology involving but not limited to:**

- A. Solving systems of equations using a variety of techniques
- B. Solving problems involving matrix algebra including the inverse of a matrix
- C. Calculating determinants of matrices and solving problems involving applications of determinants
- D. Solving problems involving general Euclidean vectors spaces that develop the theory of vectors in  $\mathbb{R}^n$
- E. Solving problems involving linear transformations in Euclidean and abstract vector spaces
- F. Solving problems that develop the theory of abstract vector spaces
- G. Calculating the rank, nullity, and nullspace of a matrix
- H. Solving problems that develop the theory of inner product spaces

I. Applying the Gram-Schmidt process to calculate an orthonormal set of vectors form a linearly independent set of vectors

- J. Calculating the eigenvalues and eigenvectors of a matrix
- K. Calculating the rank, nullity, kernel, and associated matrix of a general linear transformation

**II. Journal writing with a focus on mathematical calculations, problem solving techniques, and applied problems**

III. Essay homework or test questions that may include but are not limited to describing in complete sentences and using proper mathematical terminology proofs of mathematical statements, procedures for performing complicated computations, or the solutions to applied problems

**IV. A formal report analyzing some topic or person appropriate to mathematics**

**V. Proving basic results in linear algebra using appropriate proof-writing techniques**

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of linear algebra. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Derive, MathCad, MPP, Matlab, or Mathematica are strongly encouraged.

**I. Reading and writing assignments as specified in the course syllabus**

**II. Reading and reviewing lecture notes**

**III. Conducting library, electronic and other archival research**

**IV. Viewing assigned/recommended media materials**

**V. Attending pertinent lectures/conferences**

**VI. Completing an analytical semester project**

**VII. Developing problem solving techniques and analytical skills by solving problems found in research papers.**

**VIII. Preparing collaborative projects focusing on expanding mathematical concepts presented in class**

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

**I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques**

**II. Analyzing and solving problems**

**III. Applying various mathematical concepts in interpreting applications and in solving applied problems**

**IV. Investigating a greater variety of problems including applications of principles in a number of different contexts**

**V. Developing proofs for mathematical statements**

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

**I. In-class objective quizzes**

**II. In-class examinations**

**III. Comprehensive final examination that tests for definitions, analytical thinking, problem solving techniques, and major mathematical concepts**

**IV. Take-home essay examinations**

**V. Analytical semester projects**

**VI. Written reports on related subjects**

**I. Assigned textbook(s)**

**II. Other math books or journals such as The College Math Journal, Math Horizons, or Mathematics Magazine**

**III. Linear Algebra-related topics found on the internet**

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

A substantial portion of this course is dedicated to reading and proving mathematical statements. The students will be required to follow the proofs presented in lecture as well as in the reading, and be able to formulate logical arguments as part of the written homework assignments. The students are also expected to prove simple elementary mathematical statements using proper logic techniques and analytical reasoning.

**I. Written solutions to problems using proper mathematical terminology involving but not limited to:**

- A. Solving systems of equations using a variety of techniques
- B. Solving problems involving matrix algebra including the inverse of a matrix
- C. Calculating determinants of matrices and solving problems involving applications of determinants
- D. Solving problems involving general Euclidean vectors spaces that develop the theory of vectors in  $\mathbb{R}^n$
- E. Solving problems involving linear transformations in Euclidean and abstract vector spaces
- F. Solving problems that develop the theory of abstract vector spaces
- G. Calculating the rank, nullity, and nullspace of a matrix
- H. Solving problems that develop the theory of inner product spaces
- I. Applying the Gram-Schmidt process to calculate an orthonormal set of vectors form a linearly independent set of vectors

**J. Calculating the eigenvalues and eigenvectors of a matrix**

**K. Calculating the rank, nullity, kernel, and associated matrix of a general linear transformation**

**II. Journal writing with a focus on mathematical calculations, problem solving techniques, and applied problems**

III. Essay homework or test questions that may include but are not limited to describing in complete sentences and using proper mathematical terminology proofs of mathematical statements, procedures for performing complicated computations, or the solutions to applied problems

**IV. A formal report analyzing some topic or person appropriate to mathematics**

**V. Proving basic results in linear algebra using appropriate proof-writing techniques**

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

Students are expected to spend a minimum of two hours outside of class time in practice and preparation for each hour of lecture. This time is intended to be spent in appropriate reading and written assignments, problem solving, and the understanding of the applications and the theory of linear algebra. Demonstrations and use of spreadsheet programs such as Microsoft Excel and Computer Algebraic Systems (CAS) packages such as Maple, Derive, MathCad, MPP, Matlab, or Mathematica are strongly encouraged.

**I. Reading and writing assignments as specified in the course syllabus**

**II. Reading and reviewing lecture notes**

**III. Conducting library, electronic and other archival research**

**IV. Viewing assigned/recommended media materials**

**V. Attending pertinent lectures/conferences**

**VI. Completing an analytical semester project**

**VII. Developing problem solving techniques and analytical skills by solving problems found in research papers.**

**VIII. Preparing collaborative projects focusing on expanding mathematical concepts presented in class**

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

**I. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques**

**II. Analyzing and solving problems**

**III. Applying various mathematical concepts in interpreting applications and in solving applied problems**

**IV. Investigating a greater variety of problems including applications of principles in a number of different contexts**

**V. Developing proofs for mathematical statements**

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

**I. In-class objective quizzes**

**II. In-class examinations**

**III. Comprehensive final examination that tests for definitions, analytical thinking, problem solving techniques, and major mathematical concepts**

**IV. Take-home essay examinations**

**V. Analytical semester projects**

**VI. Written reports on related subjects**

**VII. Exploratory activities involving a graphing calculator or computer**

- VII. Exploratory activities involving a graphing calculator or computer  
VIII. Class participation, including: A. Participation in classroom discussion; B. Participation in collaborative assignments; and C. Oral presentations on a variety of linear algebra subjects  
IX. Group projects  
X. Field trips  
XI. Supplementary activities, including: A. Library and internet research; B. Current periodical reviews

### 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Lecture-Lab Combination
- \* Other (Specify)
- \* A. Guest speakers
- \* B. Field observations or field trips.

### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

#### TEXTBOOKS:

1. Anton, Howard and Chris Rorres. Elementary Linear Algebra with Applications, Student Solutions Manual, 10th ed. Wiley, 2010, ISBN: 9780470458228
2. Anton, Howard and Rorres, Chris. Elementary Linear Algebra: Applications Version, 10th ed. Wiley, 2010, ISBN: 9780470432051
3. Bretscher, Otto. Linear Algebra with Applications, 5th ed. Pearson, 2013, ISBN: 9780321796974
4. Hill, David and David Zitarelli. Linear Algebra Labs with MATLAB, 3rd ed. Pearson, 2004, ISBN: 9780131432741
5. Johnson, Lee W., R. Dean Riess, and Jimmy T. Arnold. Introduction to Linear Algebra, 5th ed. Pearson, 2002, ISBN: 9780201658590
6. Kolman, Bernard and David Hill. Elementary Linear Algebra with Applications, 9th ed. Pearson, 2007, ISBN: 9780132296540
7. Larson, Ron. Elementary Linear Algebra, 7th ed. Brooks Cole, 2013, ISBN: 9781133110873
8. Lay, David C., Steven R. Lay, and Judi J. McDonald. Linear Algebra and Its Applications, 5th ed. Pearson, 2015, ISBN: 9780321982384
9. Leon, Steven J. Linear Algebra with Applications, 9th ed. Pearson, 2014, ISBN: 9780321962218
10. Lipschutz, Seymour and Lipson, Marc. Schaums Outline Series, Linear Algebra, 5th ed. McGraw-Hill, 2013, ISBN: 9780071794565

#### MANUALS:

#### PERIODICALS:

1. *Math Horizons*,
2. *Mathematics Magazine*, Volume 1-12,

#### SOFTWARE:

#### SUPPLIES:

1. Graphing calculator
2. Graph paper
3. USB flash drive
4. Journal

ORIGINATOR: Shayne Vargo

CO-CONTRIBUTOR(S) Duane Short  
DATE: 11/03/2015

- VIII. Class participation, including: A. Participation in classroom discussion; B. Participation in collaborative assignments; and C. Oral presentations on a variety of linear algebra subjects  
IX. Group projects  
X. Field trips  
XI. Supplementary activities, including: A. Library and internet research; B. Current periodical reviews

### 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning
- \* Computer Assisted Instruction
- \* Distance Education (Fully online)
- \* Learning Modules
- \* Lecture
- \* Lecture Discussion
- \* Lecture-Lab Combination
- \* Other (Specify)
- \* A. Guest speakers
- \* B. Field observations or field trips.

### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

#### TEXTBOOKS:

1. Anton, Howard and Chris Rorres. Elementary Linear Algebra with Applications, Student Solutions Manual, 10th ed. Wiley, 2010, ISBN: 9780470458228
2. Anton, Howard, et al. Elementary Linear Algebra: Applications Version, 12th ed. Wiley, 2019, ISBN: 9781119666141
3. Bretscher, Otto. Linear Algebra with Applications, 5th ed. Pearson, 2013, ISBN: 9780321796974
4. Hill, David and David Zitarelli. Linear Algebra Labs with MATLAB, 3rd ed. Pearson, 2004, ISBN: 9780131432741
5. Johnson, Lee W., R. Dean Riess, and Jimmy T. Arnold. Introduction to Linear Algebra, 5th ed. Pearson, 2002, ISBN: 9780201658590
6. Kolman, Bernard and David Hill. Elementary Linear Algebra with Applications, 9th ed. Pearson, 2007, ISBN: 9780132296540
7. Larson, Ron. Elementary Linear Algebra, 8th ed. Cengage Learning, 2016, ISBN: 9781305658004
8. Lay, David C., Steven R. Lay, and Judi J. McDonald. Linear Algebra and Its Applications, 5th ed. Pearson, 2015, ISBN: 9780321982384
9. Leon, Steven J. and Lisette de Pillis. Linear Algebra with Applications, 10th ed. Pearson, 2021, ISBN: 9781292354866
10. Lipschutz, Seymour and Marc Lipson. Schaums Outline Series, Linear Algebra, 6th ed. McGraw-Hill, 2017, ISBN: 9781260011449

#### MANUALS:

#### PERIODICALS:

1. *Math Horizons*,
2. *Mathematics Magazine*, Volume 1-12,

#### SOFTWARE:

#### SUPPLIES:

1. Graphing calculator
2. Graph paper
3. USB flash drive
4. Journal

ORIGINATOR: Shayne Vargo

ORIGINATION DATE: 11/03/2015

PROPOSAL ORIGINATOR: Juan U. Bernal

CO-CONTRIBUTOR(S)

PROPOSAL DATE: 10/03/2022

Status: Launched

Date Printed: 12/3/2022



# Previous Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 254
- III. Course Title:** Introduction to Linear Algebra
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Introduction to Linear Algebra
- VIII. Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. Originating Campus:** MIRAMAR
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** City
- XII. Proposal Originating Date:** 11/03/2015
- XIII. Proposed Start Semester:** Spring 2017
- XIV. Field Trip:** May be required
- XV. Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. Current Short Description:** Covers matrix algebra, Gaussian elimination, determinants, vector spaces, and linear transformations.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 151 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:**

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** More clearly state in the course outline various topics covered in the class that are needed for C-ID approval. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?** 1. Transfer
- III. Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. Proposed College/District Purpose:** 1. District general education 2. Major Requirement - Associate Degree
- V. Extraordinary Cost to the College:** None.
- VI. Library Resource Materials:** No special library/audio-visual resources are required. Copy of current textbook available at the library..

### GENERAL EDUCATION ANALYSIS

CSU General Education:

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

# Current Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 254
- III. Course Title:** Introduction to Linear Algebra
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Introduction to Linear Algebra
- VIII. Course Is Active/Where?** MESA , MIRAMAR AND CITY
- IX. Originating Campus:** MESA
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** City
- XII. Proposal Originating Date:** 10/03/2022
- XIII. Proposed Start Semester:** Spring 2024
- XIV. Field Trip:** May be required
- XV. Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. Current Short Description:** Covers matrix algebra, Gaussian elimination, determinants, vector spaces, and linear transformations.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 151 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:** Texts are most current editions - 10/2022.

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** Six yr review including: 1) update DE from online course to fully online, and update verbiage, and 2) review & update texts (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?** 1. Transfer
- III. Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. District general education
- V. Extraordinary Cost to the College:** None.
- VI. Library Resource Materials:** Copy of current textbook available at the library.

### GENERAL EDUCATION ANALYSIS

CSU General Education:

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning



**District General Education:**

A2 Language and Rationality - Communication &amp; Analytical Thinking

**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.

- I. Course: MATH 151 Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.

Solve first-order separable differential equations and initial value problems.

- I. Course: MATH 151 Solve first-order separable differential equations and initial value problems.

Solve application problems involving first-order separable differential equations, such as exponential growth and decay.

- I. Course: MATH 151 Solve application problems involving first-order separable differential equations, such as exponential growth and decay.

**SECTION III****COURSE DISTANCE EDUCATION INFORMATION****I. MESA****II. Distance Education Methods of Instruction:** 1. On-line course 2. On-line/Web Based 3. Other**III. Other Distance Education Methods:** Hybrid - traditional with online components.**IV. Type and frequency of contact may include, but is not limited to:**

1. E-mail
2. Telephone Contact
3. Voice Mail

**V. List of Techniques:** 1. Frequent online homework via a course management system published by publishing companies. 2. Systematic and frequent review of students' participation and activity with the use of a course management software, like WebCT, or BlackBoard. 3. Periodic communication via email and correspondence will be required from the part of the students. 4. All online material will come from the same text as the regular lecture courses. 5. Testing will be done on a timed basis, where students have a very limited time to complete the posted exams.

**VI. How to Evaluate Students for Achieved Outcomes:** 1. The students will be required to turn in homework online, as well as submit via fax, or scanned pdf file assignments and exams. 2. Regular participation demonstrated by the course management software log will be required by the students. 3. Online group projects will be required from all students. 4. Students will be required to submit homework assignments on a regular basis as is delineated by the course schedule developed by the instructor.

**District General Education:**

A2 Language and Rationality - Communication &amp; Analytical Thinking

**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Solve first-order separable differential equations and initial value problems.

- I. Course: MATH 151 Solve first-order separable differential equations and initial value problems.

Solve application problems involving first-order separable differential equations, such as exponential growth and decay.

- I. Course: MATH 151 Solve application problems involving first-order separable differential equations, such as exponential growth and decay.

Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.

- I. Course: MATH 151 Solve integral problems by first examining the integral, then selecting and applying the appropriate technique of integration.

**SECTION III****COURSE DISTANCE EDUCATION INFORMATION****I. MESA****II. Distance Education Methods of Instruction:** 1. Fully Online**III. Other Distance Education Methods:****IV. Type and frequency of contact may include, but is not limited to:**

1. Announcements as needed  
**Participant/s:** Faculty to Student/s
2. Discussion Board and/or Synchronous or Asynchronous Video - weekly  
**Participant/s:** Faculty to Student/s , Among Students
3. Email/Message System as needed  
**Participant/s:** Faculty to Student/s , Among Students
4. Synchronous or Asynchronous Video and/or Discussion Board - weekly  
**Participant/s:** Faculty to Student/s , Among Students
5. Telephone Contact as needed  
**Participant/s:** Faculty to Student/s , Among Students

**V. List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication. 1. Frequent online homework via a course management system published by publishing companies. 2. Systematic and frequent review of students' participation and activity with the use of a course management software, like WebCT, or BlackBoard. 3. Periodic communication via email and correspondence will be required from the part of the students. 4. All online material will come from the same text as the regular lecture courses. 5. Testing will be done on a timed basis, where students have a very limited time to complete the posted exams.

**VI. How to Evaluate Students for Achieved Outcomes:** 1. The students will be required to turn in homework online, as well as submit via fax, or scanned pdf file assignments and exams. 2. Regular participation demonstrated by the course management software log will be required by the students. 3. Online group projects will be required from all students. 4. Students will be required to submit homework assignments on a regular basis as is delineated by the course schedule developed by the instructor.

**VII. Additional Resources/Materials/Information:** Students taking a class that is delivered online will be required to

**VII. Additional Resources/Materials/Information:** Students taking a class that is delivered online will be required to have access to appropriate technology to meet their needs. All materials, with the exception of the text, will disseminated via the technology. Additional resources and/or materials will not be necessary. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**VIII. Audio Visual Library Materials:** NO

**IX. MIRAMAR**

**X. Distance Education Methods of Instruction:** 1. On-line/Web Based 2. On-line course 3. Other

**XI. Other Distance Education Methods:** Hybrid - traditional with online components.

**XII. Type and frequency of contact may include, but is not limited to:**

1. E-mail  
weekly
2. Field Trips  
as assigned
3. Group Meetings  
as assigned
4. Individual Meetings  
as needed
5. Telephone Contact  
as needed
6. Threaded Conferencing  
at least twice during the term
7. Voice Mail  
as needed

**XIII. List of Techniques:** 1. Frequent online homework via a course management system published by publishing companies. 2. Systematic and frequent review of students' participation and activity with the use of a course management software such as BlackBoard. 3. Periodic communication via email and correspondence will be required from the part of the students. 4. All online material will come from the same text as the regular lecture courses. 5. Testing will be done on a timed basis, where students have a very limited time to complete the posted exams.

**XIV. How to Evaluate Students for Achieved Outcomes:** 1. The students will be required to turn in homework online, as well as submit via fax, or scanned pdf file assignments and exams. 2. Regular participation demonstrated by the course management software log will be required by the students. 3. Online group projects will be required from all students. 4. Students will be required to submit homework assignments on a regular basis as is delineated by the course schedule developed by the instructor.

**XV. Additional Resources/Materials/Information:** Students taking a class that is delivered online will be required to have access to appropriate technology to meet their needs. All materials, with the exception of the text, will disseminated via the technology. Additional resources and/or materials will not be necessary. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. CITY**

**XVIII. Distance Education Methods of Instruction:** 1. Fully Online 2. Hybrid only 3. Partially online only

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly
2. Collaborative Web Documents  
as assigned
3. Conferencing  
as assigned
4. Discussion Board  
at least three times during the term
5. Email/Message System  
as needed
6. Field Trips  
as assigned
7. Group Meetings  
as assigned
8. Individual Meetings  
as needed
9. Individualized Assignment Feedback  
as assigned

have access to appropriate technology to meet their needs. All materials, with the exception of the text, will disseminated via the technology. SDCCD and DSPS personnel will provide all needed accommodations. DSPS will provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**VIII. Audio Visual Library Materials:** NO

**IX. MIRAMAR**

**X. Distance Education Methods of Instruction:** 1. On-line/Web Based 2. On-line course 3. Other

**XI. Other Distance Education Methods:** Hybrid - traditional with online components.

**XII. Type and frequency of contact may include, but is not limited to:**

1. E-mail  
weekly
2. Field Trips  
as assigned
3. Group Meetings  
as assigned
4. Individual Meetings  
as needed
5. Telephone Contact  
as needed
6. Threaded Conferencing  
at least twice during the term
7. Voice Mail  
as needed

**XIII. List of Techniques:** 1. Frequent online homework via a course management system published by publishing companies. 2. Systematic and frequent review of students' participation and activity with the use of a course management software such as BlackBoard. 3. Periodic communication via email and correspondence will be required from the part of the students. 4. All online material will come from the same text as the regular lecture courses. 5. Testing will be done on a timed basis, where students have a very limited time to complete the posted exams.

**XIV. How to Evaluate Students for Achieved Outcomes:** 1. The students will be required to turn in homework online, as well as submit via fax, or scanned pdf file assignments and exams. 2. Regular participation demonstrated by the course management software log will be required by the students. 3. Online group projects will be required from all students. 4. Students will be required to submit homework assignments on a regular basis as is delineated by the course schedule developed by the instructor.

**XV. Additional Resources/Materials/Information:** Students taking a class that is delivered online will be required to have access to appropriate technology to meet their needs. All materials, with the exception of the text, will disseminated via the technology. Additional resources and/or materials will not be necessary. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. CITY**

**XVIII. Distance Education Methods of Instruction:** 1. Fully Online 2. Hybrid only 3. Partially online only

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly
2. Collaborative Web Documents  
as assigned
3. Conferencing  
as assigned
4. Discussion Board  
at least three times during the term
5. Email/Message System  
as needed
6. Field Trips  
as assigned
7. Group Meetings  
as assigned
8. Individual Meetings  
as needed
9. Individualized Assignment Feedback  
as assigned
10. Synchronous or Asynchronous Video  
as assigned

10. Synchronous or Asynchronous Video as assigned

11. Telephone Contact as needed

**XXI. List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

#### COURSE STUDENT LEARNING OUTCOME(S)

##### CITY

- Students will solve problems involving systems of equations, vectors, matrices, and general linear transformations by using standard techniques of linear algebra.

##### MESA

- Students will be able to orthogonally diagonalize a 3x3 symmetric matrix.
- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Students will be able to find bases for the three fundamental subspaces of a matrix (row space, column space, and null space).
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

##### MIRAMAR

- Solve dependent systems of linear equations using Gaussian elimination and state their solutions parametrically; solve independent systems using Gaussian eliminations or the inverse of the coefficient matrix; identify systems of linear equations which are inconsistent.
- Solve applications involving several variables and several linear equations by solving the corresponding system of linear equations.
- Compute the eigenvalues and corresponding eigenvectors of a square matrix, and diagonalize the matrix if possible.

#### SECTION V

##### COURSE DATA ADMINISTRATION ELEMENTS

###### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

###### **II. Lect Units:** 3.00

11. Telephone Contact as needed

**XXI. List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

#### SECTION IV

##### COURSE STUDENT LEARNING OUTCOME(S)

##### CITY

- Students will solve problems involving systems of equations, vectors, matrices, and general linear transformations by using standard techniques of linear algebra.

##### MESA

- Students will be able to orthogonally diagonalize a 3x3 symmetric matrix.
- Students should be able to apply math definitions, properties and appropriate techniques in a variety of problem solving situations.
- Students will be able to demonstrate knowledge of the interrelatedness of the concepts within a particular course and among different courses.
- Students will be able to find bases for the three fundamental subspaces of a matrix (row space, column space, and null space).
- Students will be able to demonstrate an ability to communicate mathematical reasoning in the context of solving a problem with clarity and detail.
- Students will be able to choose and apply appropriate mathematical tools and technology to various problems.

##### MIRAMAR

- Solve dependent systems of linear equations using Gaussian elimination and state their solutions parametrically; solve independent systems using Gaussian eliminations or the inverse of the coefficient matrix; identify systems of linear equations which are inconsistent.
- Solve applications involving several variables and several linear equations by solving the corresponding system of linear equations.
- Compute the eigenvalues and corresponding eigenvectors of a square matrix, and diagonalize the matrix if possible.

#### SECTION V

##### COURSE DATA ADMINISTRATION ELEMENTS

###### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Total Units: 3**

**Lecture Hours Min: 48.00 Max: 54.00**

**Lab Hours Min: 0.00 Max: 0.00**

**Other Hours Min: 0.00 Max:0.00**

**Total Contact Hours Min: 48.00 Max:54.00**

**Outside-of-Class Hours Min: 96.00 Max:108.00**

**Total Student Learning Hours Min: 144.00 Max: 162.00**

**FTEF Lecture Min: 0.2000 Max:**

**FTEF Lab Min: 0.0000 Max:**

**FTEF Total Min: 0.2000 Max:**

**III. Last Time Pre/Co Requisite Update: 11/09/2015**

**IV. Last Outline Revision Date: 04/14/2016**

**V. CIC Approval: 04/14/2016**

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date: Spring 2017**

#### **SECTION VI**

#### **CREDIT FOR PRIOR LEARNING**

**Major Restriction Code: NONE**

**II. Lect Units: 3.00**

**Total Units: 3**

**Lecture Hours Min: 48.00 Max: 54.00**

**Lab Hours Min: 0.00 Max: 0.00**

**Other Hours Min: 0.00 Max:0.00**

**Total Contact Hours Min: 48.00 Max:54.00**

**Outside-of-Class Hours Min: 96.00 Max:108.00**

**Total Student Learning Hours Min: 144.00 Max: 162.00**

**FTEF Lecture Min: 0.2000 Max:**

**FTEF Lab Min: 0.0000 Max:**

**FTEF Total Min: 0.2000 Max:**

**III. Last Time Pre/Co Requisite Update: 10/03/2022**

**IV. Last Outline Revision Date: 04/14/2016**

**V. CIC Approval:**

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:**

#### **SECTION VI**

#### **CREDIT FOR PRIOR LEARNING**

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Mathematics 255**COURSE TITLE:**

Differential Equations

**Units:**

3

Grade Only

**CATALOG COURSE DESCRIPTION:**

This course covers first order and higher order ordinary differential equations and their applications. Topics include linear first order and higher order equations, homogeneous and nonhomogeneous equations with constant or variable coefficients, and systems of ordinary differential equations. Methods used to solve equations include substitution methods, integrating factors, reduction of order, variation of parameters, power series solutions, and Laplace transforms. This course is an introduction to the theory and applications of differential equations and is the basis for many upper division courses in engineering, physics, and mathematics. It is intended for the transfer student planning to major in mathematics, engineering, operational research, physics, or other physical science subjects.

**REQUISITES:****Prerequisite:**MATH 252 with a grade of "C" or better, or equivalent  
and

MATH 254 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:****TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

## **STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Solve a variety of first order differential equations and initial value problems using several techniques including graphing solution curves based on isoclines, separation of variables, exact equations, calculating an integrating factor, and determining appropriate substitutions.
2. Analyze and assess whether a first order differential equation has a solution by applying the Existence and Uniqueness Theorem.
3. Solve a variety of real life problems applying first order differential equations including motion, variable acceleration, and population models.
4. Solve various types of higher order differential equations and initial value problems, in particular second order ordinary differential equations, using a variety of techniques including the method of undetermined coefficients, variation of parameters, and reduction of order.
5. Analyze and assess whether a differential equation of higher order has a solution using versions of the Existence and Uniqueness Theorem.
6. Solve linear systems of ordinary differential equations.
7. Find power series solutions to ordinary differential equations.
8. Determine the Laplace Transform and inverse Laplace Transform of functions.
9. Apply Picard's theorem for the existence and uniqueness of solutions and the Implicit Function theorem.

## **SECTION II**

### **1. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. First order ordinary differential equations and initial value problems
  - A. Existence and Uniqueness Theorem
  - B. Graphing solution curves based on the isoclines
  - C. Separable equations
  - D. Exact equations
  - E. Linear equations
  - F. Substitution techniques
  - G. Homogeneous equations
  - H. Bernoulli equations
- II. Applications of first order differential equations and initial value problems
  - A. Motion problems
  - B. Newton's Law of Motion
  - C. Variable acceleration
  - D. Population models
  - E. Circuits
  - F. Mixture problems
  - G. Orthogonal trajectories and slope fields
- III. Second and higher order differential equations and initial value problems
  - A. Existence and Uniqueness Theorem
  - B. Picard's Theorem and the Implicit Function Theorem
  - C. Linearly independent solutions, independence and the Wronskian
  - D. Complex Numbers and Euler's formula
  - E. Homogeneous and non-homogeneous equations
  - F. Homogeneous equations with constant coefficients
  - G. Non-homogeneous equations with constant coefficients
  - H. Euler-Cauchy equations
    - I. Non-homogeneous equations with variable coefficients using variation of parameters
- IV. Techniques and solutions to solve higher order differential equations and initial value problems
  - A. Complementary functions of the associated homogeneous equation
  - B. The linear combination of the particular solution and the complementary function

- C. The method of undetermined coefficients
  - D. Reduction of order
  - E. Variation of parameters
- V. Applications of second and higher order differential equations and initial value problems
  - A. Free undamped harmonic oscillation
  - B. Free damped harmonic oscillation
  - C. Forced mechanical and electrical vibrations in circuits
  - D. Resonance
- VI. Power series solutions of ordinary differential equations and initial value problems
  - A. Power series expansions of analytic functions
  - B. Radii of Convergence
  - C. Ordinary and singular points of differential equations
  - D. Series solutions near ordinary points
  - E. Regular and irregular singular points
  - F. The method of Frobenius
- VII. Laplace Transforms
  - A. Definition of a Laplace Transform
  - B. Laplace Transforms of standard functions
  - C. Inverse Laplace Transforms
  - D. Properties of Laplace Transforms
  - E. Laplace Transforms of derivatives of functions
  - F. Laplace Transforms of products of functions
  - G. Inverse Laplace Transforms of rational functions
  - H. The Convolution Theorem
- VIII. Solutions to ordinary differential equations and initial value problems using Laplace Transforms
  - A. The Laplace Transform of a differential equation
  - B. The solution to the transformed equation
  - C. The Inverse Laplace Transforms of the solution to the transformed equation
- IX. Systems of differential equations
  - A. First, second, and higher order systems
  - B. Higher order ordinary differential equation as a first order system
  - C. The Laplace Transform method
- X. Numerical solutions of ordinary differential equations
  - A. Euler's Method
  - B. Error in Euler's Method
  - C. Picard's Method of Successive Approximation
  - D. Taylor Polynomial Approximation Method
  - E. Runge-Kutta

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Related sections in elementary differential equations textbooks
- II. Readings in other math books or journals such as The College Math Journal, Math Horizons, or Mathematics Magazine
- III. Topics related to differential equations found on the internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Written solutions to problems using proper mathematical terminology
- II. Solutions to first and second order differential equations using various techniques
- III. Graphs of vector fields and solutions curves
- IV. Solutions to application problems dealing with physics or engineering
- V. Journal entries that focus on mathematical calculations, problem solving techniques, and applied problems
- VI. Formal reports analyzing some topic or person appropriate to mathematics
- VII. Written proofs for mathematical statements related to the material covered in class

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Reading and writing assignments as specified in the course syllabus
- II. Study and review of lecture notes
- III. Library, electronic and other archival research
- IV. Viewing of assigned/recommended media materials
- V. Observations, e.g., field trips to attend pertinent lectures/conferences
- VI. Analytical semester projects
- VII. Development of problem solving techniques and analytical skills by solving problems from various texts, such as Schaum's Outline of Differential Equations
- VIII. Review of current periodicals such as Mathematics Magazine or Math Horizons
- IX. Collaborative projects focusing on expanding mathematical concepts presented in class

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Analyzing an equation and determining which among various techniques can solve the equation
- II. Interpreting real-life phenomena modeled by a particular class of differential equations
- III. Applying appropriate continuity principles to solve families of differential equations
- IV. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- V. Analyzing and solving problems that are broader in scope than those present in class or those introduced in the text
- VI. Applying various mathematical concepts in interpreting applications and in solving applied problems
- VII. Investigating a variety of problems, including applications of principles in a number of different contexts
- VIII. Analyzing and interpreting current periodicals
- IX. Developing proofs for mathematical statements

## **2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. In-class objective quizzes
- II. In-class examinations
- III. In-class comprehensive final examination
- IV. Out-of-class writing assignments that develop critical thinking and problem solving techniques as it pertains to the application of differential equations and their theory
- V. Take home essay examinations
- VI. Analytical semester projects
- VII. Written reports on related subjects
- VIII. Exploratory activities involving a graphing calculator or computer class participation
- IX. Participation in classroom discussion
- X. Participation in collaborative assignments
- XI. Oral presentations on a variety of differential equations topics
- XII. Group projects
- XIII. Field trips
- XIV. Classroom experiments and simulations
- XV. Library and online internet research
- XVI. Reviewing current periodicals

## **3. METHODS OF INSTRUCTION:**

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning



- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Calculator and/or computer assignments
- \* Field observation and field trips
- \* Guest speakers

#### **4. REQUIRED TEXTS AND SUPPLIES:**

Textbooks may include, but are not limited to:

##### **TEXTBOOKS:**

1. Boyce, William E., et al. Elementary Differential Equations and Boundary Value Problems, 12th ed. Wiley, 2022, ISBN: 9781119820512
2. Bronson, Richard and Gabriel B. Costa. Schaum's Outline of Differential Equations, 4th ed. McGraw-Hill, 2014, ISBN: 9780071824859
3. Campbell, Stephen L. and Richard Haberman. Introduction to Differential Equations with Dynamical Systems, 1st ed. Princeton University Press, 2008, ISBN: 9780691124742
4. Edwards & Penney. Elementary Differential Equations with Boundary Value Problems, 6th ed. Pearson, 2018, ISBN: 9780134995410
5. Zill, Dennis G. A First Course in Differential Equations with Modeling Applications, 11th ed. Cengage Learning, 2017, ISBN: 9781305965720

##### **MANUALS:**

##### **PERIODICALS:**

##### **SOFTWARE:**

##### **SUPPLIES:**

1. Graphing calculator
2. Graph paper
3. USB drive
4. Journal

**ORIGINATOR:** Shayne Vargo

**ORIGINATION DATE:** 11/03/2015

**PROPOSAL ORIGINATOR:** Juan U. Bernal

**CO-CONTRIBUTOR(S)**

**PROPOSAL DATE:** 10/03/2022

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
COURSE PROPOSAL IMPACT REPORT**

**COURSE TO BE PROPOSED: MATH 255**  
Differential Equations

**ACTIVE/APPROVED COURSES IMPACTED:**

MATH 255 Differential Equations (29372)

**DISTRICT GENERAL EDUCATION:**

A2 Language and Rationality - Communication & Analytical Thinking

**ACTIVE/APPROVED/PROPOSED PROGRAMS IMPACTED:**

( City )

Applied Mathematics \*Active\*;  
**Associate of Arts Degree**

Recommended Electives:

( Mesa )

Applied Mathematics \*Active\*;  
**Associate of Arts Degree**

Required Electives:

( Mesa )

Economics \*Approved\*;  
**Associate in Arts for Transfer Degree**

CATEGORY A: SELECT TWO COURSES FROM THE FOLLOWING COURSES.  
RECOMMEND SELECTING COURSES WHICH MEET THE LOWER DIVISION  
MAJOR PREPARATION REQUIREMENTS OF YOUR PROSPECTIVE TRANSFER  
UNIVERSITY (6-9 UNITS):

( Mesa )

Economics \*Pending\*;  
**Associate in Arts for Transfer Degree**

CATEGORY A: SELECT TWO COURSES FROM THE FOLLOWING COURSES.  
RECOMMEND SELECTING COURSES WHICH MEET THE LOWER DIVISION  
MAJOR PREPARATION REQUIREMENTS OF YOUR PROSPECTIVE TRANSFER  
UNIVERSITY (6-9 UNITS):

( Mesa )

Economics \*Active\*;  
**Associate in Arts for Transfer Degree**

Category A: SELECT ONE COURSE FROM THE FOLLOWING (3-5 UNITS):

( Miramar )

Economics \*Active\*;

## **Associate in Arts for Transfer Degree**

Select at least 3 units from the following courses (not already selected above):

( **Miramar** )

Economics \*Active\*;

### **Associate in Arts for Transfer Degree**

Select one of the following courses (3-5 units) not already selected above:

( **Miramar** )

Economics \*Approved\*;

### **Associate in Arts for Transfer Degree**

Select two of the following courses:

( **Miramar** )

Economics \*Launched\*;

### **Associate in Arts for Transfer Degree**

Select two of the following courses:

( **City** )

Engineering \*Active\*;

### **Associate of Science Degree**

Courses Required for the Major:

( **City** )

Engineering \*Approved\*;

### **Associate of Science Degree**

Recommended Electives:

( **Mesa** )

Liberal Arts and Sciences: Social and Behavioral Sciences-Economics \*Active\*;

### **Associate of Arts Degree**

Select a minimum of 12 units:

( **Mesa** )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Computer Science \*Active\*;

### **Associate of Arts Degree**

Select a minimum of 5 units:

( **Mesa** )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Engineering \*Active\*;

### **Associate of Arts Degree**

Select a minimum of 3 units:

( **Mesa** )

Liberal Arts and Sciences: Mathematics and Pre-Engineering-Mathematics \*Active\*;

### **Associate of Arts Degree**

Select a minimum of 5 units:

( **Mesa** )

Liberal Arts and Sciences: Science Studies-Chemistry \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 8 units:

( **City** )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Active\*;  
**Associate of Arts Degree**

Major Courses

( **City** )

Liberal Arts and Sciences: Scientific Studies Mathematics and Pre-Engineering \*Launched\*;  
**Associate of Arts Degree**

Major Courses

( **Mesa** )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Category A: Select one course from the following (3 units):

( **City** )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Select one of the following courses if not selected above: (It is recommended that students select courses that meet lower division major preparation requirements for their transfer university.)

( **City** )

Mathematics \*Active\*;  
**Associate in Science for Transfer Degree**

Select one of the following courses:

( **Mesa** )

Mathematics \*Active\*;  
**Associate of Arts Degree**

Recommended Electives:

( **City** )

Mathematics \*Active\*;  
**Associate of Arts Degree**

Recommended Electives:

( **City** )

Mathematics \*Active\*;  
**Associate of Arts Degree**

Select 3-4 units from:

( **City** )

Mathematics \*Approved\*;

**Associate of Arts Degree**

Select 3-4 units from:

( **Mesa** )

Mathematics \*Active\*;

**Associate of Arts Degree**

Select three units from:

( **Miramar** )

Mathematics Studies \*Active\*;

**Associate of Arts Degree**

Select at least 5 units from the following:

# SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

## Course Outline of Record: Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Mathematics
- II. **Course Number:** 255
- III. **Course Title:** Differential Equations
- IV. **Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.
- VI. **Family:**
- VII. **Current Short Title:** Differential Equations
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** City , Miramar and Mesa
- XII. **Proposal Originating Date:** 10/03/2022
- XIII. **Proposed Start Semester:** Spring 2024
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Grade Only
- XVI. **Current Short Description:** First order and higher order equations and their applications.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: MATH 252 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence  
and Prerequisite: MATH 254 with a grade of "C" or better, or equivalent. Required for articulation by a UC/CSU institution
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:** Texts are most current editions - 10/2022.

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six yr review including: 1) update DE from online course to fully online, and update verbiage, 2) minorcredits to objectives and topics, and 3) review & update texts. (Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. District general education 2. Major Requirement - Associate Degree
- V. **Extraordinary Cost to the College:** None.
- VI. **Library Resource Materials:** No new resources required.

#### GENERAL EDUCATION ANALYSIS

##### **CSU General Education:**

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

##### **District General Education:**

A2 Language and Rationality - Communication & Analytical Thinking

**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

**MATH 252 - Knowledge of two or three variables, and derivatives of algebraic and transcendental functions of several variables in Cartesian and polar form.**

- I. Course: MATH 252** Extend and apply algebraic and geometric concepts of two dimensional vectors in the Cartesian plane to 3-dimensions, including the distance between vectors, vector algebra, and the Euclidean norm of a vector.
- II. Course: MATH 252** Apply operations involving the inner product, the cross product, and triple scalar product of 3-dimensional vectors and use these operations in geometric and physical applications.
- III. Course: MATH 252** Calculate the angle between vectors, and determine if two vectors are orthogonal.
- IV. Course: MATH 252** Recognize, compare, contrast, and sketch the different quadric surfaces.
- V. Course: MATH 252** Sketch simple single variable vector-valued functions in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ .
- VI. Course: MATH 252** Compute the limit, derivative, and integrals of vector-valued functions of one variable.
- VII. Course: MATH 252** Compute the unit tangent vector, principal unit normal vector, the arc length and the curvature of a vector-valued function.
- VIII. Course: MATH 252** Define the derivative and the concept of the differentials of multivariable functions, and calculate linear and quadratic approximations to multivariable scalar functions.
- IX. Course: MATH 252** Apply the Chain Rule to a composition of multivariable functions.
- X. Course: MATH 252** Calculate the directional derivative of a multivariable function at a point in a given direction; and the gradient of such a function, applying the properties of the gradient to describe the behavior of the function.
- XI. Course: MATH 252** Demonstrate use of Lagrange's Theorem to compute the extrema of a multivariable function subject to given constraints.
- XII. Course: MATH 252** Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
- XIII. Course: MATH 252** Determine areas, volumes, surface area, mass, centers of mass, and moments of inertia.
- XIV. Course: MATH 252** Calculate the work done by a vector-valued multivariable function over a piecewise smooth contour.
- XV. Course: MATH 252** Apply Green's, Stokes' and the Divergence Theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

**MATH 254 - Knowledge of algebraic operations of vectors and solving linear systems of equations.**

- I. Course: MATH 254** Solve systems of linear equations using several algebraic methods.
- II. Course: MATH 254** Construct and apply special matrices, such as symmetric, skew-symmetric, diagonal, upper triangular or lower triangular matrices.
- III. Course: MATH 254** Apply all the algebraic matrix operations, including multiplication of matrices, transposes, and traces.
- IV. Course: MATH 254** Calculate the inverse of a matrix using various methods, and perform application problems involving the inverse.
- V. Course: MATH 254** Compute the determinant of square matrices and use the determinant to assess invertibility.
- VI. Course: MATH 254** Derive and apply algebraic properties of determinants.
- VII. Course: MATH 254** Perform vector operations on vectors from Euclidean Vector Spaces including vectors from  $\mathbb{R}^n$ .
- VIII. Course: MATH 254** Perform linear transformations in Euclidean vector spaces, including basic linear operators, and determine the standard matrix of the linear transformation.
- IX. Course: MATH 254** Analyze whether a set of vectors spans a space, and if such a set is linearly dependent or independent.
- X. Course: MATH 254** Assess if a set of functions is linearly independent using various techniques including calculating the determinant of the Wronskian.

- XI. Course: MATH 254 Solve for the basis and the dimension of a vector space.
- XII. Course: MATH 254 Determine the rank, the nullity, the column space and the row space of a matrix.
- XIII. Course: MATH 254 Identify orthogonality between vectors in an abstract vector space by means of an inner product, and compute the inner product between vectors of any inner product space.
- XIV. Course: MATH 254 Express a vector space via change of base, including computation of the transition matrix and determining an orthonormal basis for the space.
- XV. Course: MATH 254 Compute all the eigenvalues of a square matrix, including any complex eigenvalues, and determine their corresponding eigenvectors.
- XVI. Course: MATH 254 Assess if a square matrix is diagonalizable and derive the diagonalization of a matrix whose eigenvalues are easily calculated.
- XVII. Course: MATH 254 Apply linear transformations among abstract general vector spaces, and derive the rank, the nullity and the associated matrix of the transformation.
- XVIII. Course: MATH 254 Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

### **SECTION III**

#### **COURSE DISTANCE EDUCATION INFORMATION**

- I. **CITY**
- II. **Distance Education Methods of Instruction:** 1. Fully Online 2. Hybrid only 3. Partially online only
- III. **Other Distance Education Methods:**
- IV. **Type and frequency of contact may include, but is not limited to:**
  - 1. Announcements  
weekly
  - 2. Collaborative Web Documents  
as assigned
  - 3. Conferencing  
as assigned
  - 4. Discussion Board  
at least three times during the term
  - 5. Email/Message System  
as needed
  - 6. Field Trips  
as assigned
  - 7. Group Meetings  
as assigned
  - 8. Individual Meetings  
as needed
  - 9. Individualized Assignment Feedback  
as assigned
  - 10. Synchronous or Asynchronous Video  
as assigned
  - 11. Telephone Contact  
as needed
- V. **List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.
- VI. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.
- VII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in



an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**VIII. Audio Visual Library Materials: NO**

**IX. MESA**

**X. Distance Education Methods of Instruction: 1. Fully Online**

**XI. Other Distance Education Methods:**

**XII. Type and frequency of contact may include, but is not limited to:**

1. Announcements

As needed

**Participant/s:** Faculty to Student/s

2. Discussion Board

Frequent

**Participant/s:** Faculty to Student/s , Among Students

3. E-mail

Instructor emails students weekly with additional contact as needed.

4. Group Meetings

Every other week as needed.

5. Review Sessions

Before each exam, online.

6. Synchronous or Asynchronous Video

Frequent

**Participant/s:** Faculty to Student/s , Among Students

**XIII. List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication. Telephone calls between students and the instructor may be used to discuss questions and concerns throughout the course. E-mail may be used for asynchronous instructor-to-student and student-to-student communication. Chat rooms may be used for synchronous interaction between students and between the instructor and students. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Assignments and tests that will be used in the Distance Education course will be exactly the same as those in the traditional course. Students will submit all course work (tests and assignments) electronically to the instructor for grading.

**XIV. How to Evaluate Students for Achieved Outcomes:** The evaluation methods will mirror the on-campus course as specified in the course outline. The feedback on assignments and tests will be submitted electronically to the student.

**XV. Additional Resources/Materials/Information:** SDCCD and DSPS personnel will provide all needed accommodations. DSPS will provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials: NO**

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction: 1. On-line course**

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms

As assigned.

2. E-mail

Instructor emails students weekly with additional contact as needed.

3. Field Trips

As assigned.

4. Group Meetings

Every other week as needed.

5. Review Sessions

Before each exam, online.

6. Telephone Contact

As needed.

7. Threaded Conferencing

As assigned.

- XXI. **List of Techniques:** Students will interact with each other and the instructor in ways that mirror the traditional classroom, only the delivery system will be altered. These methods include one-on-one communication with the instructor and other students via e-mail, the discussion board, and the chat room. In addition, students will participate in projects and discussion via the discussion board and chat rooms. Students will also demonstrate an understanding and integration of course concepts via research assignments, asynchronous class discussion, and/or other assignments.
- XXII. **How to Evaluate Students for Achieved Outcomes:** Multiple measures will be used to assess student learning outcomes. These include performance on objective examinations administered via the assessment tool, homework, writing assignments, and/or projects posted to the discussion board or other online collaboration tool.
- XXIII. **Additional Resources/Materials/Information:** The instructor may use the Internet to post materials that students can access for relevant reading. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XXIV. **Audio Visual Library Materials:** NO

## **SECTION IV**

### **COURSE STUDENT LEARNING OUTCOME(S)**

#### **CITY**

- Students will demonstrate proficiency with common techniques used for solving ordinary differential equations and learn their classical applications.

#### **MESA**

- Students will use Eigenvalues and Eigenvectors to solve a system of first-order linear homogeneous equations.
- Students will use an appropriate method to solve a second-order linear non-homogeneous equation.

#### **MIRAMAR**

- Solve various types of differential equations and initial value problems using a variety of techniques including the method of undetermined coefficients, variation of parameters, and reduction of order.
- Use differential equations and initial value problems to model a variety of physical phenomenon, like: motion problems, Newton's Law of Motion, variable acceleration, population models, free oscillation, damped oscillation, forced mechanical and electrical vibrations and resonance.
- Find solutions to initial value problems using Laplace Transforms.

## **SECTION V**

### **COURSE DATA ADMINISTRATION ELEMENTS**

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units: 3.00**

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min: 144.00 Max: 162.00**

**FTEF Lecture Min: 0.2000 Max:**

**FTEF Lab Min: 0.0000 Max:**

**FTEF Total Min: 0.2000 Max:**

**III. Last Time Pre/Co Requisite Update: 10/03/2022**

**IV. Last Outline Revision Date: 09/22/2016**

**V. CIC Approval:**

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:**

## **SECTION VI**

### **CREDIT FOR PRIOR LEARNING**

MATH 255

**Previous Report**

CIC Approval: 09/22/2016  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM: Fall 2017

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I**

**SUBJECT AREA AND COURSE NUMBER:** Mathematics 255

**COURSE TITLE:**  
Differential Equations

**Units:**  
3  
Grade Only

**CATALOG COURSE DESCRIPTION:**

This course covers first order and higher order ordinary differential equations and their applications. Topics include linear first order and higher order equations, homogeneous and nonhomogeneous equations with constant or variable coefficients, and systems of ordinary differential equations. Methods used to solve equations include substitution methods, integrating factors, reduction of order, variation of parameters, power series solutions, and Laplace transforms. This course is an introduction to the theory and applications of differential equations and is the basis for many upper division courses in engineering, physics, and mathematics. It is intended for the transfer student planning to major in mathematics, engineering, operational research, physics, or other physical science subjects.

**REQUISITES:**

**Prerequisite:**  
MATH 252 with a grade of "C" or better, or equivalent  
and  
MATH 254 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**  
May be required

**TRANSFER APPLICABILITY:**  
Associate Degree Credit & transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:**

**TOTAL LECTURE HOURS:**  
48 - 54

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**  
48 - 54

**OUTSIDE-OF-CLASS HOURS:**  
96 - 108

**TOTAL STUDENT LEARNING HOURS:**  
144 - 162

**STUDENT LEARNING OBJECTIVES:**  
Upon successful completion of the course the student will be able to:

1. Solve a variety of first order differential equations and initial value problems using several techniques including graphing solution curves based on isoclines, separation of variables, exact equations, calculating an integrating factor, and determining appropriate substitutions.
2. Analyze and assess whether a first order differential equation has a solution by applying the Existence and

**Current Report**

MATH 255

CIC Approval:  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM:

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I**

**SUBJECT AREA AND COURSE NUMBER:** Mathematics 255

**COURSE TITLE:**  
Differential Equations

**Units:**  
3  
Grade Only

**CATALOG COURSE DESCRIPTION:**

This course covers first order and higher order ordinary differential equations and their applications. Topics include linear first order and higher order equations, homogeneous and nonhomogeneous equations with constant or variable coefficients, and systems of ordinary differential equations. Methods used to solve equations include substitution methods, integrating factors, reduction of order, variation of parameters, power series solutions, and Laplace transforms. This course is an introduction to the theory and applications of differential equations and is the basis for many upper division courses in engineering, physics, and mathematics. It is intended for the transfer student planning to major in mathematics, engineering, operational research, physics, or other physical science subjects.

**REQUISITES:**

**Prerequisite:**  
MATH 252 with a grade of "C" or better, or equivalent  
and  
MATH 254 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**  
May be required

**TRANSFER APPLICABILITY:**  
Associate Degree Credit & transfer to CSU CSU General Education IGETC UC Transfer Course List

**CID:**

**TOTAL LECTURE HOURS:**  
48 - 54

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**  
48 - 54

**OUTSIDE-OF-CLASS HOURS:**  
96 - 108

**TOTAL STUDENT LEARNING HOURS:**  
144 - 162

**STUDENT LEARNING OBJECTIVES:**  
Upon successful completion of the course the student will be able to:

1. Solve a variety of first order differential equations and initial value problems using several techniques including graphing solution curves based on isoclines, separation of variables, exact equations, calculating an integrating factor, and determining appropriate substitutions.
2. Analyze and assess whether a first order differential equation has a solution by applying the Existence and Uniqueness Theorem.
3. Solve a variety of real life problems applying first order differential equations including motion, variable

Uniqueness Theorem.

3. Solve a variety of real life problems applying first order differential equations including motion, variable acceleration, and population models.

4. Solve various types of higher order differential equations and initial value problems, in particular second order ordinary differential equations, using a variety of techniques including the method of undetermined coefficients, variation of parameters, and reduction of order.

5. Analyze and assess whether a differential equation of higher order has a solution using versions of the Existence and Uniqueness Theorem.

6. Solve linear systems of ordinary differential equations.

7. Find power series solutions to ordinary differential equations.

8. Determine the Laplace Transform and inverse Laplace Transform of functions.

acceleration, and population models.

4. Solve various types of higher order differential equations and initial value problems, in particular second order ordinary differential equations, using a variety of techniques including the method of undetermined coefficients, variation of parameters, and reduction of order.

5. Analyze and assess whether a differential equation of higher order has a solution using versions of the Existence and Uniqueness Theorem.

6. Solve linear systems of ordinary differential equations.

7. Find power series solutions to ordinary differential equations.

8. Determine the Laplace Transform and inverse Laplace Transform of functions.

9. Apply Picard's theorem for the existence and uniqueness of solutions and the Implicit Function theorem.

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

#### I. First order ordinary differential equations and initial value problems

- A. Existence and Uniqueness Theorem
- B. Graphing solution curves based on the isoclines
- C. Separable equations
- D. Exact equations
- E. Linear equations
- F. Substitution techniques
- G. Homogeneous equations
- H. Bernoulli equations

#### II. Applications of first order differential equations and initial value problems

- A. Motion problems
- B. Newton's Law of Motion
- C. Variable acceleration
- D. Population models
- E. Circuits
- F. Mixture problems
- G. Orthogonal trajectories and slope fields

#### III. Second and higher order differential equations and initial value problems

- A. Existence and Uniqueness Theorem
- B. Picard's Theorem and the Implicit Function Theorem
- C. Linearly independent solutions independence and the Wronskian
- D. Complex Numbers and Euler's formula
- E. Homogeneous and non-homogeneous equations
- F. Homogeneous equations with constant coefficients
- G. Non-homogeneous equations with constant coefficients
- H. Euler-Cauchy equations
- I. Non-homogeneous equations with variable coefficients using variation of parameters

#### IV. Techniques and solutions to solve higher order differential equations and initial value problems

- A. Complementary functions of the associated homogeneous equation
- B. The linear combination of the particular solution and the complementary function
- C. The method of undetermined coefficients
- D. Reduction of order
- E. Variation of parameters

#### V. Applications of second and higher order differential equations and initial value problems

- A. Free undamped harmonic oscillation
- B. Free damped harmonic oscillation
- C. Forced mechanical and electrical vibrations in circuits
- D. Resonance

#### VI. Power series solutions of ordinary differential equations and initial value problems

- A. Power series expansions of analytic functions
- B. Radii of Convergence
- C. Ordinary and singular points of differential equations
- D. Series solutions near ordinary points
- E. Regular and irregular singular points
- F. The method of Frobenius

#### VII. Laplace Transforms

- A. Definition of a Laplace Transform
- B. Laplace Transforms of standard functions
- C. Inverse Laplace Transforms
- D. Properties of Laplace Transforms
- E. Laplace Transforms of derivatives of functions
- F. Laplace Transforms of products of functions

## SECTION II

### 1. COURSE OUTLINE AND SCOPE:

#### A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

#### I. First order ordinary differential equations and initial value problems

- A. Existence and Uniqueness Theorem
- B. Graphing solution curves based on the isoclines
- C. Separable equations
- D. Exact equations
- E. Linear equations
- F. Substitution techniques
- G. Homogeneous equations
- H. Bernoulli equations

#### II. Applications of first order differential equations and initial value problems

- A. Motion problems
- B. Newton's Law of Motion
- C. Variable acceleration
- D. Population models
- E. Circuits
- F. Mixture problems
- G. Orthogonal trajectories and slope fields

#### III. Second and higher order differential equations and initial value problems

- A. Existence and Uniqueness Theorem
- B. Linearly independent solutions independence and the Wronskian
- C. Homogeneous and non-homogeneous equations
- D. Homogeneous equations with constant coefficients
- E. Non-homogeneous equations with constant coefficients
- F. Euler-Cauchy equations
- G. Non-homogeneous equations with variable coefficients using variation of parameters

#### IV. Techniques and solutions to solve higher order differential equations and initial value problems

- A. Complementary functions of the associated homogeneous equation
- B. The linear combination of the particular solution and the complementary function
- C. The method of undetermined coefficients
- D. Reduction of order
- E. Variation of parameters

#### V. Applications of second and higher order differential equations and initial value problems

- A. Free undamped harmonic oscillation
- B. Free damped harmonic oscillation
- C. Forced mechanical and electrical vibrations in circuits
- D. Resonance

#### VI. Power series solutions of ordinary differential equations and initial value problems

- A. Power series expansions of analytic functions
- B. Radii of Convergence
- C. Ordinary and singular points of differential equations
- D. Series solutions near ordinary points
- E. Regular and irregular singular points
- F. The method of Frobenius

#### VII. Laplace Transforms

- A. Definition of a Laplace Transform
- B. Laplace Transforms of standard functions
- C. Inverse Laplace Transforms
- D. Properties of Laplace Transforms
- E. Laplace Transforms of derivatives of functions
- F. Laplace Transforms of products of functions

- G. Inverse Laplace Transforms of rational functions
- H. The Convolution Theorem
- VIII. Solutions to ordinary differential equations and initial value problems using Laplace Transforms
  - A. The Laplace Transform of a differential equation
  - B. The solution to the transformed equation
  - C. The Inverse Laplace Transforms of the solution to the transformed equation
- IX. Systems of differential equations
  - A. First second and higher order systems
  - B. Higher order ordinary differential equation as a first order system
  - C. The Laplace Transform method
- X. Numerical solutions of ordinary differential equations
  - A. Euler's Method
  - B. Error in Euler's Method

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Related sections in elementary differential equations textbooks
- II. Readings in other math books or journals such as The College Math Journal, Math Horizons, or Mathematics Magazine
- III. Topics related to differential equations found on the internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Written solutions to problems using proper mathematical terminology
- II. Solutions to first and second order differential equations using various techniques
- III. Graphs of vector fields and solutions curves
- IV. Solutions to application problems dealing with physics or engineering
- V. Journal entries that focus on mathematical calculations, problem solving techniques, and applied problems
- VI. Formal reports analyzing some topic or person appropriate to mathematics
- VII. Written proofs for mathematical statements related to the material covered in class

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Reading and writing assignments as specified in the course syllabus
- II. Study and review of lecture notes
- III. Library, electronic and other archival research
- IV. Viewing of assigned/recommended media materials
- V. Observations, e.g., field trips to attend pertinent lectures/conferences
- VI. Analytical semester projects
- VII. Development of problem solving techniques and analytical skills by solving problems from various texts, such as Schaum's Outline of Differential Equations
- VIII. Review of current periodicals such as Mathematics Magazine or Math Horizons
- IX. Collaborative projects focusing on expanding mathematical concepts presented in class

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Analyzing an equation and determining which among various techniques can solve the equation
- II. Interpreting real-life phenomena modeled by a particular class of differential equations
- III. Applying appropriate continuity principles to solve families of differential equations
- IV. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- V. Analyzing and solving problems that are broader in scope than those present in class or those introduced in the text
- VI. Applying various mathematical concepts in interpreting applications and in solving applied problems
- VII. Investigating a variety of problems, including applications of principles in a number of different contexts
- VIII. Analyzing and interpreting current periodicals
- IX. Developing proofs for mathematical statements

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- G. Inverse Laplace Transforms of rational functions
- H. The Convolution Theorem
- VIII. Solutions to ordinary differential equations and initial value problems using Laplace Transforms
  - A. The Laplace Transform of a differential equation
  - B. The solution to the transformed equation
  - C. The Inverse Laplace Transforms of the solution to the transformed equation
- IX. Systems of differential equations
  - A. First second and higher order systems
  - B. Higher order ordinary differential equation as a first order system
  - C. The Laplace Transform method
- X. Numerical solutions of ordinary differential equations
  - A. Euler's Method
  - B. Error in Euler's Method
  - C. Picard's Method of Successive Approximation
  - D. Taylor Polynomial Approximation Method
  - E. Runge-Kutta

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. Related sections in elementary differential equations textbooks
- II. Readings in other math books or journals such as The College Math Journal, Math Horizons, or Mathematics Magazine
- III. Topics related to differential equations found on the internet

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Written solutions to problems using proper mathematical terminology
- II. Solutions to first and second order differential equations using various techniques
- III. Graphs of vector fields and solutions curves
- IV. Solutions to application problems dealing with physics or engineering
- V. Journal entries that focus on mathematical calculations, problem solving techniques, and applied problems
- VI. Formal reports analyzing some topic or person appropriate to mathematics
- VII. Written proofs for mathematical statements related to the material covered in class

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Reading and writing assignments as specified in the course syllabus
- II. Study and review of lecture notes
- III. Library, electronic and other archival research
- IV. Viewing of assigned/recommended media materials
- V. Observations, e.g., field trips to attend pertinent lectures/conferences
- VI. Analytical semester projects
- VII. Development of problem solving techniques and analytical skills by solving problems from various texts, such as Schaum's Outline of Differential Equations
- VIII. Review of current periodicals such as Mathematics Magazine or Math Horizons
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Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Analyzing an equation and determining which among various techniques can solve the equation
- II. Interpreting real-life phenomena modeled by a particular class of differential equations
- III. Applying appropriate continuity principles to solve families of differential equations
- IV. Interpreting and analyzing mathematical principles, symbolic formulas, and problem solving techniques
- V. Analyzing and solving problems that are broader in scope than those present in class or those introduced in the text
- VI. Applying various mathematical concepts in interpreting applications and in solving applied problems
- VII. Investigating a variety of problems, including applications of principles in a number of different contexts
- VIII. Analyzing and interpreting current periodicals
- IX. Developing proofs for mathematical statements

**2. METHODS OF EVALUATION:**

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- I. In-class objective quizzes

- I. In-class objective quizzes
- II. In-class examinations
- III. In-class comprehensive final examination
- IV. Out-of-class writing assignments that develop critical thinking and problem solving techniques as it pertains to the application of differential equations and their theory
- V. Take home essay examinations
- VI. Analytical semester projects
- VII. Written reports on related subjects
- VIII. Exploratory activities involving a graphing calculator or computer class participation
- IX. Participation in classroom discussion
- X. Participation in collaborative assignments
- XI. Oral presentations on a variety of differential equations topics
- XII. Group projects
- XIII. Field trips
- XIV. Classroom experiments and simulations
- XV. Library and online internet research
- XVI. Reviewing current periodicals

### 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Collaborative Learning
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Calculator and/or computer assignments
- \* Field observation and field trips
- \* Guest speakers

### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

#### TEXTBOOKS:

1. Boyce, William E. and Richard C. DiPrima. Elementary Differential Equations and Boundary Value Problems, 10th ed. Wiley, 2012, ISBN: 9780470458310
2. Bronson, Richard and Gabriel B. Costa. Schaum's Outline of Differential Equations, 4th ed. McGraw-Hill, 2014, ISBN: 9780071824859
3. Campbell, Stephen L. and Richard Haberman. Introduction to Differential Equations with Dynamical Systems, 1st ed. Princeton University Press, 2008, ISBN: 9780691124742
4. Edwards & Penney. Elementary Differential Equations with Boundary Value Problems, 6th ed. Prentice Hall, 2007, ISBN: 978013600613
5. Zill, Dennis G. A First Course in Differential Equations with Modeling Applications, 10th ed. Brooks/Cole, 2013, ISBN: 9781111827052

#### MANUALS:

#### PERIODICALS:

#### SOFTWARE:

#### SUPPLIES:

1. Graphing calculator
2. Graph paper
3. USB drive
4. Journal

ORIGINATOR: Shayne Vargo

CO-CONTRIBUTOR(S) Duane Short  
DATE: 11/03/2015

- II. In-class examinations
- III. In-class comprehensive final examination
- IV. Out-of-class writing assignments that develop critical thinking and problem solving techniques as it pertains to the application of differential equations and their theory
- V. Take home essay examinations
- VI. Analytical semester projects
- VII. Written reports on related subjects
- VIII. Exploratory activities involving a graphing calculator or computer class participation
- IX. Participation in classroom discussion
- X. Participation in collaborative assignments
- XI. Oral presentations on a variety of differential equations topics
- XII. Group projects
- XIII. Field trips
- XIV. Classroom experiments and simulations
- XV. Library and online internet research
- XVI. Reviewing current periodicals

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- \* Collaborative Learning
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* Calculator and/or computer assignments
- \* Field observation and field trips
- \* Guest speakers

### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

#### TEXTBOOKS:

1. Boyce, William E., et al. Elementary Differential Equations and Boundary Value Problems, 12th ed. Wiley, 2022, ISBN: 9781119820512
2. Bronson, Richard and Gabriel B. Costa. Schaum's Outline of Differential Equations, 4th ed. McGraw-Hill, 2014, ISBN: 9780071824859
3. Campbell, Stephen L. and Richard Haberman. Introduction to Differential Equations with Dynamical Systems, 1st ed. Princeton University Press, 2008, ISBN: 9780691124742
4. Edwards & Penney. Elementary Differential Equations with Boundary Value Problems, 6th ed. Pearson, 2018, ISBN: 9780134995410
5. Zill, Dennis G. A First Course in Differential Equations with Modeling Applications, 11th ed. Cengage Learning, 2017, ISBN: 9781305965720

#### MANUALS:

#### PERIODICALS:

#### SOFTWARE:

#### SUPPLIES:

1. Graphing calculator
2. Graph paper
3. USB drive
4. Journal

ORIGINATOR: Shayne Vargo

ORIGINATION DATE: 11/03/2015

PROPOSAL ORIGINATOR: Juan U. Bernal

CO-CONTRIBUTOR(S)

PROPOSAL DATE: 10/03/2022





# Previous Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 255
- III. Course Title:** Differential Equations
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Differential Equations
- VIII. Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. Originating Campus:** MIRAMAR
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** City , Mesa and Miramar
- XII. Proposal Originating Date:** 11/03/2015
- XIII. Proposed Start Semester:** Fall 2017
- XIV. Field Trip:** May be required
- XV. Grading Option:** Grade Only
- XVI. Current Short Description:** Covers first order and higher order equations and their applications.  
**Proposed Short Description:** First order and higher order equations and their applications.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 252 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence  
and Prerequisite: MATH 254 with a grade of "C" or better, or equivalent. Required for articulation by a UC/CSU institution
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:**

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** More clearly state in the course outline various topics covered in the class that are needed for C-ID approval. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?** 1. Transfer
- III. Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. Proposed College/District Purpose:** 1. District general education 2. Major Requirement - Associate Degree
- V. Extraordinary Cost to the College:** n/a.
- VI. Library Resource Materials:** .

### GENERAL EDUCATION ANALYSIS

CSU General Education:

# Current Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

## SECTION I

- I. Subject Area:** Mathematics
- II. Course Number:** 255
- III. Course Title:** Differential Equations
- IV. Disciplines (Instructor Minimum Qualifications):** Mathematics
- V.**
- VI. Family:**
- VII. Current Short Title:** Differential Equations
- VIII. Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. Originating Campus:** MESA
- X. Action Proposed:** Course Revision (May Include Activation)
- XI. Distance Education Proposed At:** City , Miramar and Mesa
- XII. Proposal Originating Date:** 10/03/2022
- XIII. Proposed Start Semester:** Spring 2024
- XIV. Field Trip:** May be required
- XV. Grading Option:** Grade Only
- XVI. Current Short Description:** First order and higher order equations and their applications.

## SECTION II

### COURSE ENROLLMENT INFORMATION

- I. Requisites:**  
Prerequisite: MATH 252 with a grade of "C" or better, or equivalent. Is a successor course in a discipline or cross-discipline sequence  
and Prerequisite: MATH 254 with a grade of "C" or better, or equivalent. Required for articulation by a UC/CSU institution
- II. Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. Repeatability:** Course may be taken 1 time(s)
- V. Course Equivalency:** No
- VI. Additional Information:**
- VII. Additional Textbook Information:** Texts are most current editions - 10/2022.

### COURSE ANALYSIS DATA

- I. Reason for Proposed Action:** Six yr review including: 1) update DE from online course to fully online, and update verbiage, 2) minorcredits to objectives and topics, and 3) review & update texts. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission?** 1. Transfer
- III. Current Transfer Options:** 1. CSU General Education 2. IGETC 3. UC Transfer Course List
- IV. Proposed College/District Purpose:** 1. District general education 2. Major Requirement - Associate Degree
- V. Extraordinary Cost to the College:** None.
- VI. Library Resource Materials:** No new resources required.

### GENERAL EDUCATION ANALYSIS

CSU General Education:

B4 Area B. Scientific Inquiry and Quantitative Reasoning - Mathematics/Quantitative Reasoning

**District General Education:**

A2 Language and Rationality - Communication & Analytical Thinking

**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

Perform algebraic operations on vectors in two or three dimensions

- I. Course: MATH 252 Extend and apply algebraic and geometric concepts of two dimensional vectors in the Cartesian plane to 3-dimensions, including the distance between vectors, vector algebra, and the Euclidean norm of a vector.
- II. Course: MATH 252 Apply operations involving the inner product, the cross product, and triple scalar product of 3-dimensional vectors and use these operations in geometric and physical applications.
- III. Course: MATH 252 Calculate the angle between vectors, and determine if two vectors are orthogonal.
- IV. Course: MATH 254 Perform vector operations on vectors from Euclidean Vector Spaces including vectors from  $\mathbb{R}^n$ .

Understand functions of two and three variables, including the visualization of surfaces defined by functions of two variables

- I. Course: MATH 252 Recognize, compare, contrast, and sketch the different quadric surfaces.
- II. Course: MATH 252 Sketch simple single variable vector-valued functions in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ .
- III. Course: MATH 252 Compute the unit tangent vector, principal unit normal vector, the arc length and the curvature of a vector-valued function.
- IV. Course: MATH 252 Describe and apply the formal definitions of limits, and continuity from single variable calculus to functions of 2, 3 and n-variables.

Compute derivatives of algebraic and transcendental functions of several variables

- I. Course: MATH 252 Compute the limit, derivative, and integrals of vector-valued functions of one variable.
- II. Course: MATH 252 Calculate first as well as higher order partial derivatives of multivariable functions.
- III. Course: MATH 252 Define the derivative and the concept of the differentials of multivariable functions, and calculate linear and quadratic approximations to multivariable scalar functions.
- IV. Course: MATH 252 Calculate the directional derivative of a multivariable function at a point in a given direction; and the gradient of such a function, applying the properties of the gradient to describe the behavior of the function.
- V. Course: MATH 252 Calculate the critical points of a differentiable multivariable function in an open ball, and applying the second derivative test, determine if these points are relative maxima, relative minima or saddle points.
- VI. Course: MATH 252 Calculate the derivative of multivariable functions expressed implicitly by an equation, as well as the derivative of inverse functions.

Compute integrals of algebraic and transcendental functions of several variables in Cartesian and polar form

- I. Course: MATH 252 Implement changes of variables between rectangular, cylindrical, and spherical coordinates.
- II. Course: MATH 252 Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
- III. Course: MATH 252 Determine areas, volumes, surface area, mass, centers of mass, and moments of inertia.
- IV. Course: MATH 252 Compute the line integral of a vector-valued function over a piecewise smooth contour.
- V. Course: MATH 252 Calculate the work done by a vector-valued multivariable function over a piecewise smooth contour.

Solve linear systems of equations.

**District General Education:**

A2 Language and Rationality - Communication & Analytical Thinking

**IGETC:**

Area 2. Mathematical Concepts and Quantitative Reasoning - 2A: Math

**UC Transfer Course:**

Yes

**REQUISITES ANALYSIS**

MATH 252 - Knowledge of two or three variables, and derivatives of algebraic and transcendental functions of several variables in Cartesian and polar form.

- I. Course: MATH 252 Extend and apply algebraic and geometric concepts of two dimensional vectors in the Cartesian plane to 3-dimensions, including the distance between vectors, vector algebra, and the Euclidean norm of a vector.
- II. Course: MATH 252 Apply operations involving the inner product, the cross product, and triple scalar product of 3-dimensional vectors and use these operations in geometric and physical applications.
- III. Course: MATH 252 Calculate the angle between vectors, and determine if two vectors are orthogonal.
- IV. Course: MATH 252 Recognize, compare, contrast, and sketch the different quadric surfaces.
- V. Course: MATH 252 Sketch simple single variable vector-valued functions in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ .
- VI. Course: MATH 252 Compute the limit, derivative, and integrals of vector-valued functions of one variable.
- VII. Course: MATH 252 Compute the unit tangent vector, principal unit normal vector, the arc length and the curvature of a vector-valued function.
- VIII. Course: MATH 252 Define the derivative and the concept of the differentials of multivariable functions, and calculate linear and quadratic approximations to multivariable scalar functions.
- IX. Course: MATH 252 Apply the Chain Rule to a composition of multivariable functions.
- X. Course: MATH 252 Calculate the directional derivative of a multivariable function at a point in a given direction; and the gradient of such a function, applying the properties of the gradient to describe the behavior of the function.
- XI. Course: MATH 252 Demonstrate use of Lagrange's Theorem to compute the extrema of a multivariable function subject to given constraints.
- XII. Course: MATH 252 Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
- XIII. Course: MATH 252 Determine areas, volumes, surface area, mass, centers of mass, and moments of inertia.
- XIV. Course: MATH 252 Calculate the work done by a vector-valued multivariable function over a piecewise smooth contour.
- XV. Course: MATH 252 Apply Green's, Stokes' and the Divergence Theorems, and calculate surface integrals over parametrized piecewise smooth surfaces to compute flux of a vector field.

MATH 254 - Knowledge of algebraic operations of vectors and solving linear systems of equations.

- I. Course: MATH 254 Solve systems of linear equations using several algebraic methods.
- II. Course: MATH 254 Construct and apply special matrices, such as symmetric, skew-symmetric, diagonal, upper triangular or lower triangular matrices.
- III. Course: MATH 254 Apply all the algebraic matrix operations, including multiplication of matrices, transposes, and traces.
- IV. Course: MATH 254 Calculate the inverse of a matrix using various methods, and perform application problems involving the inverse.
- V. Course: MATH 254 Compute the determinant of square matrices and use the determinant to assess invertibility.
- VI. Course: MATH 254 Derive and apply algebraic properties of determinants.
- VII. Course: MATH 254 Perform vector operations on vectors from Euclidean Vector Spaces including vectors from  $\mathbb{R}^n$ .
- VIII. Course: MATH 254 Perform linear transformations in Euclidean vector spaces, including basic linear operators, and determine the standard matrix of the linear transformation.
- IX. Course: MATH 254 Analyze whether a set of vectors spans a space, and if such a set is linearly dependent or independent.
- X. Course: MATH 254 Assess if a set of functions is linearly independent using various techniques including calculating the determinant of the Wronskian.
- XI. Course: MATH 254 Solve for the basis and the dimension of a vector space.

- I. Course: MATH 254 Solve systems of linear equations using several algebraic methods.

### SECTION III

#### COURSE DISTANCE EDUCATION INFORMATION

##### I. CITY

II. Distance Education Methods of Instruction: 1. Fully Online 2. Hybrid only 3. Partially online only

III. Other Distance Education Methods:

IV. Type and frequency of contact may include, but is not limited to:

1. Announcements  
weekly
2. Collaborative Web Documents  
as assigned
3. Conferencing  
as assigned
4. Discussion Board  
at least three times during the term
5. Email/Message System  
as needed
6. Field Trips  
as assigned
7. Group Meetings  
as assigned
8. Individual Meetings  
as needed
9. Individualized Assignment Feedback  
as assigned
10. Synchronous or Asynchronous Video  
as assigned
11. Telephone Contact  
as needed

V. **List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.

VI. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

VII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

VIII. Audio Visual Library Materials: NO

##### IX. MESA

X. Distance Education Methods of Instruction: 1. On-line course

XI. Other Distance Education Methods:

XII. Type and frequency of contact may include, but is not limited to:

1. E-mail  
Instructor emails students weekly with additional contact as needed.
2. Group Meetings  
Every other week as needed.
3. Review Sessions  
Before each exam, online.

- XII. Course: MATH 254 Determine the rank, the nullity, the column space and the row space of a matrix.
- XIII. Course: MATH 254 Identify orthogonality between vectors in an abstract vector space by means of an inner product, and compute the inner product between vectors of any inner product space.
- XIV. Course: MATH 254 Express a vector space via change of base, including computation of the transition matrix and determining an orthonormal basis for the space.
- XV. Course: MATH 254 Compute all the eigenvalues of a square matrix, including any complex eigenvalues, and determine their corresponding eigenvectors.
- XVI. Course: MATH 254 Assess if a square matrix is diagonalizable and derive the diagonalization of a matrix whose eigenvalues are easily calculated.
- XVII. Course: MATH 254 Apply linear transformations among abstract general vector spaces, and derive the rank, the nullity and the associated matrix of the transformation.
- XVIII. Course: MATH 254 Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

### SECTION III

#### COURSE DISTANCE EDUCATION INFORMATION

##### I. CITY

II. Distance Education Methods of Instruction: 1. Fully Online 2. Hybrid only 3. Partially online only

III. Other Distance Education Methods:

IV. Type and frequency of contact may include, but is not limited to:

1. Announcements  
weekly
2. Collaborative Web Documents  
as assigned
3. Conferencing  
as assigned
4. Discussion Board  
at least three times during the term
5. Email/Message System  
as needed
6. Field Trips  
as assigned
7. Group Meetings  
as assigned
8. Individual Meetings  
as needed
9. Individualized Assignment Feedback  
as assigned
10. Synchronous or Asynchronous Video  
as assigned
11. Telephone Contact  
as needed

V. **List of Techniques:** For hybrid, fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. For partially online, less than fifty-one (51%) or more of instruction is taught in a traditional, on-campus format. In the online format, students engage in regular and effective interaction with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is altered. These methods include one-on-one communication with the instructor and with other students via e-mail, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, problem sets, group projects, asynchronous class discussion, and/or other assignments. A proctored final exam is mandatory and students must pass the final exam as determined by the instructor of record, in order to be eligible to pass the class.

VI. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects posted to the discussion board or other online collaboration tool.

VII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for campus based class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

VIII. Audio Visual Library Materials: NO

##### IX. MESA

X. Distance Education Methods of Instruction: 1. Fully Online

**XIII. List of Techniques:** Homeworks Quizzes Exams Projects Discussion boards Chat rooms

**XIV. How to Evaluate Students for Achieved Outcomes:** Homeworks Quizzes Exams Projects

**XV. Additional Resources/Materials/Information:** Electronic handouts Electronic texts Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. On-line course

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms  
As assigned.
2. E-mail  
Instructor emails students weekly with additional contact as needed.
3. Field Trips  
As assigned.
4. Group Meetings  
Every other week as needed.
5. Review Sessions  
Before each exam, online.
6. Telephone Contact  
As needed.
7. Threaded Conferencing  
As assigned.

**XXI. List of Techniques:** Students will interact with each other and the instructor in ways that mirror the traditional classroom, only the delivery system will be altered. These methods include one-on-one communication with the instructor and other students via e-mail, the discussion board, and the chat room. In addition, students will participate in projects and discussion via the discussion board and chat rooms. Students will also demonstrate an understanding and integration of course concepts via research assignments, asynchronous class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures will be used to assess student learning outcomes. These include performance on objective examinations administered via the assessment tool, homework, writing assignments, and/or projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** The instructor may use the Internet to post materials that students can access for relevant reading. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

## SECTION IV

### COURSE STUDENT LEARNING OUTCOME(S)

#### CITY

- Students will demonstrate proficiency with common techniques used for solving ordinary differential equations and learn their classical applications.

#### MESA

- Students will use Eigenvalues and Eigenvectors to solve a system of first-order linear homogeneous equations.

**XI. Other Distance Education Methods:**

**XII. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
As needed  
**Participant/s:** Faculty to Student/s
2. Discussion Board  
Frequent  
**Participant/s:** Faculty to Student/s , Among Students
3. E-mail  
Instructor emails students weekly with additional contact as needed.
4. Group Meetings  
Every other week as needed.
5. Review Sessions  
Before each exam, online.
6. Synchronous or Asynchronous Video  
Frequent  
**Participant/s:** Faculty to Student/s , Among Students

**XIII. List of Techniques:** Online instruction includes regular student-to-student and instructor-to-student communication. Telephone calls between students and the instructor may be used to discuss questions and concerns throughout the course. E-mail may be used for asynchronous instructor-to-student and student-to-student communication. Chat rooms may be used for synchronous interaction between students and between the instructor and students. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Assignments and tests that will be used in the Distance Education course will be exactly the same as those in the traditional course. Students will submit all course work (tests and assignments) electronically to the instructor for grading.

**XIV. How to Evaluate Students for Achieved Outcomes:** The evaluation methods will mirror the on-campus course as specified in the course outline. The feedback on assignments and tests will be submitted electronically to the student.

**XV. Additional Resources/Materials/Information:** SDCCD and DSPS personnel will provide all needed accommodations. DSPS will provide a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. On-line course

**XIX. Other Distance Education Methods:**

**XX. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms  
As assigned.
2. E-mail  
Instructor emails students weekly with additional contact as needed.
3. Field Trips  
As assigned.
4. Group Meetings  
Every other week as needed.
5. Review Sessions  
Before each exam, online.
6. Telephone Contact  
As needed.
7. Threaded Conferencing  
As assigned.

**XXI. List of Techniques:** Students will interact with each other and the instructor in ways that mirror the traditional classroom, only the delivery system will be altered. These methods include one-on-one communication with the instructor and other students via e-mail, the discussion board, and the chat room. In addition, students will participate in projects and discussion via the discussion board and chat rooms. Students will also demonstrate an understanding and integration of course concepts via research assignments, asynchronous class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures will be used to assess student learning outcomes. These include performance on objective examinations administered via the assessment tool, homework, writing assignments, and/or projects posted to the discussion board or other online collaboration tool.

**XXIII. Additional Resources/Materials/Information:** The instructor may use the Internet to post materials that students can access for relevant reading. Distance education techniques used in this course will be accessible to individuals

- Students will use an appropriate method to solve a second-order linear non-homogeneous equation.

## MIRAMAR

- Solve various types of differential equations and initial value problems using a variety of techniques including the method of undetermined coefficients, variation of parameters, and reduction of order.
- Use differential equations and initial value problems to model a variety of physical phenomenon, like: motion problems, Newton's Law of Motion, variable acceleration, population models, free oscillation, damped oscillation, forced mechanical and electrical vibrations and resonance.
- Find solutions to initial value problems using Laplace Transforms.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 11/03/2015

#### **IV. Last Outline Revision Date:** 09/22/2016

#### **V. CIC Approval:** 09/22/2016

#### **VI. BOT Approval:**

#### **VII. State Approval:**

#### **VIII. Revised State Approval:**

#### **IX. Course Approval Effective Date:** Fall 2017

## SECTION VI

### CREDIT FOR PRIOR LEARNING

with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

## **XXIV. Audio Visual Library Materials:** NO

## SECTION IV

### COURSE STUDENT LEARNING OUTCOME(S)

## CITY

- Students will demonstrate proficiency with common techniques used for solving ordinary differential equations and learn their classical applications.

## MESA

- Students will use Eigenvalues and Eigenvectors to solve a system of first-order linear homogeneous equations.
- Students will use an appropriate method to solve a second-order linear non-homogeneous equation.

## MIRAMAR

- Solve various types of differential equations and initial value problems using a variety of techniques including the method of undetermined coefficients, variation of parameters, and reduction of order.
- Use differential equations and initial value problems to model a variety of physical phenomenon, like: motion problems, Newton's Law of Motion, variable acceleration, population models, free oscillation, damped oscillation, forced mechanical and electrical vibrations and resonance.
- Find solutions to initial value problems using Laplace Transforms.

## SECTION V

### COURSE DATA ADMINISTRATION ELEMENTS

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1701.00 Mathematics, General

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** B = CSGE B4, IGET 2, Math or Quantitative Reasoning

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 10/03/2022

#### **IV. Last Outline Revision Date:** 09/22/2016

#### **V. CIC Approval:**

#### **VI. BOT Approval:**

#### **VII. State Approval:**

#### **VIII. Revised State Approval:**

#### **IX. Course Approval Effective Date:**

## SECTION VI

### CREDIT FOR PRIOR LEARNING

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Spanish 210**COURSE TITLE:**

Conversation and Composition Spanish I

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course further develops oral comprehension and fluency as well as written communication at a mid-intermediate level in Spanish through culturally relevant materials. Students increase vocabulary, dramatize everyday topics of conversation, interpret and describe materials, and compare and contrast Latin American and Spanish cultures with U.S. culture both orally and in writing. Writing strategies are emphasized and literature is introduced. This course is intended for students who want to enhance their skills in the Spanish language.

**REQUISITES:****Prerequisite:**

SPAN 102 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU UC Transfer Course List

**CID:****TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:



1. Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency
2. Dramatize everyday topics through role-play and contextual decision making at mid-intermediate level proficiency in Spanish
3. Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles; short stories and/or films; and other materials
4. Apply enhanced communication skills in Spanish to everyday topics through the analysis of selected themes from literature, films, and/or current events
5. Orally interpret and describe materials at mid-intermediate level proficiency in Spanish
6. Analyze; compare and contrast; dramatize; interpret; and describe selected topics in written compositions in Spanish
7. Describe Spanish terms through the process of circumlocution in order to communicate verbally with a native Spanish speaker.

## **SECTION II**

### **1. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Spanish vocabulary and fluency as applied to Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency
  - A. Education
  - B. Travel
  - C. Art
  - D. Social customs
  - E. Technology
  - F. Societal roles
  - G. Environment.
- II. Everyday topics at mid-intermediate level proficiency in Spanish
  - A. Student interaction and educational situations
  - B. Client interaction
  - C. Vendor and customer interaction
  - D. Dining and dating situations
  - E. Doctor and patient interaction.
- III. Comparison of Latin American and Spanish cultures with U.S. culture
  - A. Articles
  - B. Literature
  - C. Films
  - D. Foods and eating.
- IV. Application of enhanced communication skills to everyday topics in Spanish
  - A. Articles
  - B. Literature
  - C. Films.
- V. Oral interpretation and description at mid-intermediate level proficiency in Spanish
  - A. Educational values
  - B. Travel experiences
  - C. Shopping excursions
  - D. Art
  - E. Holidays.
- VI. Analysis; comparison and contrast; dramatization; interpretation; and description of selected topics in written compositions in Spanish
  - A. Educational values
  - B. Travel in Latin America and Spain
  - C. Bargaining in the different cultures
  - D. Analysis of works of art
  - E. Examination of societal beliefs reflected in holidays.

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. College level Spanish readers
- II. Current library periodicals in Spanish
- III. Poems, songs, short stories, short essays, and chronicles from Spanish speaking countries
- IV. Internet and social media readings in Spanish
- V. Native Spanish language popular reading materials such as newspapers.

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Compositions in Spanish varying in length from a paragraph to one hundred and fifty words about Latin American and Spanish culturally relevant topics
- II. Written dialogues in Spanish that critique Latin American and Spanish culturally relevant topics
- III. Written interpretations and paraphrasing of class materials in Spanish
- IV. Class journal in Spanish, including personally relevant Spanish vocabulary.

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Oral presentation in Spanish based on library research of culture/literature
- II. Homework requiring students to recognize and select grammar and vocabulary in Spanish language recordings
- III. Visits to Spanish language Latin American and Spanish culturally relevant websites
- IV. Attendance at Latin American and Spanish culturally relevant events such as museum exhibitions and films
- V. Use of audio-visual materials at the Independent Learning Center to prepare work to be presented orally and/or in writing in Spanish
- VI. Verbal interactions with native speakers of Spanish in person or by telephone
- VII. Library research of selected topics related to culture/literature.

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Comparing and contrasting Latin American, Spanish, and U.S. values and cultures
- II. Creating impromptu written and oral dialogues in Spanish
- III. Determining culturally appropriate actions (e.g. vocals, body language, idiomatic expressions) during a conversation with a native speaker of Spanish
- IV. Applying Spanish vocabulary in context through asking and answering questions, engaging in debates, and expressing opinions.

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Chapter exams that apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culture and everyday topics at mid-intermediate level proficiency
- II. Final exam that applies increased vocabulary to the dramatization, interpretation, and/or description of everyday topics and to the comparing and contrasting of Latin American, Spanish, and U.S. cultures at mid-intermediate level proficiency
- III. Oral final exam that analyzes and examines an aspect of Latin American and/or Spanish culture at mid-intermediate level proficiency
- IV. Quizzes that apply increased Spanish vocabulary
- V. Homework that prepares students for exams, quizzes, in-class discussion, and recognition of the differences among Latin American, Spanish, and U.S. cultures



- VI. Writing assignments that employ vocabulary and culture
- VII. Oral projects that apply increased vocabulary
- VIII. Individual and group participation in class activities.

### 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Distance Education (Hybrid only)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* A. Group analysis of topics
- \* B. Group dramatization and description of everyday situations
- \* C. Quiz and examination review
- \* D. Field trips
- \* E. Guest speakers
- \* F. Technically mediated instruction, including television, videos, social media, and/or the internet
- \* G. Student-centered conversation practice.

### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

#### TEXTBOOKS:

1. Andrian, Gustave W. Modern Spanish Prose, 7th ed. Prentice Hall, 2006, ISBN: 9780132226776
2. Bacon, Susan B., Gregg Courtad, and Aitor Bikandi-Mejias. Leyendas del mundo hispano, 4th ed. Prentice Hall, 2015, ISBN: 9780133977967
3. Espasa (ed.). Diccionario de sinónimos y antónimos, 1st ed. Espasa, 2012, ISBN: 9788467007510
4. Iorillo, Nino R. and Andres C. Diaz. Conversacion y Controversia: Topicos de hoy y de Siempre, 6th ed. Prentice Hall, 2010, ISBN: 9780205696550
5. Jarvis, Ana C. and Raquel Lebreo. !Conversemos!, 3rd ed. Heinle Cengage Learning, 2003, ISBN: 9780618220885
6. Kooreman, Thomas E., Olga M. Kooreman, and Eufemia Sanchez de la Calle. Breves cuentos hispanos, 4th ed. Prentice Hall, 2008, ISBN: 9780132391641

#### MANUALS:

#### PERIODICALS:

#### SOFTWARE:

#### SUPPLIES:

**ORIGINATOR:** April Koch

**ORIGINATION DATE:** 04/06/2015

**PROPOSAL ORIGINATOR:** Alison Primoza

**CO-CONTRIBUTOR(S)**

**PROPOSAL DATE:** 09/17/2022

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
COURSE PROPOSAL IMPACT REPORT**

**COURSE TO BE PROPOSED:** SPAN 210  
Conversation and Composition Spanish I

**ACTIVE/APPROVED COURSES IMPACTED:**

SPAN 210 Conversation and Composition Spanish I (29318)

Prerequisite

SPAN 211 (Active)

**ACTIVE/APPROVED/PROPOSED PROGRAMS IMPACTED:**

( City )

Biliteracy: English and Spanish \*Pending\*;  
**Certificate of Achievement**

Choose ONE course from the following if not already taken above

( Miramar )

Honors Global Competencies Certificate\* \*Active\*;  
**Certificate of Performance**

Select 3-5 units from the following introductory or higher level foreign languages:

( Mesa )

Liberal Arts and Sciences: Language Arts and Humanities - World Languages \*Pending\*;  
**Associate of Arts Degree**

Select 3-5 units of additional coursework.

( Mesa )

Liberal Arts and Sciences: Language Arts and Humanities-Spanish \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 3 units:

( Mesa )

Spanish \*Approved\*;  
**Associate in Arts for Transfer Degree**

Category A: Select one of the following courses (3 - 5 units):

( Mesa )

Spanish \*Active\*;  
**Associate in Arts for Transfer Degree**

Category A: Select one of the following courses (3 units):

( Miramar )

Spanish \*Active\*;  
**Associate in Arts for Transfer Degree**

Select one course (3 units) from the following:

( **City** )

Spanish \*Active\*;  
**Associate in Arts for Transfer Degree**

Select one of the following:

( **City** )

Spanish \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( **Mesa** )

Spanish \*Active\*;  
**Associate of Arts Degree**

Courses Required for the Major:

( **Miramar** )

World Language Studies \*Active\*;  
**Associate of Arts Degree**

Select the remainder of units needed to meet the minimum of 18 from the following:

# SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

## Course Outline of Record: Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Spanish
- II. **Course Number:** 210
- III. **Course Title:** Conversation and Composition Spanish I
- IV. **Disciplines (Instructor Minimum Qualifications):** Foreign Languages
- V.
- VI. **Family:**
- VII. **Current Short Title:** Conversation and Composition S
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** Mesa , City and Miramar
- XII. **Proposal Originating Date:** 09/17/2022
- XIII. **Proposed Start Semester:** Summer 2023
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Develops oral and written Spanish communication at a mid-intermediate level.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: SPAN 102 with a grade of "C" or better, or equivalent. Health & Safety Requirements
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:**

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Revision of distance ed to Fully Online (with statement - "All online instructional hours will be delivered synchronously.") and appropriate edits to verbiage.
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Performance
- V. **Extraordinary Cost to the College:** None.
- VI. **Library Resource Materials:** No new resources needed.

#### GENERAL EDUCATION ANALYSIS

UC Transfer Course:

Yes

#### REQUISITES ANALYSIS

Identify sound/meaning in Spanish at novice level, using aquired skills by expressing needs, asking questions, making statements, opinions, and describing basic life situations orally or in writing

- I. **Course:** SPAN 102 **Use clear and comprehensible Spanish language production to discuss a variety of meaningful real life activities and to compare and contrast the nuances of everyday life in the Hispano-**

American world.

- II. **Course: SPAN 102** Use novice-high level Spanish grammatical structures, vocabulary, and idiomatic expressions to narrate and describe real life activities and past events, extend invitations in various Hispano-American cultural situations, ask for and give directions, discuss health issues, and compare and contrast interpersonal relations in the Hispano-American world.

Comprehend written work, identify aspects of Spanish history, geography, art, music, and culture in Spanish.

- I. **Course: SPAN 102** Express personal attitudes related to daily life situations through culturally appropriate commands.
- II. **Course: SPAN 102** Compare and contrast various themes in Hispano-American and Spanish history, geography, art, music, and general culture in written and spoken Spanish at the novice-high level.

### **SECTION III**

#### **COURSE DISTANCE EDUCATION INFORMATION**

- I. **MESA**
- II. **Distance Education Methods of Instruction:** 1. Fully Online
- III. **Other Distance Education Methods:** All online instructional hours will be delivered synchronously.
- IV. **Type and frequency of contact may include, but is not limited to:**
1. Announcements  
As needed  
**Participant/s:** Faculty to Student/s
  2. Discussion Board  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
  3. Email/Message System  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
  4. Synchronous or Asynchronous Video  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
  5. Telephone Contact  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
- V. **List of Techniques:** The online format will include frequent interaction with the instructor via threaded conferencing, e-mail, and telephone contact as needed. Zoom or other format will be used for synchronous interaction between students and between the instructor and students. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Other assessment, such as quizzes or assignments, may be administered online. Videos of lecture material may be used online to supplement lectures.
- VI. **How to Evaluate Students for Achieved Outcomes:** Other assessment, such as quizzes or assignments, may be administered online. Students will have opportunities to receive instructor and peer feedback both online.
- VII. **Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. **Audio Visual Library Materials:** NO
- IX. **CITY**
- X. **Distance Education Methods of Instruction:** 1. Hybrid only
- XI. **Other Distance Education Methods:**
- XII. **Type and frequency of contact may include, but is not limited to:**
1. Chat Rooms  
Frequent.
  2. E-mail  
Frequent.

3. Group Meetings  
Frequently in person and online as needed.
4. Individual Meetings  
As needed.
5. Telephone Contact  
As needed.
6. Threaded Conferencing  
At least once a semester.
- XIII. **List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional campus format. All chapter and final will be administered in campus. The online format will include frequent interaction with the instructor via, threaded conferencing, e-mail, and telephone contact as needed. Videos of lecture materials may be used online to supplement on-campus lectures.
- XIV. **How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional on-campus format. All chapter exams and final will be administered in campus. Other assessments such as quizzes and assignments may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and online.
- XV. **Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Request for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA). Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XVI. **Audio Visual Library Materials:** NO
- XVII. **MIRAMAR**
- XVIII. **Distance Education Methods of Instruction:** 1. Hybrid only
- XIX. **Other Distance Education Methods:** At least 50% of the in-class time must be conducted in person, while the other 50% must be conducted via synchronous video. During emergency periods of campus closure only, 100% of the time must be conducted via synchronous video.
- XX. **Type and frequency of contact may include, but is not limited to:**
  1. Announcements  
weekly via the "announcements" tool or during the in-person or synchronous video portion of the course
  2. Conferencing  
as assigned
  3. Discussion Board  
as assigned
  4. Email/Message System  
as needed
  5. Field Trips  
as assigned
  6. Group Meetings  
at least 50% of the in-class time must be conducted in person; during emergency periods of campus closure only, this time may be conducted via synchronous online video conferencing
  7. Individual Meetings  
as needed
  8. Individualized Assignment Feedback  
as assigned
  9. Synchronous or Asynchronous Video  
all online instruction must be conducted in a synchronous video format
  10. Telephone Contact  
as needed
- XXI. **List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is via synchronous online video conferencing instead of in-person communication. Students may also interact with each other and the instructor via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, writing exercises, class discussion, and/or other assignments.
- XXII. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects.
- XXIII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for the

in-person class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

## **SECTION IV**

### **COURSE STUDENT LEARNING OUTCOME(S)**

#### **CITY**

- Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency

#### **MESA**

- Communicate in a meaningful context in the Spanish language at the novice-high to intermediate-low level on the ACTFL proficiency scale.
- Explain or analyze the nature of language through comparisons of the Spanish language and their own.
- Demonstrate knowledge of and sensitivity to aspects of behavior, attitudes, and customs of Spanish-speaking countries.
- Connect with the global community through study and acquisition of the Spanish language and creative forms of expression.

#### **MIRAMAR**

- Ability to hold a conversation that requires conjugation of verbs, use culturally appropriate body language, idiomatic expressions, circumlocution, reactions, interruptions, and clarifications, the use of filler words in Spanish and no use of English.

## **SECTION V**

### **COURSE DATA ADMINISTRATION ELEMENTS**

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1105.00 Spanish

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** Y = Not applicable

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 09/17/2022

#### **IV. Last Outline Revision Date:** 03/24/2016

#### **V. CIC Approval:**

- VI. BOT Approval:
- VII. State Approval:
- VIII. Revised State Approval:
- IX. Course Approval Effective Date:

**SECTION VI**

**CREDIT FOR PRIOR LEARNING**



SPAN 210

## Previous Report

CIC Approval: 03/24/2016  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM: Spring 2017

### SAN DIEGO COMMUNITY COLLEGE DISTRICT CITY, MESA, AND MIRAMAR COLLEGES ASSOCIATE DEGREE COURSE OUTLINE

#### SECTION I

**SUBJECT AREA AND COURSE NUMBER:** Spanish 210

**COURSE TITLE:**

Conversation and Composition Spanish I

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course further develops oral comprehension and fluency as well as written communication at a mid-intermediate level in Spanish through culturally relevant materials. Students increase vocabulary, dramatize everyday topics of conversation, interpret and describe materials, and compare and contrast Latin American and Spanish cultures with U.S. culture both orally and in writing. Writing strategies are emphasized and literature is introduced. This course is intended for students who want to enhance their skills in the Spanish language.

**REQUISITES:**

**Prerequisite:**

SPAN 102 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit & transfer to CSU UC Transfer Course List

**CID:**

**TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency
2. Dramatize everyday topics through role-play and contextual decision making at mid-intermediate level proficiency in Spanish
3. Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles; short stories and/or films; and other materials
4. Apply enhanced communication skills in Spanish to everyday topics through the analysis of selected themes from literature, films, and/or current events

## Current Report

SPAN 210

CIC Approval:  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM:

### SAN DIEGO COMMUNITY COLLEGE DISTRICT CITY, MESA, AND MIRAMAR COLLEGES ASSOCIATE DEGREE COURSE OUTLINE

#### SECTION I

**SUBJECT AREA AND COURSE NUMBER:** Spanish 210

**COURSE TITLE:**

Conversation and Composition Spanish I

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course further develops oral comprehension and fluency as well as written communication at a mid-intermediate level in Spanish through culturally relevant materials. Students increase vocabulary, dramatize everyday topics of conversation, interpret and describe materials, and compare and contrast Latin American and Spanish cultures with U.S. culture both orally and in writing. Writing strategies are emphasized and literature is introduced. This course is intended for students who want to enhance their skills in the Spanish language.

**REQUISITES:**

**Prerequisite:**

SPAN 102 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit & transfer to CSU UC Transfer Course List

**CID:**

**TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

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Upon successful completion of the course the student will be able to:

1. Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency
2. Dramatize everyday topics through role-play and contextual decision making at mid-intermediate level proficiency in Spanish
3. Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles; short stories and/or films; and other materials
4. Apply enhanced communication skills in Spanish to everyday topics through the analysis of selected themes from literature, films, and/or current events
5. Orally interpret and describe materials at mid-intermediate level proficiency in Spanish
6. Analyze; compare and contrast; dramatize; interpret; and describe selected topics in written compositions in

5. Orally interpret and describe materials at mid-intermediate level proficiency in Spanish
6. Analyze; compare and contrast; dramatize; interpret; and describe selected topics in written compositions in Spanish
7. Describe Spanish terms through the process of circumlocution in order to communicate verbally with a native Spanish speaker.

## **SECTION II**

### **I. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Spanish vocabulary and fluency as applied to Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency
  - A. Education
  - B. Travel
  - C. Art
  - D. Social customs
  - E. Technology
  - F. Societal roles
  - G. Environment.
- II. Everyday topics at mid-intermediate level proficiency in Spanish
  - A. Student interaction and educational situations
  - B. Client interaction
  - C. Vendor and customer interaction
  - D. Dining and dating situations
  - E. Doctor and patient interaction.
- III. Comparison of Latin American and Spanish cultures with U.S. culture
  - A. Articles
  - B. Literature
  - C. Films
  - D. Foods and eating.
- IV. Application of enhanced communication skills to everyday topics in Spanish
  - A. Articles
  - B. Literature
  - C. Films.
- V. Oral interpretation and description at mid-intermediate level proficiency in Spanish
  - A. Educational values
  - B. Travel experiences
  - C. Shopping excursions
  - D. Art
  - E. Holidays.
- VI. Analysis; comparison and contrast; dramatization; interpretation; and description of selected topics in written compositions in Spanish
  - A. Educational values
  - B. Travel in Latin America and Spain
  - C. Bargaining in the different cultures
  - D. Analysis of works of art
  - E. Examination of societal beliefs reflected in holidays.

#### **B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. College level Spanish readers
- II. Current library periodicals in Spanish
- III. Poems, songs, short stories, short essays, and chronicles from Spanish speaking countries
- IV. Internet and social media readings in Spanish
- V. Native Spanish language popular reading materials such as newspapers.

#### **C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Compositions in Spanish varying in length from a paragraph to one hundred and fifty words about Latin American and Spanish culturally relevant topics
- II. Written dialogues in Spanish that critique Latin American and Spanish culturally relevant topics
- III. Written interpretations and paraphrasing of class materials in Spanish
- IV. Class journal in Spanish, including personally relevant Spanish vocabulary.

#### **D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

Spanish

7. Describe Spanish terms through the process of circumlocution in order to communicate verbally with a native Spanish speaker.

## **SECTION II**

### **I. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

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  - A. Education
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  - C. Art
  - D. Social customs
  - E. Technology
  - F. Societal roles
  - G. Environment.
- II. Everyday topics at mid-intermediate level proficiency in Spanish
  - A. Student interaction and educational situations
  - B. Client interaction
  - C. Vendor and customer interaction
  - D. Dining and dating situations
  - E. Doctor and patient interaction.
- III. Comparison of Latin American and Spanish cultures with U.S. culture
  - A. Articles
  - B. Literature
  - C. Films
  - D. Foods and eating.
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  - B. Travel experiences
  - C. Shopping excursions
  - D. Art
  - E. Holidays.
- VI. Analysis; comparison and contrast; dramatization; interpretation; and description of selected topics in written compositions in Spanish
  - A. Educational values
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- V. Native Spanish language popular reading materials such as newspapers.

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Writing assignments are required and may include, but are not limited to, the following:

- I. Compositions in Spanish varying in length from a paragraph to one hundred and fifty words about Latin American and Spanish culturally relevant topics
- II. Written dialogues in Spanish that critique Latin American and Spanish culturally relevant topics
- III. Written interpretations and paraphrasing of class materials in Spanish
- IV. Class journal in Spanish, including personally relevant Spanish vocabulary.

#### **D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Oral presentation in Spanish based on library research of culture/literature
- II. Homework requiring students to recognize and select grammar and vocabulary in Spanish language recordings
- III. Visits to Spanish language Latin American and Spanish culturally relevant websites
- IV. Attendance at Latin American and Spanish culturally relevant events such as museum exhibitions and films
- V. Use of audio-visual materials at the Independent Learning Center to prepare work to be presented orally and/or in writing in Spanish
- VI. Verbal interactions with native speakers of Spanish in person or by telephone
- VII. Library research of selected topics related to culture/literature.

#### E. Appropriate Assignments that Demonstrate Critical Thinking:

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Comparing and contrasting Latin American, Spanish, and U.S. values and cultures
- II. Creating impromptu written and oral dialogues in Spanish
- III. Determining culturally appropriate actions (e.g. vocals, body language, idiomatic expressions) during a conversation with a native speaker of Spanish
- IV. Applying Spanish vocabulary in context through asking and answering questions, engaging in debates, and expressing opinions.

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Chapter exams that apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culture and everyday topics at mid-intermediate level proficiency
- II. Final exam that applies increased vocabulary to the dramatization, interpretation, and/or description of everyday topics and to the comparing and contrasting of Latin American, Spanish, and U.S. cultures at mid-intermediate level proficiency
- III. Oral final exam that analyzes and examines an aspect of Latin American and/or Spanish culture at mid-intermediate level proficiency
- IV. Quizzes that apply increased Spanish vocabulary
- V. Homework that prepares students for exams, quizzes, in-class discussion, and recognition of the differences among Latin American, Spanish, and U.S. cultures
- VI. Writing assignments that employ vocabulary and culture
- VII. Oral projects that apply increased vocabulary
- VIII. Individual and group participation in class activities.

## 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Discussion Seminar
- \* Distance Education (Hybrid only)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* A. Group analysis of topics
- \* B. Group dramatization and description of everyday situations
- \* C. Quiz and examination review
- \* D. Field trips
- \* E. Guest speakers
- \* F. Technically mediated instruction, including television, videos, social media, and/or the internet
- \* G. Student-centered conversation practice.

## 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

### TEXTBOOKS:

1. Andrian, Gustave W. Modern Spanish Prose, 7th ed. Prentice Hall, 2006, ISBN: 9780132226776
2. Bacon, Susan B., Gregg Courtad, and Aitor Bikandi-Mejias. Leyendas del mundo hispano, 4th ed. Prentice Hall, 2015, ISBN: 9780133977967
3. Espasa (ed.). Diccionario de sinónimos y antónimos, 1st ed. Espasa, 2012, ISBN: 9788467007510
4. Iorillo, Nino R. and Andres C. Diaz. Conversacion y Controversia: Topicos de hoy y de Siempre, 6th ed. Prentice

- I. Oral presentation in Spanish based on library research of culture/literature
- II. Homework requiring students to recognize and select grammar and vocabulary in Spanish language recordings
- III. Visits to Spanish language Latin American and Spanish culturally relevant websites
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- V. Use of audio-visual materials at the Independent Learning Center to prepare work to be presented orally and/or in writing in Spanish
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- VII. Library research of selected topics related to culture/literature.

#### E. Appropriate Assignments that Demonstrate Critical Thinking:

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Comparing and contrasting Latin American, Spanish, and U.S. values and cultures
- II. Creating impromptu written and oral dialogues in Spanish
- III. Determining culturally appropriate actions (e.g. vocals, body language, idiomatic expressions) during a conversation with a native speaker of Spanish
- IV. Applying Spanish vocabulary in context through asking and answering questions, engaging in debates, and expressing opinions.

## 2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Chapter exams that apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culture and everyday topics at mid-intermediate level proficiency
- II. Final exam that applies increased vocabulary to the dramatization, interpretation, and/or description of everyday topics and to the comparing and contrasting of Latin American, Spanish, and U.S. cultures at mid-intermediate level proficiency
- III. Oral final exam that analyzes and examines an aspect of Latin American and/or Spanish culture at mid-intermediate level proficiency
- IV. Quizzes that apply increased Spanish vocabulary
- V. Homework that prepares students for exams, quizzes, in-class discussion, and recognition of the differences among Latin American, Spanish, and U.S. cultures
- VI. Writing assignments that employ vocabulary and culture
- VII. Oral projects that apply increased vocabulary
- VIII. Individual and group participation in class activities.

## 3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Distance Education (Hybrid only)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* A. Group analysis of topics
- \* B. Group dramatization and description of everyday situations
- \* C. Quiz and examination review
- \* D. Field trips
- \* E. Guest speakers
- \* F. Technically mediated instruction, including television, videos, social media, and/or the internet
- \* G. Student-centered conversation practice.

## 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

### TEXTBOOKS:

1. Andrian, Gustave W. Modern Spanish Prose, 7th ed. Prentice Hall, 2006, ISBN: 9780132226776
2. Bacon, Susan B., Gregg Courtad, and Aitor Bikandi-Mejias. Leyendas del mundo hispano, 4th ed. Prentice Hall, 2015, ISBN: 9780133977967
3. Espasa (ed.). Diccionario de sinónimos y antónimos, 1st ed. Espasa, 2012, ISBN: 9788467007510
4. Iorillo, Nino R. and Andres C. Diaz. Conversacion y Controversia: Topicos de hoy y de Siempre, 6th ed. Prentice Hall, 2010, ISBN: 9780205696550
5. Jarvis, Ana C. and Raquel Lebrede. ¡Conversemos!, 3rd ed. Heinle Cengage Learning, 2003, ISBN: 9780618220885

Hall, 2010, ISBN: 9780205696550  
5. Jarvis, Ana C. and Raquel Lebreo. !Conversemos!, 3rd ed. Heinle Cengage Learning, 2003, ISBN: 9780618220885  
6. Kooreman, Thomas E., Olga M. Kooreman, and Eufemia Sanchez de la Calle. Breves cuentos hispanos, 4th ed. Prentice Hall, 2008, ISBN: 9780132391641

**MANUALS:**

**PERIODICALS:**

**SOFTWARE:**

**SUPPLIES:**

**ORIGINATOR:** April Koch

**CO-CONTRIBUTOR(S)** Duane Short, Virginia Naters

**DATE:** 04/06/2015

Status: Active

Date Printed: 12/3/2022

6. Kooreman, Thomas E., Olga M. Kooreman, and Eufemia Sanchez de la Calle. Breves cuentos hispanos, 4th ed. Prentice Hall, 2008, ISBN: 9780132391641

**MANUALS:**

**PERIODICALS:**

**SOFTWARE:**

**SUPPLIES:**

**ORIGINATOR:** April Koch

**ORIENTATION DATE:** 04/06/2015

**PROPOSAL ORIGINATOR:** Alison Primoza

**CO-CONTRIBUTOR(S)**

**PROPOSAL DATE:** 09/17/2022

Status: Launched

Date Printed: 12/3/2022

## Previous Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

### SECTION I

- I. Subject Area: Spanish
- II. Course Number: 210
- III. Course Title: Conversation and Composition Spanish I
- IV. Disciplines (Instructor Minimum Qualifications): Foreign Languages
- V.
- VI. Family:
- VII. Current Short Title: Conversation and Composition S
- VIII. Course Is Active/Where? CITY , MESA AND MIRAMAR
- IX. Originating Campus: MIRAMAR
- X. Action Proposed: Course Revision (May Include Activation)
- XI. Distance Education Proposed At: Mesa , City and Miramar
- XII. Proposal Originating Date: 04/06/2015
- XIII. Proposed Start Semester: Spring 2017
- XIV. Field Trip: May be required
- XV. Grading Option: Letter Grade or Pass/No Pass Option
- XVI. Current Short Description: Develops oral and written Spanish communication at a mid-intermediate level.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. Requisites:  
Prerequisite: SPAN 102 with a grade of "C" or better, or equivalent. Health & Safety Requirements
- II. Current Degree Applicability: Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation: N - Not a Basic Skills Course
- IV. Repeatability: Course may be taken 1 time(s)
- V. Course Equivalency: No
- VI. Additional Information:
- VII. Additional Textbook Information:

#### COURSE ANALYSIS DATA

- I. Reason for Proposed Action: Six-year review. (Course revision is for six year review.)
- II. How Does The Course Fit The College Mission? 1. Transfer
- III. Current Transfer Options: 1. UC Transfer Course List
- IV. Proposed College/District Purpose: 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Performance
- V. Extraordinary Cost to the College: None.
- VI. Library Resource Materials: .

#### GENERAL EDUCATION ANALYSIS

UC Transfer Course:  
Yes

#### REQUISITES ANALYSIS

Identify sound/meaning in Spanish at novice level, using aquired skills by expressing needs, asking questions, making

## Current Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

### SECTION I

- I. Subject Area: Spanish
- II. Course Number: 210
- III. Course Title: Conversation and Composition Spanish I
- IV. Disciplines (Instructor Minimum Qualifications): Foreign Languages
- V.
- VI. Family:
- VII. Current Short Title: Conversation and Composition S
- VIII. Course Is Active/Where? CITY , MESA AND MIRAMAR
- IX. Originating Campus: MESA
- X. Action Proposed: Course Revision (May Include Activation)
- XI. Distance Education Proposed At: Mesa , City and Miramar
- XII. Proposal Originating Date: 09/17/2022
- XIII. Proposed Start Semester: Summer 2023
- XIV. Field Trip: May be required
- XV. Grading Option: Letter Grade or Pass/No Pass Option
- XVI. Current Short Description: Develops oral and written Spanish communication at a mid-intermediate level.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. Requisites:  
Prerequisite: SPAN 102 with a grade of "C" or better, or equivalent. Health & Safety Requirements
- II. Current Degree Applicability: Associate Degree Credit & transfer to CSU
- III. Current Basic Skills Designation: N - Not a Basic Skills Course
- IV. Repeatability: Course may be taken 1 time(s)
- V. Course Equivalency: No
- VI. Additional Information:
- VII. Additional Textbook Information:

#### COURSE ANALYSIS DATA

- I. Reason for Proposed Action: Revision of distance ed to Fully Online (with statement - "All online instructional hours will be delivered synchronously.") and appropriate edits to verbiage.
- II. How Does The Course Fit The College Mission? 1. Transfer
- III. Current Transfer Options: 1. UC Transfer Course List
- IV. Proposed College/District Purpose: 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Performance
- V. Extraordinary Cost to the College: None.
- VI. Library Resource Materials: No new resources needed.

#### GENERAL EDUCATION ANALYSIS

UC Transfer Course:  
Yes

#### REQUISITES ANALYSIS

Identify sound/meaning in Spanish at novice level, using aquired skills by expressing needs, asking questions, making

statements, opinions, and describing basic life situations orally or in writing

- I. **Course: SPAN 102** Use clear and comprehensible Spanish language production to discuss a variety of meaningful real life activities and to compare and contrast the nuances of everyday life in the Hispano-American world.
- II. **Course: SPAN 102** Use novice-high level Spanish grammatical structures, vocabulary, and idiomatic expressions to narrate and describe real life activities and past events, extend invitations in various Hispano-American cultural situations, ask for and give directions, discuss health issues, and compare and contrast interpersonal relations in the Hispano-American world.
- III. **Course: SPAN 102** Express personal attitudes related to daily life situations through culturally appropriate commands.

Comprehend written work, identify aspects of Spanish history, geography, art, music, and culture in Spanish.

- I. **Course: SPAN 102** Compare and contrast various themes in Hispano-American and Spanish history, geography, art, music, and general culture in written and spoken Spanish at the novice-high level.

### SECTION III

#### COURSE DISTANCE EDUCATION INFORMATION

- I. **MESA**
- II. **Distance Education Methods of Instruction:** 1. Hybrid only
- III. **Other Distance Education Methods:**
- IV. **Type and frequency of contact may include, but is not limited to:**
  1. Chat Rooms  
Frequent
  2. Correspondence  
At least once a semester
  3. E-mail  
Frequent
  4. Group Meetings  
In person frequently; Online as needed
  5. Individual Meetings  
As needed
  6. Telephone Contact  
As needed
- V. **List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional on campus format. All chapter exams and final will be administered on campus. The online format will include frequent interaction with the instructor via threaded conferencing, e-mail, and telephone contact as needed. Other assessment, such as quizzes or assignments, may be administered online. Videos of lecture material may be used online to supplement on campus lectures.
- VI. **How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional on campus format. All chapter exams and final will be administered on campus. Other assessment, such as quizzes or assignments, may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and via online.
- VII. **Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. **Audio Visual Library Materials:** NO
- IX. **CITY**
- X. **Distance Education Methods of Instruction:** 1. Hybrid only
- XI. **Other Distance Education Methods:**
- XII. **Type and frequency of contact may include, but is not limited to:**
  1. Chat Rooms  
Frequent.

statements, opinions, and describing basic life situations orally or in writing

- I. **Course: SPAN 102** Use clear and comprehensible Spanish language production to discuss a variety of meaningful real life activities and to compare and contrast the nuances of everyday life in the Hispano-American world.
- II. **Course: SPAN 102** Use novice-high level Spanish grammatical structures, vocabulary, and idiomatic expressions to narrate and describe real life activities and past events, extend invitations in various Hispano-American cultural situations, ask for and give directions, discuss health issues, and compare and contrast interpersonal relations in the Hispano-American world.

Comprehend written work, identify aspects of Spanish history, geography, art, music, and culture in Spanish.

- I. **Course: SPAN 102** Express personal attitudes related to daily life situations through culturally appropriate commands.
- II. **Course: SPAN 102** Compare and contrast various themes in Hispano-American and Spanish history, geography, art, music, and general culture in written and spoken Spanish at the novice-high level.

### SECTION III

#### COURSE DISTANCE EDUCATION INFORMATION

- I. **MESA**
- II. **Distance Education Methods of Instruction:** 1. Fully Online
- III. **Other Distance Education Methods:** All online instructional hours will be delivered synchronously.
- IV. **Type and frequency of contact may include, but is not limited to:**
  1. Announcements  
As needed  
**Participant/s:** Faculty to Student/s
  2. Discussion Board  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
  3. Email/Message System  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
  4. Synchronous or Asynchronous Video  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
  5. Telephone Contact  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
- V. **List of Techniques:** The online format will include frequent interaction with the instructor via threaded conferencing, e-mail, and telephone contact as needed. Zoom or other format will be used for synchronous interaction between students and between the instructor and students. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Other assessment, such as quizzes or assignments, may be administered online. Videos of lecture material may be used online to supplement lectures.
- VI. **How to Evaluate Students for Achieved Outcomes:** Other assessment, such as quizzes or assignments, may be administered online. Students will have opportunities to receive instructor and peer feedback both online.
- VII. **Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. **Audio Visual Library Materials:** NO
- IX. **CITY**
- X. **Distance Education Methods of Instruction:** 1. Hybrid only
- XI. **Other Distance Education Methods:**
- XII. **Type and frequency of contact may include, but is not limited to:**
  1. Chat Rooms  
Frequent.

2. E-mail  
Frequent.
3. Group Meetings  
Frequently in person and online as needed.
4. Individual Meetings  
As needed.
5. Telephone Contact  
As needed.
6. Threaded Conferencing  
At least once a semester.

**XIII. List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional campus format. All chapter and final will be administered in campus. The online format will include frequent interaction with the instructor via, threaded conferencing, e-mail, and telephone contact as needed. Videos of lecture materials may be used online to supplement on-campus lectures.

**XIV. How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional on-campus format. All chapter exams and final will be administered in campus. Other assessments such as quizzes and assignments may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and online.

**XV. Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Request for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA). Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

#### **XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Hybrid only

**XIX. Other Distance Education Methods:** At least 50% of the in-class time must be conducted in person, while the other 50% must be conducted via synchronous video. During emergency periods of campus closure only, 100% of the time must be conducted via synchronous video.

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly via the announcements tool or during the in-person or synchronous video portion of the course
2. Conferencing  
as assigned
3. Discussion Board  
as assigned
4. Email/Message System  
as needed
5. Field Trips  
as assigned
6. Group Meetings  
at least 50% of the in-class time must be conducted in person; during emergency periods of campus closure only, this time may be conducted via synchronous online video conferencing
7. Individual Meetings  
as needed
8. Individualized Assignment Feedback  
as assigned
9. Synchronous or Asynchronous Video  
all online instruction must be conducted in a synchronous video format
10. Telephone Contact  
as needed

**XXI. List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is via synchronous online video conferencing instead of in-person communication. Students may also interact with each other and the instructor via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, writing exercises, class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for the in-person class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

#### **SECTION III**

2. E-mail  
Frequent.
3. Group Meetings  
Frequently in person and online as needed.
4. Individual Meetings  
As needed.
5. Telephone Contact  
As needed.
6. Threaded Conferencing  
At least once a semester.

**XIII. List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional campus format. All chapter and final will be administered in campus. The online format will include frequent interaction with the instructor via, threaded conferencing, e-mail, and telephone contact as needed. Videos of lecture materials may be used online to supplement on-campus lectures.

**XIV. How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional on-campus format. All chapter exams and final will be administered in campus. Other assessments such as quizzes and assignments may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and online.

**XV. Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Request for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA). Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

#### **XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Hybrid only

**XIX. Other Distance Education Methods:** At least 50% of the in-class time must be conducted in person, while the other 50% must be conducted via synchronous video. During emergency periods of campus closure only, 100% of the time must be conducted via synchronous video.

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly via the announcements tool or during the in-person or synchronous video portion of the course
2. Conferencing  
as assigned
3. Discussion Board  
as assigned
4. Email/Message System  
as needed
5. Field Trips  
as assigned
6. Group Meetings  
at least 50% of the in-class time must be conducted in person; during emergency periods of campus closure only, this time may be conducted via synchronous online video conferencing
7. Individual Meetings  
as needed
8. Individualized Assignment Feedback  
as assigned
9. Synchronous or Asynchronous Video  
all online instruction must be conducted in a synchronous video format
10. Telephone Contact  
as needed

**XXI. List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is via synchronous online video conferencing instead of in-person communication. Students may also interact with each other and the instructor via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, writing exercises, class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for the in-person class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).



**XXIV. Audio Visual Library Materials: NO**  
**COURSE STUDENT LEARNING OUTCOME(S)**

**CITY**

- Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency

**MESA**

- Communicate in a meaningful context in the Spanish language at the novice-high to intermediate-low level on the ACTFL proficiency scale.
- Explain or analyze the nature of language through comparisons of the Spanish language and their own.
- Demonstrate knowledge of and sensitivity to aspects of behavior, attitudes, and customs of Spanish-speaking countries.
- Connect with the global community through study and acquisition of the Spanish language and creative forms of expression.

**MIRAMAR**

- Ability to hold a conversation that requires conjugation of verbs, use culturally appropriate body language, idiomatic expressions, circumlocution, reactions, interruptions, and clarifications, the use of filler words in Spanish and no use of English.

**SECTION V**

**COURSE DATA ADMINISTRATION ELEMENTS**

**I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1105.00 Spanish

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):**

**Course Support Course Status (CB26):**

**Major Restriction Code:** NONE

**II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

**III. Last Time Pre/Co Requisite Update:** 04/06/2015

**IV. Last Outline Revision Date:** 03/24/2016

**V. CIC Approval:** 03/24/2016

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:** Spring 2017

**SECTION VI**

**CREDIT FOR PRIOR LEARNING**

**XXIV. Audio Visual Library Materials: NO**

**SECTION IV**

**COURSE STUDENT LEARNING OUTCOME(S)**

**CITY**

- Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency

**MESA**

- Communicate in a meaningful context in the Spanish language at the novice-high to intermediate-low level on the ACTFL proficiency scale.
- Explain or analyze the nature of language through comparisons of the Spanish language and their own.
- Demonstrate knowledge of and sensitivity to aspects of behavior, attitudes, and customs of Spanish-speaking countries.
- Connect with the global community through study and acquisition of the Spanish language and creative forms of expression.

**MIRAMAR**

- Ability to hold a conversation that requires conjugation of verbs, use culturally appropriate body language, idiomatic expressions, circumlocution, reactions, interruptions, and clarifications, the use of filler words in Spanish and no use of English.

**SECTION V**

**COURSE DATA ADMINISTRATION ELEMENTS**

**I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1105.00 Spanish

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** Y = Not applicable

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

**II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

**III. Last Time Pre/Co Requisite Update:** 09/17/2022

**IV. Last Outline Revision Date:** 03/24/2016

**V. CIC Approval:**

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:**

**SECTION VI**

**CREDIT FOR PRIOR LEARNING**



**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CITY, MESA, AND MIRAMAR COLLEGES  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Spanish 211**COURSE TITLE:**

Conversation and Composition Spanish II

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course further develops oral comprehension and fluency as well as written communication at an advanced-intermediate level in Spanish through culturally relevant materials. Students further increase vocabulary; dramatize everyday topics of conversation; interpret and describe materials; and compare and contrast Latin American and Spanish cultures with U.S. culture both orally and in writing. Pre-reading strategies introduced in the prerequisite course are used as a basis upon which to build course emphasis in reading. In addition, more literature is introduced. This course is intended for students who want to further enhance their skills in Spanish.

**REQUISITES:****Prerequisite:**

SPAN 210 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit &amp; transfer to CSU UC Transfer Course List

**CID:****TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:****TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally-relevant topics emphasized in reading selections at advanced-intermediate level proficiency
2. Dramatize through role-play and decision making through context of everyday topics and reading selections at advanced-intermediate level proficiency in Spanish
3. Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles, literary short stories, other selected reading materials, and/or films in Spanish
4. Apply enhanced communication skills to everyday topics through the analysis of selected readings from literature, films, and/or current events in Spanish
5. Orally interpret and describe selected readings at advanced-intermediate level proficiency in Spanish
6. Analyze; compare and contrast; dramatize; interpret; and describe selected reading topics in written compositions in Spanish
7. Apply pre-reading strategies introduced in the prerequisite course to successfully identify and expand upon the main idea/topic of a particular reading selection.

## **SECTION II**

### **1. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Application of increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally-relevant topics emphasized in reading selections at advanced-intermediate level proficiency in Spanish
  - A. Leisure activities such as dining and cuisine
  - B. Celebrations
  - C. Environmental issues
  - D. Mass media
  - E. Idiomatic expressions.
- II. Dramatization through role-play and decision-making of everyday topics and reading selections at advanced-intermediate level proficiency in Spanish
  - A. Interviews and panel discussions
  - B. Recreation and social interaction during parties and celebrations
  - C. Dialogues, interviews, and panel discussions about transportation, traffic, and migration
  - D. Expression of environmental and civic concerns
  - E. Celebrity interviews
  - F. Application of idiomatic expressions to everyday conversation.
- III. Comparing and contrasting in Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials.
- IV. Application of enhanced communication skills to everyday topics through the analysis of selected readings in Spanish
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials presented by the instructor.
- V. Oral interpretation and description of selected readings at advanced-intermediate level proficiency in Spanish
  - A. Sports commentary
  - B. Holidays and different systems of belief
  - C. Urban problems and urban successes
  - D. Environmental and civic problems

- E. Movie and television reviews and elementary critical analysis
- F. Idiomatic expressions in advertising, literature, film, and television.
- VI. Analysis, interpretation, and description of selected reading topics at the advanced-intermediate level in Spanish
  - A. Different leisure activities in Latin America, Spain, and the U.S. such as dining and cuisine
  - B. Latin American, Spanish, and U.S. holidays and different systems of belief
  - C. Urban issues in Latin America, Spain, and the U.S.
  - D. Analysis of environmental and civic problems in Latin America, Spain, and the U.S.
  - E. Reviews of Spanish, Latin American, and U.S. movies and television
  - F. Interpretation and contrast of culturally relevant topics as represented through idiomatic expressions used in advertising, literature, film, and television
- VII. Application of pre-reading strategies introduced to identify and expand upon the main idea/topic of a particular reading selection
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials.

**B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. College level Spanish readers
- II. Current library periodicals in Spanish such as *La Opinion* or *People en español*
- III. Poems, songs, short stories, short essays, and chronicles from Spanish-speaking countries
- IV. Internet readings.

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Compositions in Spanish varying in length from a paragraph to one hundred and fifty words about Latin American and Spanish culturally relevant topics, literary selections, and other selected reading materials
- II. Written dialogues in Spanish that critique Latin American and Spanish culturally relevant topics, literary selections, and other selected reading materials
- III. Written interpretations and paraphrasing of literary selections and other selected reading materials in Spanish
- IV. Journals in Spanish.

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Oral presentation in Spanish based on library research of culture/literature
- II. Homework requiring students to recognize and select grammar and vocabulary in Spanish language recordings
- III. Visits to Spanish language Latin American and Spanish cultural and literary websites
- IV. Attendance at Latin American and Spanish culturally relevant events such as literary readings, museum exhibitions, and films
- V. Use of audio-visual materials in the Independent Learning Center to facilitate comprehension of literary selections and other selected reading materials and to prepare work to be presented orally and/or in writing in Spanish
- VI. Library research of selected topics related to culture/literature.

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Recognizing Latin American, Spanish, and U.S. contrasting values and cultures
- II. Creating both impromptu written and oral dialogues in Spanish based on literary selections and other selected reading materials
- III. Producing Spanish vocabulary through asking and answering questions, debates, and expressing

opinions in Spanish about topics, literary selections, and other selected reading materials.

## **2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Chapter exams that apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culture, everyday topics, literary selections, and other reading materials at advanced-intermediate level proficiency
- II. Final exam that applies increased vocabulary to the dramatization, interpretation, and/or description of everyday topics, literary selections, and other reading materials to the comparing and contrasting of Latin American, Spanish, and U.S. cultures at advanced-intermediate level proficiency
- III. Oral final exam that analyzes and examines an aspect of Latin American and/or Spanish culture at advanced-intermediate level proficiency
- IV. Quizzes that apply increased Spanish vocabulary
- V. Homework that prepares the student for exams, quizzes, comprehension of literary selections and other reading materials, in-class discussion, and recognition of the differences among Latin American, Spanish, and U.S. cultures
- VI. Writing assignments that employ vocabulary, culture, comprehension, and analysis of literary selections and other reading materials
- VII. Oral projects that apply increased vocabulary
- VIII. Individual and group participation in class activities.

## **3. METHODS OF INSTRUCTION:**

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Distance Education (Hybrid only)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* A. Group analysis of topics, readings, and literary selections
- \* B. Group dramatization and description of everyday situations, readings, and literary selections
- \* C. Quiz and examination review
- \* D. Field trips
- \* E. Guest speakers
- \* F. Technically mediated instruction, including television, video, and/or the internet.

## **4. REQUIRED TEXTS AND SUPPLIES:**

Textbooks may include, but are not limited to:

### **TEXTBOOKS:**

1. Andrian, Gustave W. Modern Spanish Prose, 7th ed. Prentice Hall, 2006, ISBN: 9780132226776
2. Bacon, Susan B., Gregg Courtad, and Aitor Bikandi-Mejias. Leyendas del mundo hispano, 4th ed. Prentice Hall, 2015, ISBN: 9780133977967
3. Blanco, Jose A. and C. Cecilia Tocaimaza-Hatch. Imagina, 3rd ed. Vista Higher Learning, 2015, ISBN: 9781618578839
4. Bretz, Mary Lee, Trisha Dvorak, and Carl Kirschner. Pasajes: Cultura, 7th ed. McGraw-Hill, 2009, ISBN: 9780077264109
5. Iorillo, Nino R. and Andres C. Diaz. Coversacion y controversia: Topicos de hoy y de siempre, 6th ed. Prentice Hall, 2010, ISBN: 9780205696550
6. Jarvis, Ana C. and Raquel Lebreo. !Conversemos!, 3rd ed. Heinle Cengage Learning, 2003, ISBN: 9780618220885

7. Kooreman, Thomas E., Olga M. Kooreman, and Eufemia Sanchez de la Calle. Breves cuentos hispanos, 4th ed. Prentice Hall, 2008, ISBN: 9780132391641

**MANUALS:**

**PERIODICALS:**

**SOFTWARE:**

**SUPPLIES:**

**ORIGINATOR:** April Koch

**ORIGINATION DATE:** 04/20/2015

**PROPOSAL ORIGINATOR:** Alison Primoza

**CO-CONTRIBUTOR(S)**

**PROPOSAL DATE:** 09/17/2022

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
COURSE PROPOSAL IMPACT REPORT**

**COURSE TO BE PROPOSED:** SPAN 211  
Conversation and Composition Spanish II

**ACTIVE/APPROVED COURSES IMPACTED:**

SPAN 211 Conversation and Composition Spanish II (29319)

**ACTIVE/APPROVED/PROPOSED PROGRAMS IMPACTED:**

( **City** )

Biliteracy: English and Spanish \*Pending\*;  
**Certificate of Achievement**

Choose ONE course from the following if not already taken above

( **Miramar** )

Honors Global Competencies Certificate\* \*Active\*;  
**Certificate of Performance**

Select 3-5 units from the following introductory or higher level foreign languages:

( **Mesa** )

Liberal Arts and Sciences: Language Arts and Humanities - World Languages \*Pending\*;  
**Associate of Arts Degree**

Select 3-5 units of additional coursework.

( **Mesa** )

Liberal Arts and Sciences: Language Arts and Humanities-Spanish \*Active\*;  
**Associate of Arts Degree**

Select a minimum of 3 units:

( **Mesa** )

Spanish \*Approved\*;  
**Associate in Arts for Transfer Degree**

Category A: Select one of the following courses (3 - 5 units):

( **Mesa** )

Spanish \*Active\*;  
**Associate in Arts for Transfer Degree**

Category A: Select one of the following courses (3 units):

( **Miramar** )

Spanish \*Active\*;  
**Associate in Arts for Transfer Degree**

Select one course (3 units) from the following:

( **City** )

Spanish \*Active\*;

**Associate in Arts for Transfer Degree**

Select one of the following:

( **City** )

Spanish \*Active\*;

**Associate of Arts Degree**

Courses Required for the Major:

( **Mesa** )

Spanish \*Active\*;

**Associate of Arts Degree**

Courses Required for the Major:

( **Miramar** )

World Language Studies \*Active\*;

**Associate of Arts Degree**

Select the remainder of units needed to meet the minimum of 18 from the following:

# SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

## Course Outline of Record: Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Spanish
- II. **Course Number:** 211
- III. **Course Title:** Conversation and Composition Spanish II
- IV. **Disciplines (Instructor Minimum Qualifications):** Foreign Languages
- V.
- VI. **Family:**
- VII. **Current Short Title:** Conversation and Composition Spanish II
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** Mesa , City and Miramar
- XII. **Proposal Originating Date:** 09/17/2022
- XIII. **Proposed Start Semester:** Summer 2023
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Develops oral and written comprehension and fluency in Spanish.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: SPAN 210 with a grade of "C" or better, or equivalent. Health & Safety Requirements
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:**

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Revision of distance ed to Fully Online (with statement - "All online instructional hours will be delivered synchronously.") and appropriate edits to verbiage.
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Performance
- V. **Extraordinary Cost to the College:** N/A.
- VI. **Library Resource Materials:** No new resources needed.

#### GENERAL EDUCATION ANALYSIS

UC Transfer Course:

Yes

#### REQUISITES ANALYSIS

Apply increased Spanish vocabulary and fluency to the oral and written analysis of Latin American and Spanish culturally relevant topics, at mid-intermediate level proficiency.

- I. **Course:** SPAN 210 **Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency**



**Dramatize, analyze, compare/contrast, interpret, describe everyday topics, culturally relevant themes, and other materials both orally and in writing at mid-intermediate level proficiency in Spanish.**

- I. Course: SPAN 210 Dramatize everyday topics through role-play and contextual decision making at mid-intermediate level proficiency in Spanish**

**Compare/contrast Latin American/Spanish cultures with U.S. culture to recognize their contrasting values through analysis of articles, short stories, films, and other materials orally and in writing.**

- I. Course: SPAN 210 Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles; short stories and/or films; and other materials**

### **SECTION III**

#### **COURSE DISTANCE EDUCATION INFORMATION**

- I. MESA**
- II. Distance Education Methods of Instruction:** 1. Fully Online
- III. Other Distance Education Methods:** All online instructional hours will be delivered synchronously.
- IV. Type and frequency of contact may include, but is not limited to:**
1. Announcements  
As needed  
**Participant/s:** Faculty to Student/s
  2. Discussion Board  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
  3. Email/Message System  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
  4. Synchronous or Asynchronous Video  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
  5. Telephone Contact  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
- V. List of Techniques:** The online format will include frequent interaction with the instructor via threaded conferencing, e-mail, and telephone contact as needed. Zoom or other format will be used for synchronous interaction between students and between the instructor and students. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Other assessment, such as quizzes or assignments, may be administered online. Videos of lecture material may be used online to supplement lectures.
- VI. How to Evaluate Students for Achieved Outcomes:** Assessments, such as quizzes or assignments, may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and via online.
- VII. Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- VIII. Audio Visual Library Materials:** NO
- IX. CITY**
- X. Distance Education Methods of Instruction:** 1. Hybrid only
- XI. Other Distance Education Methods:**
- XII. Type and frequency of contact may include, but is not limited to:**
1. Chat Rooms  
Frequent
  2. E-mail

Frequent

3. Group Meetings

In person frequently

4. Individual Meetings

As needed

5. Telephone Contact

As needed

6. Threaded Conferencing

At least once a semester

XIII. **List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional campus format. All chapter and final will be administered in campus. The online format will include frequent interaction with the instructor via, threaded conferencing ,e-mail, and telephone contact as needed. Videos of lecture materials may be used online to supplement on-campus lectures.

XIV. **How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional campus format. All chapter and final will be administered in campus. Other assessments such as quizzes and assignments may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and online.

XV. **Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individual with disabilities (Sections 504 and 508 of the Rehabilitation Act). Request for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA). Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

XVI. **Audio Visual Library Materials:** NO

XVII. **MIRAMAR**

XVIII. **Distance Education Methods of Instruction:** 1. Hybrid only

XIX. **Other Distance Education Methods:** At least 50% of the in-class time must be conducted in person, while the other 50% must be conducted via synchronous video. During emergency periods of campus closure only, 100% of the time must be conducted via synchronous video.

XX. **Type and frequency of contact may include, but is not limited to:**

1. Announcements

weekly via the "announcements" tool or during the in-person or synchronous video portion of the course

2. Conferencing

as assigned

3. Discussion Board

as assigned

4. Email/Message System

as needed

5. Field Trips

as assigned

6. Group Meetings

at least 50% of the in-class time must be conducted in person; during emergency periods of campus closure only, this time may be conducted via synchronous online video conferencing

7. Individual Meetings

as needed

8. Individualized Assignment Feedback

as assigned

9. Synchronous or Asynchronous Video

all online instruction must be conducted in a synchronous video format

10. Telephone Contact

as needed

XXI. **List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is via synchronous online video conferencing instead of in-person communication. Students may also interact with each other and the instructor via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, writing exercises, class discussion, and/or other assignments.

XXII. **How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects.

- XXIII. **Additional Resources/Materials/Information:** Materials posted online are consistent with those required for the in-person class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).
- XXIV. **Audio Visual Library Materials:** NO

## **SECTION IV**

### **COURSE STUDENT LEARNING OUTCOME(S)**

#### **CITY**

- Students will compare and contrast Latin American and Spanish cultures with U.S. culture, both orally and in writing.

#### **MESA**

- Communicate in a meaningful context in the Spanish language at the intermediate-mid to intermediate-intermediate high level on the ACTFL proficiency scale.
- Explain or analyze the nature of language through comparisons of the Spanish language and their own.
- Demonstrate knowledge of and sensitivity to aspects of behavior, attitudes, and customs of Spanish-speaking countries.
- Connect with the global community through study and acquisition of the Spanish language and creative forms of expression.

#### **MIRAMAR**

- Student ability to express & react casually to opinions, beliefs, and feelings, utilize/recall appropriate class vocabulary, demonstrate the ability to start, continue and end a conversation and deal effectively with unanticipated complications through a variety of communicative and coping devices. Also, the ability to use appropriate communicative strategies in real life situations and to successfully manage time.

## **SECTION V**

### **COURSE DATA ADMINISTRATION ELEMENTS**

#### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1105.00 Spanish

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** Y = Not applicable

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

#### **II. Lect Units: 3.00**

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

#### **III. Last Time Pre/Co Requisite Update:** 09/17/2022

**IV. Last Outline Revision Date:** 03/24/2016

**V. CIC Approval:**

**VI. BOT Approval:**

**VII. State Approval:**

**VIII. Revised State Approval:**

**IX. Course Approval Effective Date:**

## **SECTION VI**

### **CREDIT FOR PRIOR LEARNING**

SPAN 211

## Previous Report

CIC Approval: 03/24/2016  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM: Fall 2017

### SAN DIEGO COMMUNITY COLLEGE DISTRICT CITY, MESA, AND MIRAMAR COLLEGES ASSOCIATE DEGREE COURSE OUTLINE

#### SECTION I

**SUBJECT AREA AND COURSE NUMBER:** Spanish 211

**COURSE TITLE:**

Conversation and Composition Spanish II

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course further develops oral comprehension and fluency as well as written communication at an advanced-intermediate level in Spanish through culturally relevant materials. Students further increase vocabulary; dramatize everyday topics of conversation; interpret and describe materials; and compare and contrast Latin American and Spanish cultures with U.S. culture both orally and in writing. Pre-reading strategies introduced in the prerequisite course are used as a basis upon which to build course emphasis in reading. In addition, more literature is introduced. This course is intended for students who want to further enhance their skills in Spanish.

**REQUISITES:**

**Prerequisite:**

SPAN 210 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit & transfer to CSU UC Transfer Course List

**CID:**

**TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally-relevant topics emphasized in reading selections at advanced-intermediate level proficiency
2. Dramatize through role-play and decision making through context of everyday topics and reading selections at advanced-intermediate level proficiency in Spanish
3. Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles, literary short stories, other selected reading materials, and/or films in Spanish

## Current Report

SPAN 211

CIC Approval:  
BOT APPROVAL:  
STATE APPROVAL:  
EFFECTIVE TERM:

### SAN DIEGO COMMUNITY COLLEGE DISTRICT CITY, MESA, AND MIRAMAR COLLEGES ASSOCIATE DEGREE COURSE OUTLINE

#### SECTION I

**SUBJECT AREA AND COURSE NUMBER:** Spanish 211

**COURSE TITLE:**

Conversation and Composition Spanish II

**Units:**

3

Letter Grade or Pass/No Pass Option

**CATALOG COURSE DESCRIPTION:**

This course further develops oral comprehension and fluency as well as written communication at an advanced-intermediate level in Spanish through culturally relevant materials. Students further increase vocabulary; dramatize everyday topics of conversation; interpret and describe materials; and compare and contrast Latin American and Spanish cultures with U.S. culture both orally and in writing. Pre-reading strategies introduced in the prerequisite course are used as a basis upon which to build course emphasis in reading. In addition, more literature is introduced. This course is intended for students who want to further enhance their skills in Spanish.

**REQUISITES:**

**Prerequisite:**

SPAN 210 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:**

May be required

**TRANSFER APPLICABILITY:**

Associate Degree Credit & transfer to CSU UC Transfer Course List

**CID:**

**TOTAL LECTURE HOURS:**

48 - 54

**TOTAL LAB HOURS:**

**TOTAL CONTACT HOURS:**

48 - 54

**OUTSIDE-OF-CLASS HOURS:**

96 - 108

**TOTAL STUDENT LEARNING HOURS:**

144 - 162

**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally-relevant topics emphasized in reading selections at advanced-intermediate level proficiency
2. Dramatize through role-play and decision making through context of everyday topics and reading selections at advanced-intermediate level proficiency in Spanish
3. Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles, literary short stories, other selected reading materials, and/or films in Spanish
4. Apply enhanced communication skills to everyday topics through the analysis of selected readings from literature, films, and/or current events in Spanish

4. Apply enhanced communication skills to everyday topics through the analysis of selected readings from literature, films, and/or current events in Spanish
5. Orally interpret and describe selected readings at advanced-intermediate level proficiency in Spanish
6. Analyze; compare and contrast; dramatize; interpret; and describe selected reading topics in written compositions in Spanish
7. Apply pre-reading strategies introduced in the prerequisite course to successfully identify and expand upon the main idea/topic of a particular reading selection.

## **SECTION II**

### **1. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Application of increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally-relevant topics emphasized in reading selections at advanced-intermediate level proficiency in Spanish
  - A. Leisure activities such as dining and cuisine
  - B. Celebrations
  - C. Environmental issues
  - D. Mass media
  - E. Idiomatic expressions.
- II. Dramatization through role-play and decision-making of everyday topics and reading selections at advanced-intermediate level proficiency in Spanish
  - A. Interviews and panel discussions
  - B. Recreation and social interaction during parties and celebrations
  - C. Dialogues interviews and panel discussions about transportation traffic and migration
  - D. Expression of environmental and civic concerns
  - E. Celebrity interviews
  - F. Application of idiomatic expressions to everyday conversation.
- III. Comparing and contrasting in Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials.
- IV. Application of enhanced communication skills to everyday topics through the analysis of selected readings in Spanish
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials presented by the instructor.
- V. Oral interpretation and description of selected readings at advanced-intermediate level proficiency in Spanish
  - A. Sports commentary
  - B. Holidays and different systems of belief
  - C. Urban problems and urban successes
  - D. Environmental and civic problems
  - E. Movie and television reviews and elementary critical analysis
  - F. Idiomatic expressions in advertising literature film and television.
- VI. Analysis interpretation and description of selected reading topics at the advanced-intermediate level in Spanish
  - A. Different leisure activities in Latin America Spain and the U.S. such as dining and cuisine
  - B. Latin American Spanish and U.S. holidays and different systems of belief
  - C. Urban issues in Latin America Spain and the U.S.
  - D. Analysis of environmental and civic problems in Latin America Spain and the U.S.
  - E. Reviews of Spanish Latin American and U.S. movies and television
  - F. Interpretation and contrast of culturally relevant topics as represented through idiomatic expressions used in advertising literature film and television
- VII. Application of pre-reading strategies introduced to identify and expand upon the main idea/topic of a particular reading selection
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials.

#### **B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

5. Orally interpret and describe selected readings at advanced-intermediate level proficiency in Spanish
6. Analyze; compare and contrast; dramatize; interpret; and describe selected reading topics in written compositions in Spanish
7. Apply pre-reading strategies introduced in the prerequisite course to successfully identify and expand upon the main idea/topic of a particular reading selection.

## **SECTION II**

### **1. COURSE OUTLINE AND SCOPE:**

#### **A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Application of increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally-relevant topics emphasized in reading selections at advanced-intermediate level proficiency in Spanish
  - A. Leisure activities such as dining and cuisine
  - B. Celebrations
  - C. Environmental issues
  - D. Mass media
  - E. Idiomatic expressions.
- II. Dramatization through role-play and decision-making of everyday topics and reading selections at advanced-intermediate level proficiency in Spanish
  - A. Interviews and panel discussions
  - B. Recreation and social interaction during parties and celebrations
  - C. Dialogues interviews and panel discussions about transportation traffic and migration
  - D. Expression of environmental and civic concerns
  - E. Celebrity interviews
  - F. Application of idiomatic expressions to everyday conversation.
- III. Comparing and contrasting in Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials.
- IV. Application of enhanced communication skills to everyday topics through the analysis of selected readings in Spanish
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials presented by the instructor.
- V. Oral interpretation and description of selected readings at advanced-intermediate level proficiency in Spanish
  - A. Sports commentary
  - B. Holidays and different systems of belief
  - C. Urban problems and urban successes
  - D. Environmental and civic problems
  - E. Movie and television reviews and elementary critical analysis
  - F. Idiomatic expressions in advertising literature film and television.
- VI. Analysis interpretation and description of selected reading topics at the advanced-intermediate level in Spanish
  - A. Different leisure activities in Latin America Spain and the U.S. such as dining and cuisine
  - B. Latin American Spanish and U.S. holidays and different systems of belief
  - C. Urban issues in Latin America Spain and the U.S.
  - D. Analysis of environmental and civic problems in Latin America Spain and the U.S.
  - E. Reviews of Spanish Latin American and U.S. movies and television
  - F. Interpretation and contrast of culturally relevant topics as represented through idiomatic expressions used in advertising literature film and television
- VII. Application of pre-reading strategies introduced to identify and expand upon the main idea/topic of a particular reading selection
  - A. Articles
  - B. Literature
  - C. Films
  - D. Literary selections
  - E. Other materials.

#### **B. Reading Assignments:**

Reading assignments are required and may include, but are not limited to, the following:

- I. College level Spanish readers
- II. Current library periodicals in Spanish such as La Opinion or People en espanol
- III. Poems, songs, short stories, short essays, and chronicles from Spanish-speaking countries
- IV. Internet readings.

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Compositions in Spanish varying in length from a paragraph to one hundred and fifty words about Latin American and Spanish culturally relevant topics, literary selections, and other selected reading materials
- II. Written dialogues in Spanish that critique Latin American and Spanish culturally relevant topics, literary selections, and other selected reading materials
- III. Written interpretations and paraphrasing of literary selections and other selected reading materials in Spanish
- IV. Journals in Spanish.

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Oral presentation in Spanish based on library research of culture/literature
- II. Homework requiring students to recognize and select grammar and vocabulary in Spanish language recordings
- III. Visits to Spanish language Latin American and Spanish cultural and literary websites
- IV. Attendance at Latin American and Spanish culturally relevant events such as literary readings, museum exhibitions, and films
- V. Use of audio-visual materials in the Independent Learning Center to facilitate comprehension of literary selections and other selected reading materials and to prepare work to be presented orally and/or in writing in Spanish
- VI. Library research of selected topics related to culture/literature.

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Recognizing Latin American, Spanish, and U.S. contrasting values and cultures
- II. Creating both impromptu written and oral dialogues in Spanish based on literary selections and other selected reading materials
- III. Producing Spanish vocabulary through asking and answering questions, debates, and expressing opinions in Spanish about topics, literary selections, and other selected reading materials.

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Chapter exams that apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culture, everyday topics, literary selections, and other reading materials at advanced-intermediate level proficiency
- II. Final exam that applies increased vocabulary to the dramatization, interpretation, and/or description of everyday topics, literary selections, and other reading materials to the comparing and contrasting of Latin American, Spanish, and U.S. cultures at advanced-intermediate level proficiency
- III. Oral final exam that analyzes and examines an aspect of Latin American and/or Spanish culture at advanced-intermediate level proficiency
- IV. Quizzes that apply increased Spanish vocabulary
- V. Homework that prepares the student for exams, quizzes, comprehension of literary selections and other reading materials, in-class discussion, and recognition of the differences among Latin American, Spanish, and U.S. cultures
- VI. Writing assignments that employ vocabulary, culture, comprehension, and analysis of literary selections and other reading materials
- VII. Oral projects that apply increased vocabulary
- VIII. Individual and group participation in class activities.

**3. METHODS OF INSTRUCTION:**

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Discussion Seminar
- \* Distance Education (Hybrid only)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* A. Group analysis of topics, readings, and literary selections

- I. College level Spanish readers
- II. Current library periodicals in Spanish such as La Opinion or People en espanol
- III. Poems, songs, short stories, short essays, and chronicles from Spanish-speaking countries
- IV. Internet readings.

**C. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. Compositions in Spanish varying in length from a paragraph to one hundred and fifty words about Latin American and Spanish culturally relevant topics, literary selections, and other selected reading materials
- II. Written dialogues in Spanish that critique Latin American and Spanish culturally relevant topics, literary selections, and other selected reading materials
- III. Written interpretations and paraphrasing of literary selections and other selected reading materials in Spanish
- IV. Journals in Spanish.

**D. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. Oral presentation in Spanish based on library research of culture/literature
- II. Homework requiring students to recognize and select grammar and vocabulary in Spanish language recordings
- III. Visits to Spanish language Latin American and Spanish cultural and literary websites
- IV. Attendance at Latin American and Spanish culturally relevant events such as literary readings, museum exhibitions, and films
- V. Use of audio-visual materials in the Independent Learning Center to facilitate comprehension of literary selections and other selected reading materials and to prepare work to be presented orally and/or in writing in Spanish
- VI. Library research of selected topics related to culture/literature.

**E. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Recognizing Latin American, Spanish, and U.S. contrasting values and cultures
- II. Creating both impromptu written and oral dialogues in Spanish based on literary selections and other selected reading materials
- III. Producing Spanish vocabulary through asking and answering questions, debates, and expressing opinions in Spanish about topics, literary selections, and other selected reading materials.

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

- I. Chapter exams that apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culture, everyday topics, literary selections, and other reading materials at advanced-intermediate level proficiency
- II. Final exam that applies increased vocabulary to the dramatization, interpretation, and/or description of everyday topics, literary selections, and other reading materials to the comparing and contrasting of Latin American, Spanish, and U.S. cultures at advanced-intermediate level proficiency
- III. Oral final exam that analyzes and examines an aspect of Latin American and/or Spanish culture at advanced-intermediate level proficiency
- IV. Quizzes that apply increased Spanish vocabulary
- V. Homework that prepares the student for exams, quizzes, comprehension of literary selections and other reading materials, in-class discussion, and recognition of the differences among Latin American, Spanish, and U.S. cultures
- VI. Writing assignments that employ vocabulary, culture, comprehension, and analysis of literary selections and other reading materials
- VII. Oral projects that apply increased vocabulary
- VIII. Individual and group participation in class activities.

**3. METHODS OF INSTRUCTION:**

Methods of instruction may include, but are not limited to, the following:

- \* Audio-Visual
- \* Discussion Seminar
- \* Distance Education (Fully online)
- \* Distance Education (Hybrid only)
- \* Lecture
- \* Lecture Discussion
- \* Other (Specify)
- \* A. Group analysis of topics, readings, and literary selections
- \* B. Group dramatization and description of everyday situations, readings, and literary selections
- \* C. Quiz and examination review

- \* B. Group dramatization and description of everyday situations, readings, and literary selections
- \* C. Quiz and examination review
- \* D. Field trips
- \* E. Guest speakers
- \* F. Technically mediated instruction, including television, video, and/or the internet.

#### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

##### TEXTBOOKS:

1. Andrian, Gustave W. Modern Spanish Prose, 7th ed. Prentice Hall, 2006, ISBN: 9780132226776
2. Bacon, Susan B., Gregg Courtad, and Aitor Bikandi-Mejias. Leyendas del mundo hispano, 4th ed. Prentice Hall, 2015, ISBN: 9780133977967
3. Blanco, Jose A. and C. Cecilia Tocaimaza-Hatch. Imagina, 3rd ed. Vista Higher Learning, 2015, ISBN: 9781618578839
4. Bretz, Mary Lee, Trisha Dvorak, and Carl Kirschner. Pasajes: Cultura, 7th ed. McGraw-Hill, 2009, ISBN: 9780077264109
5. Iorillo, Nino R. and Andres C. Diaz. Coversacion y controversia: Topicos de hoy y de siempre, 6th ed. Prentice Hall, 2010, ISBN: 9780205696550
6. Jarvis, Ana C. and Raquel Lebreo. !Conversemos!, 3rd ed. Heinle Cengage Learning, 2003, ISBN: 9780618220885
7. Kooreman, Thomas E., Olga M. Kooreman, and Eufemia Sanchez de la Calle. Breves cuentos hispanos, 4th ed. Prentice Hall, 2008, ISBN: 9780132391641

##### MANUALS:

##### PERIODICALS:

##### SOFTWARE:

##### SUPPLIES:

ORIGINATOR: April Koch

CO-CONTRIBUTOR(S) Duane Short, Virginia Naters  
DATE: 04/20/2015

- \* D. Field trips
- \* E. Guest speakers
- \* F. Technically mediated instruction, including television, video, and/or the internet.

#### 4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

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2. Bacon, Susan B., Gregg Courtad, and Aitor Bikandi-Mejias. Leyendas del mundo hispano, 4th ed. Prentice Hall, 2015, ISBN: 9780133977967
3. Blanco, Jose A. and C. Cecilia Tocaimaza-Hatch. Imagina, 3rd ed. Vista Higher Learning, 2015, ISBN: 9781618578839
4. Bretz, Mary Lee, Trisha Dvorak, and Carl Kirschner. Pasajes: Cultura, 7th ed. McGraw-Hill, 2009, ISBN: 9780077264109
5. Iorillo, Nino R. and Andres C. Diaz. Coversacion y controversia: Topicos de hoy y de siempre, 6th ed. Prentice Hall, 2010, ISBN: 9780205696550
6. Jarvis, Ana C. and Raquel Lebreo. !Conversemos!, 3rd ed. Heinle Cengage Learning, 2003, ISBN: 9780618220885
7. Kooreman, Thomas E., Olga M. Kooreman, and Eufemia Sanchez de la Calle. Breves cuentos hispanos, 4th ed. Prentice Hall, 2008, ISBN: 9780132391641

##### MANUALS:

##### PERIODICALS:

##### SOFTWARE:

##### SUPPLIES:

ORIGINATOR: April Koch

ORIGINATION DATE: 04/20/2015

PROPOSAL ORIGINATOR: Alison Primoza

CO-CONTRIBUTOR(S)

PROPOSAL DATE: 09/17/2022

Status: Launched

Date Printed: 12/3/2022

Status: Active

Date Printed: 12/3/2022



## Previous Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Spanish
- II. **Course Number:** 211
- III. **Course Title:** Conversation and Composition Spanish II
- IV. **Disciplines (Instructor Minimum Qualifications):** Foreign Languages
- V.
- VI. **Family:**
- VII. **Current Short Title:** Conversation and Composition Spanish II
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MIRAMAR
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** Mesa , City and Miramar
- XII. **Proposal Originating Date:** 04/20/2015
- XIII. **Proposed Start Semester:** Fall 2017
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Develops oral and written comprehension and fluency in Spanish.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: SPAN 210 with a grade of "C" or better, or equivalent. Health & Safety Requirements
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:**

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Six year review. (Course revision is for six year review.)
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Performance
- V. **Extraordinary Cost to the College:** N/A.
- VI. **Library Resource Materials:** .

#### GENERAL EDUCATION ANALYSIS

UC Transfer Course:  
Yes

#### REQUISITES ANALYSIS

Apply increased Spanish vocabulary and fluency to the oral and written analysis of Latin American and Spanish

## Current Report

SAN DIEGO COMMUNITY COLLEGE DISTRICT

CITY , MESA AND MIRAMAR COLLEGES

Course Outline of Record:  
Curriculum Proposal Report

### SECTION I

- I. **Subject Area:** Spanish
- II. **Course Number:** 211
- III. **Course Title:** Conversation and Composition Spanish II
- IV. **Disciplines (Instructor Minimum Qualifications):** Foreign Languages
- V.
- VI. **Family:**
- VII. **Current Short Title:** Conversation and Composition Spanish II
- VIII. **Course Is Active/Where?** CITY , MESA AND MIRAMAR
- IX. **Originating Campus:** MESA
- X. **Action Proposed:** Course Revision (May Include Activation)
- XI. **Distance Education Proposed At:** Mesa , City and Miramar
- XII. **Proposal Originating Date:** 09/17/2022
- XIII. **Proposed Start Semester:** Summer 2023
- XIV. **Field Trip:** May be required
- XV. **Grading Option:** Letter Grade or Pass/No Pass Option
- XVI. **Current Short Description:** Develops oral and written comprehension and fluency in Spanish.

### SECTION II

#### COURSE ENROLLMENT INFORMATION

- I. **Requisites:**  
Prerequisite: SPAN 210 with a grade of "C" or better, or equivalent. Health & Safety Requirements
- II. **Current Degree Applicability:** Associate Degree Credit & transfer to CSU
- III. **Current Basic Skills Designation:** N - Not a Basic Skills Course
- IV. **Repeatability:** Course may be taken 1 time(s)
- V. **Course Equivalency:** No
- VI. **Additional Information:**
- VII. **Additional Textbook Information:**

#### COURSE ANALYSIS DATA

- I. **Reason for Proposed Action:** Revision of distance ed to Fully Online (with statement - "All online instructional hours will be delivered synchronously.") and appropriate edits to verbiage.
- II. **How Does The Course Fit The College Mission?** 1. Transfer
- III. **Current Transfer Options:** 1. UC Transfer Course List
- IV. **Proposed College/District Purpose:** 1. Major Requirement - Associate Degree 2. Major Requirement - Certificate of Performance
- V. **Extraordinary Cost to the College:** N/A.
- VI. **Library Resource Materials:** No new resources needed.

#### GENERAL EDUCATION ANALYSIS

UC Transfer Course:  
Yes

#### REQUISITES ANALYSIS

Apply increased Spanish vocabulary and fluency to the oral and written analysis of Latin American and Spanish

culturally relevant topics, at mid-intermediate level proficiency.

- I. Course: SPAN 210** Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency

Dramatize, analyze, compare/contrast, interpret, describe everyday topics, culturally relevant themes, and other materials both orally and in writing at mid-intermediate level proficiency in Spanish.

- I. Course: SPAN 210** Apply enhanced communication skills in Spanish to everyday topics through the analysis of selected themes from literature, films, and/or current events
- II. Course: SPAN 210** Analyze; compare and contrast; dramatize; interpret; and describe selected topics in written compositions in Spanish

Compare/contrast Latin American/Spanish cultures with U.S. culture to recognize their contrasting values through analysis of articles, short stories, films, and other materials orally and in writing.

- I. Course: SPAN 210** Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles; short stories and/or films; and other materials

### SECTION III

#### COURSE DISTANCE EDUCATION INFORMATION

##### **I. MESA**

- II. Distance Education Methods of Instruction:** 1. Hybrid only

##### **III. Other Distance Education Methods:**

##### **IV. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms  
Frequent
2. E-mail  
Frequent
3. Group Meetings  
In person frequently; Online as needed
4. Individual Meetings  
As needed
5. Telephone Contact  
As needed
6. Threaded Conferencing  
At least once a semester

- V. List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional on campus format. All chapter exams and final will be administered on campus. The online format will include frequent interaction with the instructor via threaded conferencing, e-mail, and telephone contact as needed. Other assessment, such as quizzes or assignments, may be administered online. Videos of lecture material may be used online to supplement on campus lectures.

- VI. How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional on campus format. All chapter exams and final will be administered on campus. Other assessment, such as quizzes or assignments, may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and via online.

- VII. Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

##### **VIII. Audio Visual Library Materials:** NO

##### **IX. CITY**

- X. Distance Education Methods of Instruction:** 1. Hybrid only

##### **XI. Other Distance Education Methods:**

culturally relevant topics, at mid-intermediate level proficiency.

- I. Course: SPAN 210** Apply increased Spanish vocabulary and fluency to the analysis of Latin American and Spanish culturally relevant topics at mid-intermediate level proficiency

Dramatize, analyze, compare/contrast, interpret, describe everyday topics, culturally relevant themes, and other materials both orally and in writing at mid-intermediate level proficiency in Spanish.

- I. Course: SPAN 210** Dramatize everyday topics through role-play and contextual decision making at mid-intermediate level proficiency in Spanish

Compare/contrast Latin American/Spanish cultures with U.S. culture to recognize their contrasting values through analysis of articles, short stories, films, and other materials orally and in writing.

- I. Course: SPAN 210** Compare and contrast Latin American and Spanish cultures with U.S. culture in Spanish to recognize their contrasting values through the analysis of articles; short stories and/or films; and other materials

### SECTION III

#### COURSE DISTANCE EDUCATION INFORMATION

##### **I. MESA**

- II. Distance Education Methods of Instruction:** 1. Fully Online

##### **III. Other Distance Education Methods:** All online instructional hours will be delivered synchronously.

##### **IV. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
As needed  
**Participant/s:** Faculty to Student/s
2. Discussion Board  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
3. Email/Message System  
As needed  
**Participant/s:** Faculty to Student/s , Among Students
4. Synchronous or Asynchronous Video  
Weekly  
**Participant/s:** Faculty to Student/s , Among Students
5. Telephone Contact  
As needed  
**Participant/s:** Faculty to Student/s , Among Students

- V. List of Techniques:** The online format will include frequent interaction with the instructor via threaded conferencing, e-mail, and telephone contact as needed. Zoom or other format will be used for synchronous interaction between students and between the instructor and students. Threaded discussions may be used for instructor-to-student and student-to-student asynchronous group communication. Live-classroom may be used for synchronous online lectures, meetings and office hour meetings as appropriate. Video, audio, learning objects and archived live-classroom lectures may be included for students to interact with asynchronously where appropriate. Other assessment, such as quizzes or assignments, may be administered online. Videos of lecture material may be used online to supplement lectures.

- VI. How to Evaluate Students for Achieved Outcomes:** Assessments, such as quizzes or assignments, may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and via online.

- VII. Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

##### **VIII. Audio Visual Library Materials:** NO

##### **IX. CITY**

- X. Distance Education Methods of Instruction:** 1. Hybrid only

##### **XI. Other Distance Education Methods:**

##### **XII. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms

**XII. Type and frequency of contact may include, but is not limited to:**

1. Chat Rooms  
Frequent
2. E-mail  
Frequent
3. Group Meetings  
In person frequently
4. Individual Meetings  
As needed
5. Telephone Contact  
As needed
6. Threaded Conferencing  
At least once a semester

**XIII. List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional campus format. All chapter and final will be administered in campus. The online format will include frequent interaction with the instructor via, threaded conferencing ,e-mail, and telephone contact as needed. Videos of lecture materials may be used online to supplement on-campus lectures.

**XIV. How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional campus format. All chapter and final will be administered in campus. Other assessments such as quizzes and assignments may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and online.

**XV. Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individual with disabilities (Sections 504 and 508 of the Rehabilitation Act). Request for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA). Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Hybrid only

**XIX. Other Distance Education Methods:** At least 50% of the in-class time must be conducted in person, while the other 50% must be conducted via synchronous video. During emergency periods of campus closure only, 100% of the time must be conducted via synchronous video.

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly via the announcements tool or during the in-person or synchronous video portion of the course
2. Conferencing  
as assigned
3. Discussion Board  
as assigned
4. Email/Message System  
as needed
5. Field Trips  
as assigned
6. Group Meetings  
at least 50% of the in-class time must be conducted in person; during emergency periods of campus closure only, this time may be conducted via synchronous online video conferencing
7. Individual Meetings  
as needed
8. Individualized Assignment Feedback  
as assigned
9. Synchronous or Asynchronous Video  
all online instruction must be conducted in a synchronous video format
10. Telephone Contact  
as needed

**XXI. List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is via synchronous online video conferencing instead of in-person communication. Students may also interact with each other and the instructor via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, writing exercises, class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for the in-person class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this

- Frequent
2. E-mail  
Frequent
3. Group Meetings  
In person frequently
4. Individual Meetings  
As needed
5. Telephone Contact  
As needed
6. Threaded Conferencing  
At least once a semester

**XIII. List of Techniques:** Fifty-one percent (51%) or more of instruction will be taught in a traditional campus format. All chapter and final will be administered in campus. The online format will include frequent interaction with the instructor via, threaded conferencing ,e-mail, and telephone contact as needed. Videos of lecture materials may be used online to supplement on-campus lectures.

**XIV. How to Evaluate Students for Achieved Outcomes:** Fifty-one percent (51%) or more of the evaluation will be assessed in a traditional campus format. All chapter and final will be administered in campus. Other assessments such as quizzes and assignments may be administered online. Students will have opportunities to receive instructor and peer feedback both in person and online.

**XV. Additional Resources/Materials/Information:** Computer access with video and audio capabilities is available on campus for students as needed. Distance education techniques used in this course will be accessible to individual with disabilities (Sections 504 and 508 of the Rehabilitation Act). Request for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA). Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XVI. Audio Visual Library Materials:** NO

**XVII. MIRAMAR**

**XVIII. Distance Education Methods of Instruction:** 1. Hybrid only

**XIX. Other Distance Education Methods:** At least 50% of the in-class time must be conducted in person, while the other 50% must be conducted via synchronous video. During emergency periods of campus closure only, 100% of the time must be conducted via synchronous video.

**XX. Type and frequency of contact may include, but is not limited to:**

1. Announcements  
weekly via the announcements tool or during the in-person or synchronous video portion of the course
2. Conferencing  
as assigned
3. Discussion Board  
as assigned
4. Email/Message System  
as needed
5. Field Trips  
as assigned
6. Group Meetings  
at least 50% of the in-class time must be conducted in person; during emergency periods of campus closure only, this time may be conducted via synchronous online video conferencing
7. Individual Meetings  
as needed
8. Individualized Assignment Feedback  
as assigned
9. Synchronous or Asynchronous Video  
all online instruction must be conducted in a synchronous video format
10. Telephone Contact  
as needed

**XXI. List of Techniques:** Students interact with each other and the instructor in ways that mirror the traditional classroom; only the delivery system is via synchronous online video conferencing instead of in-person communication. Students may also interact with each other and the instructor via email, the announcement system, the discussion board, or other tools. Students also demonstrate an understanding and integration of course concepts via research assignments, writing exercises, class discussion, and/or other assignments.

**XXII. How to Evaluate Students for Achieved Outcomes:** Multiple measures are used to assess student learning objectives. These include performance on objective examinations administered via the assessment tool, writing assignments, and/or group or individual projects.

**XXIII. Additional Resources/Materials/Information:** Materials posted online are consistent with those required for the in-person class. SDCCD and DSPS personnel provide all needed accommodations. DSPS provides a student in an online classroom with the same level of support as an on-campus student. Distance education techniques used in this course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure

course will be accessible to individuals with disabilities (Sections 504 and 508 of the Rehabilitation Act). Requests for technology accommodations will be met by working with the Adaptive Technology Specialist to ensure compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

#### COURSE STUDENT LEARNING OUTCOME(S)

##### CITY

- Students will compare and contrast Latin American and Spanish cultures with U.S. culture, both orally and in writing.

##### MESA

- Communicate in a meaningful context in the Spanish language at the intermediate-mid to intermediate-intermediate high level on the ACTFL proficiency scale.
- Explain or analyze the nature of language through comparisons of the Spanish language and their own.
- Demonstrate knowledge of and sensitivity to aspects of behavior, attitudes, and customs of Spanish-speaking countries.
- Connect with the global community through study and acquisition of the Spanish language and creative forms of expression.

##### MIRAMAR

- Student ability to express & react casually to opinions, beliefs, and feelings, utilize/recall appropriate class vocabulary, demonstrate the ability to start, continue and end a conversation and deal effectively with unanticipated complications through a variety of communicative and coping devices. Also, the ability to use appropriate communicative strategies in real life situations and to successfully manage time.

#### SECTION V

##### COURSE DATA ADMINISTRATION ELEMENTS

###### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1105.00 Spanish

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** Y = Not applicable

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

###### **II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

###### **III. Last Time Pre/Co Requisite Update:** 04/20/2015

###### **IV. Last Outline Revision Date:** 03/24/2016

###### **V. CIC Approval:** 03/24/2016

###### **VI. BOT Approval:**

###### **VII. State Approval:**

###### **VIII. Revised State Approval:**

###### **IX. Course Approval Effective Date:** Fall 2017

#### SECTION VI

##### CREDIT FOR PRIOR LEARNING

compliance with the Americans with Disabilities Act (ADA).

**XXIV. Audio Visual Library Materials:** NO

#### SECTION IV

##### COURSE STUDENT LEARNING OUTCOME(S)

##### CITY

- Students will compare and contrast Latin American and Spanish cultures with U.S. culture, both orally and in writing.

##### MESA

- Communicate in a meaningful context in the Spanish language at the intermediate-mid to intermediate-intermediate high level on the ACTFL proficiency scale.
- Explain or analyze the nature of language through comparisons of the Spanish language and their own.
- Demonstrate knowledge of and sensitivity to aspects of behavior, attitudes, and customs of Spanish-speaking countries.
- Connect with the global community through study and acquisition of the Spanish language and creative forms of expression.

##### MIRAMAR

- Student ability to express & react casually to opinions, beliefs, and feelings, utilize/recall appropriate class vocabulary, demonstrate the ability to start, continue and end a conversation and deal effectively with unanticipated complications through a variety of communicative and coping devices. Also, the ability to use appropriate communicative strategies in real life situations and to successfully manage time.

#### SECTION V

##### COURSE DATA ADMINISTRATION ELEMENTS

###### **I. Codes:**

**California Classification:** (Y Credit Course)

**TOP Code:** 1105.00 Spanish

**SAM Code:** E - Non Occupational

**Course Prior to College Level (CB21):** Y - Not applicable. Level of course is not one of the levels listed above, may be above level A (transferable) or below level C (more than 3 levels below transfer level).

**Funding Agency Category (CB23):** Not Applicable (funding not used to develop course)

**Course Program Status (CB24):** Program-applicable

**Course Gen Education Status (CB25):** Y = Not applicable

**Course Support Course Status (CB26):** N = Course is not a support course

**Major Restriction Code:** NONE

###### **II. Lect Units:** 3.00

**Total Units:** 3

**Lecture Hours Min:** 48.00 **Max:** 54.00

**Lab Hours Min:** 0.00 **Max:** 0.00

**Other Hours Min:** 0.00 **Max:** 0.00

**Total Contact Hours Min:** 48.00 **Max:** 54.00

**Outside-of-Class Hours Min:** 96.00 **Max:** 108.00

**Total Student Learning Hours Min:** 144.00 **Max:** 162.00

**FTEF Lecture Min:** 0.2000 **Max:**

**FTEF Lab Min:** 0.0000 **Max:**

**FTEF Total Min:** 0.2000 **Max:**

###### **III. Last Time Pre/Co Requisite Update:** 09/17/2022

###### **IV. Last Outline Revision Date:** 03/24/2016

###### **V. CIC Approval:**

###### **VI. BOT Approval:**

###### **VII. State Approval:**

###### **VIII. Revised State Approval:**

###### **IX. Course Approval Effective Date:**

#### SECTION VI

##### CREDIT FOR PRIOR LEARNING

# CITY - ELECTRONIC MANUFACTURING - CERTIFICATE OF PERFORMANCE

## PROPOSAL INFORMATION

**Action Proposed:**New Program

**Proposal Originator:**Kenneth Heifner

**Origination**

**Date:**05/05/2022

**Proposed Start:**Fall 2024

### **Need for Proposal:**

City College proposes to create a certificate of performance to provide electronic manufacturing skills based on advisory board recommendations. This certificate is supported by the Kearny High School EID cohort grant. Proposed TOP Code: 0934.00, CIP Code: 47.0101

### **Attached Documents:**

[Advisory Board Minutes](#)

[OccProfile\\_SOC17-2071](#)

[OccProfile\\_SOC17-3023](#)

[OccProfile\\_SOC49-2094](#)

[Narrative\\_FA2024\\_2022-11-16\\_v2](#)

## PROGRAM & AWARD INFORMATION

### **Award Description:**

The Certificate of Performance in Electronic Manufacturing prepares students with necessary skills, knowledge, and experience to continue on with the coursework and projects in the MFET program.

Students learn skills in problem-solving methods used in manufacturing industries and develop fundamental knowledge of the programming, setup, operation, and maintenance of electronic manufacturing systems. Students explore the study of automated electronic inspection and testing to complete electronic assembly rework, modification, and repair.

### **Award Notes:**

The Certificate of Performance is a departmental award that does not appear on the student's transcript. All courses must be completed within the San Diego Community College District.

This program is not eligible for federal financial aid in accordance with Federal regulations.

### **Program Description:**

Manufacturing Engineering Technology (MFET) program provides students the opportunity to acquire highly valued skills in an innovative, hands-on learning environment. The program features integrating experiences through which students participate in all aspects of a manufacturing enterprise, from materials and processes to safety, design, automation, quality and lean manufacturing. Armed with these skills, MFET graduates can pursue rewarding, growth-oriented careers in such diverse industries as plastics, automotive, biomedical, electronics, aerospace, machining and other high-value manufacturing sectors.

### **Program Goals:**

This section is no longer updated in the CurricUNET.

### **Program Emphasis:**

### **Career Options:**

Some careers in manufacturing engineering technology require education beyond the

associate degree. Examples of careers in manufacturing engineering technology include: manufacturing engineering or engineering technician, manufacturing operation management, equipment maintenance and troubleshooting, quality and production control, production planning, and automation. MFET graduates may also further their education by transferring to a number of four-year colleges and universities.

<b><u>COURSES REQUIRED FOR THE MAJOR:</u></b>		<b><u>UNITS</u></b>
MFET 114	Problem Solving and Corrective Action *Active*	3
MFET 205	Introduction to Electronic Manufacturing Services *Active*	3
MFET 215	Automated PCBA Inspection and Testing *Active*	3
MFET 215L	Automated PCBA Inspection and Testing Laboratory *Active*	2
<b>Total Units</b>		<b>11</b>

## **DATES & CODES**

**CIC Approval:**

**Board Approval:**

**State Approval:**

**TOP Code:** 0934.00

**State Approval (Unique) Code:**

Subject Area: Manufacturing Engineering  
Technology

Program Area: Manufacturing Technology

Report Run: 12/03/2022 11:34 AM

Program ID: 4386



# CITY - ELECTRONIC MANUFACTURING - CERTIFICATE OF PERFORMANCE

## PROPOSAL INFORMATION

**Action Proposed:**New Program

**Proposal Originator:**Kenneth Heifner

**Origination**

**Date:**05/05/2022

**Proposed Start:**Fall 2024

### **Need for Proposal:**

City College proposes to create a certificate of performance to provide electronic manufacturing skills based on advisory board recommendations. This certificate is supported by the Kearny High School EID cohort grant. Proposed TOP Code: 0934.00, CIP Code: 47.0101

### **Attached Documents:**

[Advisory Board Minutes](#)

[OccProfile\\_SOC17-2071](#)

[OccProfile\\_SOC17-3023](#)

[OccProfile\\_SOC49-2094](#)

[Narrative\\_FA2024\\_2022-11-16\\_v2](#)

## PROGRAM & AWARD INFORMATION

### **Award Description:**

The Certificate of Performance in Electronic Manufacturing prepares students with necessary skills, knowledge, and experience to continue on with the coursework and projects in the MFET program.

Students learn skills in problem-solving methods used in manufacturing industries and develop fundamental knowledge of the programming, setup, operation, and maintenance of electronic manufacturing systems. Students explore the study of automated electronic inspection and testing to complete electronic assembly rework, modification, and repair.

### **Award Notes:**

The Certificate of Performance is a departmental award that does not appear on the student's transcript. All courses must be completed within the San Diego Community College District.

This program is not eligible for federal financial aid in accordance with Federal regulations.

### **Program Description:**

Manufacturing Engineering Technology (MFET) program provides students the opportunity to acquire highly valued skills in an innovative, hands-on learning environment. The program features integrating experiences through which students participate in all aspects of a manufacturing enterprise, from materials and processes to safety, design, automation, quality and lean manufacturing. Armed with these skills, MFET graduates can pursue rewarding, growth-oriented careers in such diverse industries as plastics, automotive, biomedical, electronics, aerospace, machining and other high-value manufacturing sectors.

### **Program Goals:**

This section is no longer updated in the CurricUNET.

### **Program Emphasis:**

### **Career Options:**

Some careers in manufacturing engineering technology require education beyond the

associate degree. Examples of careers in manufacturing engineering technology include: manufacturing engineering or engineering technician, manufacturing operation management, equipment maintenance and troubleshooting, quality and production control, production planning, and automation. MFET graduates may also further their education by transferring to a number of four-year colleges and universities.

<b><u>COURSES REQUIRED FOR THE MAJOR:</u></b>		<b><u>UNITS</u></b>
MFET 114	Problem Solving and Corrective Action *Active*	3
MFET 205	Introduction to Electronic Manufacturing Services *Active*	3
MFET 215	Automated PCBA Inspection and Testing *Active*	3
MFET 215L	Automated PCBA Inspection and Testing Laboratory *Active*	2
<b>Total Units</b>		<b>11</b>

## **DATES & CODES**

**CIC Approval:**

**Board Approval:**

**State Approval:**

**TOP Code:** 0934.00

**State Approval (Unique) Code:**

Subject Area: Manufacturing Engineering  
Technology

Program Area: Manufacturing Technology

Report Run: 12/03/2022 11:34 AM

Program ID: 4386



# CITY - FILM, TELEVISION, AND ELECTRONIC MEDIA - ASSOCIATE IN SCIENCE FOR TRANSFER DEGREE

## PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Cy Kuckenbaker

**Origination**

**Date:**10/20/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Update the Associate Degree for Transfer in Film, Television, and Electronic Media to 2/1/2022 CCCCCO template; replace courses carrying the RTVF or DJRN course indicator to courses carrying the FJMP course indicator.

**Attached Documents:**

[CSU GE List C1](#)

[AAM SDSU TAP DRAM 105](#)

[TMC Film, Television, and Media AST](#)

[AAM SDSU TAP MUSI 100](#)

[Narrative\\_FA2024\\_2022-11-16](#)

[COCI Approval Letter\\_2017-11-07](#)

## PROGRAM & AWARD INFORMATION

**Award Description:**

The Associate in Arts in Film, Television, and Electronic Media for Transfer Degree is intended for students who plan to complete a bachelor's degree in film, television, or a related major in the California State University (CSU) system. It is accepted by some but not all CSU campuses. Students who complete this degree and transfer to a participating CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor's degree. It may not be appropriate preparation for students transferring to a CSU campus that does not accept the degree. Students who plan to complete this degree should consult a counselor for additional information about participating CSU campuses as well as university admission, degree, and transfer requirements.

NOTE: Students intending to transfer into this major at a CSU should consult with a counselor and visit [www.assist.org](http://www.assist.org) for guidance on appropriate transfer coursework.

**Award Notes:**

General Education: In addition to the courses listed above, students must complete one of the following general education options:

\*The IGETC pattern (page XX) is accepted by all CSU campuses and most UC campuses and majors. It is also accepted by some private/independent or out of state universities.

\*The CSU GE pattern (page XX) is accepted by all CSU campuses and some private/independent or out of state universities. It is not accepted by the UC system.

\*It is strongly recommended that students consult with a counselor to determine which general education option is most appropriate for their individual educational goals.

The following is required for all AA-T or AS-T degrees:

\*Completion of 60 CSU-transferable semester units. No more than 60 units are required.

\*Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework. While a minimum of 2.0 is required for admission, some CSU campuses and majors may require a higher GPA. Please see a counselor for more information.

\*Completion of a minimum of 18 semester units in an "AA-T" or "AS-T" major (see list below). All courses in the major must be completed with a grade of C or P or better.

\*Certified completion of the California State University General Education-Breadth pattern (CSU GE; see page XX for more information); OR the Intersegmental General Education Transfer Curriculum pattern (IGETC; see page XX for more information).

**Program Description:**

N/A

**Program Goals:**

N/A

**Program Emphasis:**

**Career Options:**

Careers related to this field typically require education beyond the associate degree level and some may require a graduate degree.

SELECT TWO COURSES (6 UNITS) FROM THE FOLLOWING:

<b>COURSES REQUIRED FOR THE MAJOR:</b>		<b>UNITS</b>
FJMP 100	Introduction to Cinema *Pending*	3
FJMP 101	Introduction to Mass Media *Pending*	3
FJMP 120	Introduction to Screenwriting *Pending*	3

**SELECT TWO COURSES (6 UNITS) FROM THE FOLLOWING:**

	FJMP 112	Introduction to Audio Production *Pending*	3
and	FJMP 111	Single Camera Production *Pending*	3
or	FJMP 144	Multi-Camera Studio Operations *Launched*	3

**SELECT A MINIMUM OF TWO COURSES (6 UNITS) NOT ALREADY SELECTED ABOVE:**

DRAM 105	Introduction to Dramatic Arts *Active*	3
DRAM 107	Study of Filmed Plays *Active*	3
FJMP 100	Introduction to Cinema *Pending*	3
FJMP 101	Introduction to Mass Media *Pending*	3
FJMP 111	Single Camera Production *Pending*	3
FJMP 120	Introduction to Screenwriting *Pending*	3
FJMP 144	Multi-Camera Studio Operations *Launched*	3
MUSI 100	Introduction to Music *Active*	3

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Total Units	18
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**DATES & CODES**

**CIC Approval:**

**Board Approval:**

**State Approval:**

**TOP Code:** 0604.20

**State Approval (Unique) Code:** 35977

Production

Program Area: Visual and Performing Arts

Program ID: 4469

## Previous Report

### CITY - FILM, TELEVISION, AND ELECTRONIC MEDIA - ASSOCIATE IN SCIENCE FOR TRANSFER DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**New Program

**Proposal Originator:**Cy Kuckenbaker

**Origination Date:**09/13/2016

**Proposed Start:**Fall 2018

**Need for Proposal:**

Create an Associate Degree for Transfer in Radio, Film, and Electronic Media.

#### PROGRAM & AWARD INFORMATION

**Award Description:**

General Education: In addition to the courses listed below, students must complete one of the following general education options:

The IGETC pattern (page XX) is accepted by all CSU campuses and most UC campuses and majors. It is also accepted by some private/independent or out of state universities.

The CSU GE pattern (page XX) is accepted by all CSU campuses and some private/independent or out of state universities. It is not accepted by the UC system.

It is strongly recommended that students consult with a counselor to determine which general education option is most appropriate for their individual educational goals.

The following is required for all AA-T or AS-T degrees:

Completion of 60 CSU-transferable semester units. No more than 60 units are required.

Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework. While a minimum of 2.0 is required for admission, some CSU campuses and majors may require a higher GPA. Please see a counselor for more information.

Completion of a minimum of 18 semester units in an "AA-T" or "AS-T" major (see list below). All courses in the major must be completed with a grade of C or better.

Certified completion of the California State University General Education-Breadth pattern (CSU GE; see page XX for more information); OR the Intersegmental General Education Transfer Curriculum pattern (IGETC; see page XX for more information).

**Award Notes:**

**Program Description:**

The Associate in Science in Radio, Film, and Electronic Media for Transfer Degree is intended for students who plan to complete a bachelor's degree in Radio, Film, and Electronic Media or a related major in the California State University (CSU) system. It is accepted by some but not all CSU campuses. Students who complete this degree and transfer to a participating CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor's degree. It may not be appropriate preparation for

## Current Report

### CITY - FILM, TELEVISION, AND ELECTRONIC MEDIA - ASSOCIATE IN SCIENCE FOR TRANSFER DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Cy Kuckenbaker

**Origination Date:**10/20/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Update the Associate Degree for Transfer in Film, Television, and Electronic Media to 2/1/2022 CCCCCO template; replace courses carrying the RTVF or DJRN course indicator to courses carrying the FJMP course indicator.

**Attached Documents:**

[CSU GE List C1](#)

[AAM SDSU TAP DRAM 105](#)

[TMC Film, Television, and Media AST](#)

[AAM SDSU TAP MUSI 100](#)

[Narrative\\_FA2024\\_2022-11-16](#)

[COCI Approval Letter\\_2017-11-07](#)

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Associate in Arts in Film, Television, and Electronic Media for Transfer Degree is intended for students who plan to complete a bachelor's degree in film, television, or a related major in the California State University (CSU) system. It is accepted by some but not all CSU campuses. Students who complete this degree and transfer to a participating CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor's degree. It may not be appropriate preparation for students transferring to a CSU campus that does not accept the degree. Students who plan to complete this degree should consult a counselor for additional information about participating CSU campuses as well as university admission, degree, and transfer requirements.

NOTE: Students intending to transfer into this major at a CSU should consult with a counselor and visit [www.assist.org](http://www.assist.org) for guidance on appropriate transfer coursework.

**Award Notes:**

General Education: In addition to the courses listed above, students must complete one of the following general education options:

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\*The CSU GE pattern (page XX) is accepted by all CSU campuses and some private/independent or out of state universities. It is not accepted by the UC system.

\*It is strongly recommended that students consult with a counselor to determine which general education option is most appropriate for their individual educational goals.

students transferring to a CSU campus that does not accept the degree. Students who plan to complete this degree should consult a counselor for additional information about participating CSU campuses as well as university admission, degree and transfer requirements.

NOTE: Students intending to transfer into this major at a CSU should consult with a counselor and visit [www.assist.org](http://www.assist.org) for guidance on appropriate transfer coursework.

#### Program Goals:

The purpose of the Associate in Science in Radio, Film, and Electronic Media for Transfer degree is to offer an organized course of study that will prepare students intending to major in Film, Television, and Electronic Media at the California State University (CSU). It is accepted by some but not all CSU campuses. Students who complete this degree and transfer to a participating CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor's degree. It may not be appropriate preparation for students transferring to a CSU campus that does not accept the degree. Students who plan to complete this degree should consult a counselor for additional information about participating CSU campuses as well as university admission, degree and transfer requirements.

#### Program Emphasis:

#### Career Options:

Careers related to this field typically require education beyond the associate degree level and some may require a graduate degree.

COURSES REQUIRED FOR THE MAJOR:		UNITS
RTVF 100	Introduction To Electronic Media *Active*	3
or FJMP 101	Introduction to Mass Media *Pending*	3
RTVF 107	Audio Production *Active*	3
RTVF 110	Introduction to Scriptwriting *Active*	3
or RTVF 160	Introduction to Cinema *Active*	3

SELECT ONE COURSE FROM THE FOLLOWING (3 UNITS):		UNITS
RTVF 118	Television Studio Operations *Active*	3
RTVF 124	Single Camera Production *Active*	3

SELECT ONE COURSE FROM THE FOLLOWING (3 UNITS)		UNITS
RTVF 118	Television Studio Operations *Active*	3
RTVF 167	Motion Picture Production *Active*	3

SELECT ONE COURSE FROM THE FOLLOWING (3 UNITS):		UNITS
RTVF 112	Documentary Film Production *Active*	3
RTVF 118	Television Studio Operations *Active*	3
RTVF 124	Single Camera Production *Active*	3
RTVF 151	Introduction to Multimedia *Active*	3
RTVF 153	Introduction to Nonlinear Editing *Active*	3
RTVF 167	Motion Picture Production *Active*	3

Total Units	18
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#### DATES & CODES

CIC Approval: 12/08/2016

Board Approval: 03/16/2017

State Approval: 11/07/2017

TOP Code: 0604.20

State Approval (Unique) Code: 35977

Subject Area: Radio, Television and Film  
Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM  
Program ID: 3312

The following is required for all AA-T or AS-T degrees:

\*Completion of 60 CSU-transferable semester units. No more than 60 units are required.

\*Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework. While a minimum of 2.0 is required for admission, some CSU campuses and majors may require a higher GPA. Please see a counselor for more information.

\*Completion of a minimum of 18 semester units in an "AA-T" or "AS-T" major (see list below). All courses in the major must be completed with a grade of C or P or better.

\*Certified completion of the California State University General Education-Breadth pattern (CSU GE; see page XX for more information); OR the Intersegmental General Education Transfer Curriculum pattern (IGETC; see page XX for more information).

#### Program Description:

N/A

#### Program Goals:

N/A

#### Program Emphasis:

#### Career Options:

Careers related to this field typically require education beyond the associate degree level and some may require a graduate degree.

SELECT TWO COURSES (6 UNITS) FROM THE FOLLOWING:		UNITS
FJMP 100	Introduction to Cinema *Pending*	3
FJMP 101	Introduction to Mass Media *Pending*	3
FJMP 120	Introduction to Screenwriting *Pending*	3

SELECT TWO COURSES (6 UNITS) FROM THE FOLLOWING:		UNITS
FJMP 112	Introduction to Audio Production *Pending*	3
and FJMP 111	Single Camera Production *Pending*	3
or FJMP 144	Multi-Camera Studio Operations *Launched*	3

SELECT A MINIMUM OF TWO COURSES (6 UNITS) NOT ALREADY SELECTED ABOVE:		UNITS
DRAM 105	Introduction to Dramatic Arts *Active*	3
DRAM 107	Study of Filmed Plays *Active*	3
FJMP 100	Introduction to Cinema *Pending*	3
FJMP 101	Introduction to Mass Media *Pending*	3
FJMP 111	Single Camera Production *Pending*	3
FJMP 120	Introduction to Screenwriting *Pending*	3
FJMP 144	Multi-Camera Studio Operations *Launched*	3
MUSI 100	Introduction to Music *Active*	3

Total Units	18
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#### DATES & CODES

#### CIC Approval:

#### Board Approval:

#### State Approval:

TOP Code: 0604.20

State Approval (Unique) Code: 35977

Subject Area: Film, Journalism, and Media  
Production

Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM

Program ID: 4469

## Previous Report

### CITY - FILM, TELEVISION, AND ELECTRONIC MEDIA - ASSOCIATE IN SCIENCE FOR TRANSFER DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**New Program

**Proposal Originator:**Cy Kuckenbaker

**Origination Date:**09/13/2016

**Proposed Start:**Fall 2018

**Need for Proposal:**

Create an Associate Degree for Transfer in Radio, Film, and Electronic Media.

#### PROGRAM & AWARD INFORMATION

**Award Description:**

General Education: In addition to the courses listed below, students must complete one of the following general education options:

The IGETC pattern (page XX) is accepted by all CSU campuses and most UC campuses and majors. It is also accepted by some private/independent or out of state universities.

The CSU GE pattern (page XX) is accepted by all CSU campuses and some private/independent or out of state universities. It is not accepted by the UC system.

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The following is required for all AA-T or AS-T degrees:

Completion of 60 CSU-transferable semester units. No more than 60 units are required.

Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework. While a minimum of 2.0 is required for admission, some CSU campuses and majors may require a higher GPA. Please see a counselor for more information.

Completion of a minimum of 18 semester units in an "AA-T" or "AS-T" major (see list below). All courses in the major must be completed with a grade of C or better.

Certified completion of the California State University General Education-Breadth pattern (CSU GE; see page XX for more information); OR the Intersegmental General Education Transfer Curriculum pattern (IGETC; see page XX for more information).

**Award Notes:**

**Program Description:**

The Associate in Science in Radio, Film, and Electronic Media for Transfer Degree is intended for students who plan to complete a bachelor's degree in Radio, Film, and Electronic Media or a related major in the California State University (CSU) system. It is accepted by some but not all CSU campuses. Students who complete this degree and transfer to a participating CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor's degree. It may not be appropriate preparation for

## Current Report

### CITY - FILM, TELEVISION, AND ELECTRONIC MEDIA - ASSOCIATE IN SCIENCE FOR TRANSFER DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Cy Kuckenbaker

**Origination Date:**10/20/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Update the Associate Degree for Transfer in Film, Television, and Electronic Media to 2/1/2022 CCCCCO template; replace courses carrying the RTVF or DJRN course indicator to courses carrying the FJMP course indicator.

**Attached Documents:**

[CSU GE List C1](#)

[AAM SDSU TAP DRAM 105](#)

[TMC Film, Television, and Media AST](#)

[AAM SDSU TAP MUSI 100](#)

[Narrative\\_FA2024\\_2022-11-16](#)

[COCI Approval Letter\\_2017-11-07](#)

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Associate in Arts in Film, Television, and Electronic Media for Transfer Degree is intended for students who plan to complete a bachelor's degree in film, television, or a related major in the California State University (CSU) system. It is accepted by some but not all CSU campuses. Students who complete this degree and transfer to a participating CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor's degree. It may not be appropriate preparation for students transferring to a CSU campus that does not accept the degree. Students who plan to complete this degree should consult a counselor for additional information about participating CSU campuses as well as university admission, degree, and transfer requirements.

NOTE: Students intending to transfer into this major at a CSU should consult with a counselor and visit [www.assist.org](http://www.assist.org) for guidance on appropriate transfer coursework.

**Award Notes:**

General Education: In addition to the courses listed above, students must complete one of the following general education options:

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\*The CSU GE pattern (page XX) is accepted by all CSU campuses and some private/independent or out of state universities. It is not accepted by the UC system.

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students transferring to a CSU campus that does not accept the degree. Students who plan to complete this degree should consult a counselor for additional information about participating CSU campuses as well as university admission, degree and transfer requirements.

NOTE: Students intending to transfer into this major at a CSU should consult with a counselor and visit [www.assist.org](http://www.assist.org) for guidance on appropriate transfer coursework.

#### Program Goals:

The purpose of the Associate in Science in Radio, Film, and Electronic Media for Transfer degree is to offer an organized course of study that will prepare students intending to major in Film, Television, and Electronic Media at the California State University (CSU). It is accepted by some but not all CSU campuses. Students who complete this degree and transfer to a participating CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor's degree. It may not be appropriate preparation for students transferring to a CSU campus that does not accept the degree. Students who plan to complete this degree should consult a counselor for additional information about participating CSU campuses as well as university admission, degree and transfer requirements.

#### Program Emphasis:

#### Career Options:

Careers related to this field typically require education beyond the associate degree level and some may require a graduate degree.

COURSES REQUIRED FOR THE MAJOR:		UNITS
RTVF 100	Introduction To Electronic Media *Active*	3
or FJMP 101	Introduction to Mass Media *Pending*	3
RTVF 107	Audio Production *Active*	3
RTVF 110	Introduction to Scriptwriting *Active*	3
or RTVF 160	Introduction to Cinema *Active*	3

SELECT ONE COURSE FROM THE FOLLOWING (3 UNITS):		UNITS
RTVF 118	Television Studio Operations *Active*	3
RTVF 124	Single Camera Production *Active*	3

SELECT ONE COURSE FROM THE FOLLOWING (3 UNITS)		UNITS
RTVF 118	Television Studio Operations *Active*	3
RTVF 167	Motion Picture Production *Active*	3

SELECT ONE COURSE FROM THE FOLLOWING (3 UNITS):		UNITS
RTVF 112	Documentary Film Production *Active*	3
RTVF 118	Television Studio Operations *Active*	3
RTVF 124	Single Camera Production *Active*	3
RTVF 151	Introduction to Multimedia *Active*	3
RTVF 153	Introduction to Nonlinear Editing *Active*	3
RTVF 167	Motion Picture Production *Active*	3

Total Units 18

#### DATES & CODES

CIC Approval: 12/08/2016

Board Approval: 03/16/2017

State Approval: 11/07/2017

TOP Code: 0604.20

State Approval (Unique) Code: 35977

Subject Area: Radio, Television and Film  
Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM  
Program ID: 3312

The following is required for all AA-T or AS-T degrees:

\*Completion of 60 CSU-transferable semester units. No more than 60 units are required.

\*Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework. While a minimum of 2.0 is required for admission, some CSU campuses and majors may require a higher GPA. Please see a counselor for more information.

\*Completion of a minimum of 18 semester units in an "AA-T" or "AS-T" major (see list below). All courses in the major must be completed with a grade of C or P or better.

\*Certified completion of the California State University General Education-Breadth pattern (CSU GE; see page XX for more information); OR the Intersegmental General Education Transfer Curriculum pattern (IGETC; see page XX for more information).

#### Program Description:

N/A

#### Program Goals:

N/A

#### Program Emphasis:

#### Career Options:

Careers related to this field typically require education beyond the associate degree level and some may require a graduate degree.

SELECT TWO COURSES (6 UNITS) FROM THE FOLLOWING:

COURSES REQUIRED FOR THE MAJOR:		UNITS
FJMP 100	Introduction to Cinema *Pending*	3
FJMP 101	Introduction to Mass Media *Pending*	3
FJMP 120	Introduction to Screenwriting *Pending*	3

SELECT TWO COURSES (6 UNITS) FROM THE FOLLOWING:

		UNITS
FJMP 112	Introduction to Audio Production *Pending*	3
and FJMP 111	Single Camera Production *Pending*	3
or FJMP 144	Multi-Camera Studio Operations *Launched*	3

SELECT A MINIMUM OF TWO COURSES (6 UNITS) NOT ALREADY SELECTED ABOVE:

		UNITS
DRAM 105	Introduction to Dramatic Arts *Active*	3
DRAM 107	Study of Filmed Plays *Active*	3
FJMP 100	Introduction to Cinema *Pending*	3
FJMP 101	Introduction to Mass Media *Pending*	3
FJMP 111	Single Camera Production *Pending*	3
FJMP 120	Introduction to Screenwriting *Pending*	3
FJMP 144	Multi-Camera Studio Operations *Launched*	3
MUSI 100	Introduction to Music *Active*	3

Total Units 18

#### DATES & CODES

#### CIC Approval:

#### Board Approval:

#### State Approval:

TOP Code: 0604.20

State Approval (Unique) Code: 35977

Subject Area: Film, Journalism, and Media  
Production

Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM

Program ID: 4469



# CITY - LIBERAL ARTS AND SCIENCES: SCIENTIFIC STUDIES MATHEMATICS AND PRE-ENGINEERING - ASSOCIATE OF ARTS DEGREE

## PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Elizabeth Norvell

**Origination**

**Date:**04/13/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Remove CISC 150, MATH 104/116/118/141 from required courses. Add CHEM 201L, ELDT 143/143L/232/232L, ENGE 108/111/116/210, MATH 141A/141B, PHYS 180B/181B to required courses. Revise award description.

**Attached Documents:**

[CSU Chico Applied Mathematics](#)  
[CSU Northridge Manufacturing Systems Engineering](#)  
[CSU San Marcos Applied Electronics](#)  
[CSU San Marcos Software Engineering](#)  
[San Diego State University Environmental Engineeri](#)  
[San Diego State University Mathematics - Computati](#)  
[UC Merced Physics Astrophysics Emphasis BS](#)  
[UC Riverside Data Science](#)  
[UC Riverside Robotics](#)  
[UC Santa Barbara Applied Mathematics](#)  
[UC Santa Barbara Statistics and Data Science BS](#)  
[UC Santa Cruz Robotics Engineering](#)  
[UCLA Aerospace Engineering](#)  
[UCLA Computer Engineering](#)  
[UCLA Mathematics Applied Science](#)  
[UCSD ECE Electrical Engineering](#)  
[Zipped Articulation Agreements](#)  
[UCSD Mathematics Applied Science](#)  
[UCSD Mathematics Probability and Statistics](#)  
[UCSD Structural Engineering](#)  
[Narrative\\_FA23\\_2022-10-13](#)

## PROGRAM & AWARD INFORMATION

**Award Description:**

The Liberal Arts and Sciences: Scientific Studies in Mathematics and Pre-Engineering Associate Degree offer students the mathematical and scientific knowledge, practical experience, and quantitative reasoning skills necessary to transfer to a University of California, a California State University, or an independent/private college or university in a variety specializations, including Aerospace Engineering, Applied Electronics, Applied Mathematics, Astrophysics, Civil Engineering, Computer Engineering, Computer Science, Construction Engineering, Data Science, Electrical Engineering, Engineering, Engineering Technology, Environmental Engineering, Industrial Engineering Technology, Information Systems, Manufacturing Engineering, Materials Science, Mathematics, Robotics, Statistics,



Mechanical Engineering, Network and Digital Technology, Nuclear Engineering, Software Engineering, and Structural Engineering.

### Award Notes:

The Liberal Arts and Sciences Degree is designed to enable students to complete the requirements for an Associate in Arts Degree with a minimum of 18 units in an area of emphasis and transfer to a University of California, a California State University, or an independent/private college. Because admission and major preparation requirements vary at each transfer institution, courses used to complete this major should be selected with the assistance of a San Diego City College counselor.

### Program Description:

N/A

### Program Goals:

N/A

### Program Emphasis:

### Career Options:

Complete a minimum of 18 units from the courses listed below:

<b>COURSES REQUIRED FOR THE MAJOR:</b>		<b>UNITS</b>
MATH 119	Elementary Statistics *Active*	3
or PSYC 258	Behavioral Science Statistics *Active*	3
or MATH 115	Gateway to Experimental Statistics *Active*	4
CHEM 200	General Chemistry I - Lecture *Active*	3
CHEM 200L	General Chemistry I - Laboratory *Active*	2
CHEM 201	General Chemistry II - Lecture *Active*	3
CHEM 201L	General Chemistry II - Laboratory *Active*	2
CISC 179	Python Programming *Active*	4
CISC 181	Principles of Information Systems *Active*	4
CISC 186	Visual Basic Programming *Active*	4
CISC 187	Data Structures in C++ *Active*	4
CISC 190	Java Programming *Active*	4
CISC 192	C/C++ Programming *Active*	4
CISC 205	Object Oriented Programming using C++ *Active*	4
CISC 220	Fundamentals of Computer Game Programming *Active*	4
ELCT 111	Electrical Theory I *Active*	3
ELCT 111L	Electrical Laboratory I *Active*	2
ELCT 121	Electrical Theory II *Active*	3
ELCT 121L	Electrical Laboratory II *Active*	2
ELDT 123	Introduction to Digital Circuits *Active*	3
ELDT 123L	Digital Circuits Laboratory *Active*	1
ELDT 124	Basic DC Electronics *Active*	4
ELDT 124L	Basic DC Laboratory *Active*	1
ELDT 125	AC Circuit Analysis *Active*	4
ELDT 125L	DC/AC Circuit Analysis Laboratory with Pspice *Active*	1
ELDT 143	Semiconductor Devices *Active*	3
ELDT 143L	Semiconductor Devices Laboratory *Active*	1.5
ELDT 232	Advanced Computer Design and Interfacing *Active*	4
ELDT 232L	Advanced Computer Designs Laboratory *Active*	1.5
ENGE 101	Introduction to Engineering *Active*	1.5
ENGE 108	Dimensioning and Tolerancing *Active*	3
ENGE 111	Introduction to Computer-Aided Design *Active*	3
ENGE 116	Computational Methods in Engineering *Approved*	3
ENGE 151	Computer-Aided Design *Active*	2
ENGE 152	Engineering Design *Active*	3
ENGE 200	Statics *Active*	3
ENGE 210	Properties of Materials *Active*	3

ENGE 240	Digital Systems *Active*	3
ENGE 250	Dynamics *Active*	3
ENGE 260	Electric Circuits *Active*	3
MATH 107	Introduction to Scientific Programming *Active*	3
MATH 107L	Introduction to Scientific Programming Lab *Active*	1
MATH 121	Basic Techniques of Applied Calculus I *Active*	3
MATH 122	Basic Techniques of Calculus II *Active*	3
MATH 141A	Precalculus I *Launched*	4
MATH 141B	Precalculus II *Launched*	4
MATH 150	Calculus with Analytic Geometry I *Active*	5
MATH 151	Calculus with Analytic Geometry II *Active*	4
MATH 245	Discrete Mathematics *Active*	3
MATH 252	Calculus with Analytic Geometry III *Active*	4
MATH 254	Introduction to Linear Algebra *Active*	3
MATH 255	Differential Equations *Active*	3
MFET 101	Introduction to Manufacturing Engineering Technology *Active*	3
MFET 110	Industrial Safety *Active*	2
MFET 120	Manufacturing Processes *Active*	4
MFET 210	Statistical Process Control *Active*	3
PHYS 180A	General Physics I *Active*	4
PHYS 180B	General Physics II *Active*	4
PHYS 181A	General Physics Laboratory I *Active*	1
PHYS 181B	General Physics Laboratory II *Active*	1
PHYS 195	Mechanics *Active*	5
PHYS 196	Electricity and Magnetism *Active*	5
PHYS 197	Waves, Optics and Modern Physics *Active*	5

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Total Units	18
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## **DATES & CODES**

**CIC Approval:**

**Board Approval:**

**State Approval:**

**TOP Code:** 4902.00

**State Approval (Unique) Code:** 18102

Subject Area: Liberal Arts and Sciences

Program Area: Liberal Arts and Sciences

Report Run: 12/03/2022 11:34 AM

Program ID: 4380

## Previous Report

### CITY - LIBERAL ARTS AND SCIENCES: SCIENTIFIC STUDIES MATHEMATICS AND PRE-ENGINEERING - ASSOCIATE OF ARTS DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Elizabeth Norvell

**Origination  
Date:**04/11/2017

**Proposed Start:**Fall 2019

**Need for Proposal:**

Remove BIOL 200, ENGN 110, CBTE 114, CBTE 162, CBTE 164, CBTE 180, CBTE 210, INWT 120, TEHW 101, COMS 103, from courses required for the major; add CISC 179 to courses required for the major; Change title to remove "in" from award title to comply with CCCCC requirements.

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Liberal Arts and Sciences Degree is designed to enable students to complete the requirements for an Associate of Arts Degree with a minimum of 18 units in an area of emphasis and transfer to a University of California, a California State University or an independent/private college and university.

Course work emphasizes the study of mathematical and quantitative reasoning skills and impart knowledge of the facts and principles that form the foundations of living and non-living systems. Students recognize and appreciate the methodologies of science as investigative tools, as well as the limitations of scientific endeavors. This area is divided into the following specializations: Biological Science, Mathematics and Pre-engineering, Physical and Earth Sciences.

**Award Notes:**

The specialization in Mathematics and Pre-Engineering is intended for students who plan to complete a bachelor's degree at a transfer institution in a mathematical, computer science or engineering related major. Common university majors in this field include: Aerospace Engineering, Applied Mathematics, Civil Engineering, Cognitive Science, Computer Engineering, Computer Science, Construction Engineering, Electrical Engineering, Engineering, Engineering Technology, Environmental Engineering, Industrial Engineering Technology, Information Systems, Manufacturing Engineering, Materials Science, Mathematics, and Statistics, Mechanical Engineering, Nuclear Engineering, and Structural Engineering.

This degree is designed to accommodate the differing requirements of a wide variety of transfer institutions and major options. Because admission and major preparation requirements vary at each transfer institution, courses used to complete this major should be selected with the assistance of a San Diego City College counselor.

**Program Description:**

N/A

**Program Goals:**

N/A

## Current Report

### CITY - LIBERAL ARTS AND SCIENCES: SCIENTIFIC STUDIES MATHEMATICS AND PRE-ENGINEERING - ASSOCIATE OF ARTS DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Elizabeth Norvell

**Origination  
Date:**04/13/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Remove CISC 150, MATH 104/116/118/141 from required courses. Add CHEM 201L, ELDT 143/143L/232/232L, ENGE 108/111/116/210, MATH 141A/141B, PHYS 180B/181B to required courses. Revise award description.

**Attached Documents:**

[CSU Chico Applied Mathematics](#)  
[CSU Northridge Manufacturing Systems Engineering](#)  
[CSU San Marcos Applied Electronics](#)  
[CSU San Marcos Software Engineering](#)  
[San Diego State University Environmental Engineeri](#)  
[San Diego State University Mathematics - Computati](#)  
[UC Merced Physics Astrophysics Emphasis BS](#)  
[UC Riverside Data Science](#)  
[UC Riverside Robotics](#)  
[UC Santa Barbara Applied Mathematics](#)  
[UC Santa Barbara Statistics and Data Science BS](#)  
[UC Santa Cruz Robotics Engineering](#)  
[UCLA Aerospace Engineering](#)  
[UCLA Computer Engineering](#)  
[UCLA Mathematics Applied Science](#)  
[UCSD ECE Electrical Engineering](#)  
[Zipped Articulation Agreements](#)  
[UCSD Mathematics Applied Science](#)  
[UCSD Mathematics Probability and Statistics](#)  
[UCSD Structural Engineering](#)  
[Narrative\\_FA23\\_2022-10-13](#)

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Liberal Arts and Sciences: Scientific Studies in Mathematics and Pre-Engineering Associate Degree offer students the mathematical and scientific knowledge, practical experience, and quantitative reasoning skills necessary to transfer to a University of California, a California State University, or an independent/private college or university in a variety of specializations, including Aerospace Engineering, Applied Electronics, Applied Mathematics, Astrophysics, Civil Engineering, Computer Engineering, Computer Science, Construction Engineering, Data Science, Electrical Engineering, Engineering, Engineering Technology, Environmental Engineering, Industrial Engineering Technology, Information Systems, Manufacturing Engineering, Materials Science, Mathematics, Robotics, Statistics,

**Program Emphasis:****Career Options:**

Complete a minimum of 18 units from the courses listed below:

<b>COURSES REQUIRED FOR THE MAJOR:</b>			<b>UNITS</b>
MATH 119	Elementary Statistics *Active*		3
or PSYC 258	Behavioral Science Statistics *Active*		3
or MATH 115	Gateway to Experimental Statistics *Active*		4
CHEM 200	General Chemistry I - Lecture *Active*		3
CHEM 200L	General Chemistry I - Laboratory *Active*		2
CHEM 201	General Chemistry II - Lecture *Active*		3
CISC 150	Introduction to Computer and Information Sciences *Active*		3
CISC 179	Python Programming *Active*		4
CISC 181	Principles of Information Systems *Active*		4
CISC 187	Data Structures in C++ *Active*		4
CISC 186	Visual Basic Programming *Active*		4
CISC 190	Java Programming *Active*		4
CISC 192	C/C++ Programming *Active*		4
CISC 205	Object Oriented Programming using C++ *Active*		4
CISC 220	Fundamentals of Computer Game Programming *Active*		4
ELCT 111	Electrical Theory I *Active*		3
ELCT 111L	Electrical Laboratory I *Active*		2
ELCT 121	Electrical Theory II *Active*		3
ELCT 121L	Electrical Laboratory II *Active*		2
ELDT 123	Introduction to Digital Circuits *Active*		3
ELDT 123L	Digital Circuits Laboratory *Active*		1
ELDT 124	Basic DC Electronics *Active*		4
ELDT 124L	Basic DC Laboratory *Active*		1
ELDT 125	AC Circuit Analysis *Active*		4
ELDT 125L	DC/AC Circuit Analysis Laboratory with Pspice *Active*		1
ENGE 101	Introduction to Engineering *Active*		1.5
ENGE 151	Computer-Aided Design *Active*		2
ENGE 152	Engineering Design *Active*		3
ENGE 200	Statics *Active*		3
ENGE 240	Digital Systems *Active*		3
ENGE 250	Dynamics *Active*		3
ENGE 260	Electric Circuits *Active*		3
MATH 104	Trigonometry *Active*		3
MATH 107	Introduction to Scientific Programming *Active*		3
MATH 107L	Introduction to Scientific Programming Lab *Active*		1
MATH 116	College and Matrix Algebra *Active*		3
MATH 118	Math for the Liberal Arts Student *Active*		3
MATH 121	Basic Techniques of Applied Calculus I *Active*		3
MATH 122	Basic Techniques of Calculus II *Active*		3
MATH 141	Precalculus *Active*		5
MATH 150	Calculus with Analytic Geometry I *Active*		5
MATH 151	Calculus with Analytic Geometry II *Active*		4
MATH 245	Discrete Mathematics *Active*		3
MATH 252	Calculus with Analytic Geometry III *Active*		4
MATH 254	Introduction to Linear Algebra *Active*		3
MATH 255	Differential Equations *Active*		3
MFET 101	Introduction to Manufacturing Engineering Technology *Active*		3
MFET 110	Industrial Safety *Active*		2
MFET 120	Manufacturing Processes *Active*		4
MFET 210	Statistical Process Control *Active*		3
PHYS 180A	General Physics I *Active*		4
PHYS 181A	General Physics Laboratory I *Active*		1
PHYS 195	Mechanics *Active*		5
PHYS 196	Electricity and Magnetism *Active*		5
PHYS 197	Waves, Optics and Modern Physics *Active*		5

Total Units

18

Mechanical Engineering, Network and Digital Technology, Nuclear Engineering, Software Engineering, and Structural Engineering.

**Award Notes:**

The Liberal Arts and Sciences Degree is designed to enable students to complete the requirements for an Associate in Arts Degree with a minimum of 18 units in an area of emphasis and transfer to a University of California, a California State University, or an independent/private college. Because admission and major preparation requirements vary at each transfer institution, courses used to complete this major should be selected with the assistance of a San Diego City College counselor.

**Program Description:**

N/A

**Program Goals:**

N/A

**Program Emphasis:****Career Options:**

Complete a minimum of 18 units from the courses listed below:

<b>COURSES REQUIRED FOR THE MAJOR:</b>			<b>UNITS</b>
MATH 119	Elementary Statistics *Active*		3
or PSYC 258	Behavioral Science Statistics *Active*		3
or MATH 115	Gateway to Experimental Statistics *Active*		4
CHEM 200	General Chemistry I - Lecture *Active*		3
CHEM 200L	General Chemistry I - Laboratory *Active*		2
CHEM 201	General Chemistry II - Lecture *Active*		3
CHEM 201L	General Chemistry II - Laboratory *Active*		2
CISC 179	Python Programming *Active*		4
CISC 181	Principles of Information Systems *Active*		4
CISC 186	Visual Basic Programming *Active*		4
CISC 187	Data Structures in C++ *Active*		4
CISC 190	Java Programming *Active*		4
CISC 192	C/C++ Programming *Active*		4
CISC 205	Object Oriented Programming using C++ *Active*		4
CISC 220	Fundamentals of Computer Game Programming *Active*		4
ELCT 111	Electrical Theory I *Active*		3
ELCT 111L	Electrical Laboratory I *Active*		2
ELCT 121	Electrical Theory II *Active*		3
ELCT 121L	Electrical Laboratory II *Active*		2
ELDT 123	Introduction to Digital Circuits *Active*		3
ELDT 123L	Digital Circuits Laboratory *Active*		1
ELDT 124	Basic DC Electronics *Active*		4
ELDT 124L	Basic DC Laboratory *Active*		1
ELDT 125	AC Circuit Analysis *Active*		4
ELDT 125L	DC/AC Circuit Analysis Laboratory with Pspice *Active*		1
ELDT 143	Semiconductor Devices *Active*		3
ELDT 143L	Semiconductor Devices Laboratory *Active*		1.5
ELDT 232	Advanced Computer Design and Interfacing *Active*		4
ELDT 232L	Advanced Computer Designs Laboratory *Active*		1.5
ENGE 101	Introduction to Engineering *Active*		1.5
ENGE 108	Dimensioning and Tolerancing *Active*		3
ENGE 111	Introduction to Computer-Aided Design *Active*		3
ENGE 116	Computational Methods in Engineering *Approved*		3
ENGE 151	Computer-Aided Design *Active*		2
ENGE 152	Engineering Design *Active*		3
ENGE 200	Statics *Active*		3
ENGE 210	Properties of Materials *Active*		3
ENGE 240	Digital Systems *Active*		3
ENGE 250	Dynamics *Active*		3
ENGE 260	Electric Circuits *Active*		3
MATH 107	Introduction to Scientific Programming *Active*		3
MATH 107L	Introduction to Scientific Programming Lab *Active*		1
MATH 121	Basic Techniques of Applied Calculus I *Active*		3

## **DATES & CODES**

**CIC Approval:** 12/13/2018

**Board Approval:** 01/31/2019

**State Approval:** 01/29/2020

**TOP Code:** 4902.00

**State Approval (Unique) Code:** 18102

Subject Area: Liberal Arts and Sciences

Program Area: Liberal Arts and Sciences

Report Run: 12/03/2022 11:34 AM

Program ID: 3428

MATH 122	Basic Techniques of Calculus II *Active*	3
MATH 141A	Precalculus I *Launched*	4
MATH 141B	Precalculus II *Launched*	4
MATH 150	Calculus with Analytic Geometry I *Active*	5
MATH 151	Calculus with Analytic Geometry II *Active*	4
MATH 245	Discrete Mathematics *Active*	3
MATH 252	Calculus with Analytic Geometry III *Active*	4
MATH 254	Introduction to Linear Algebra *Active*	3
MATH 255	Differential Equations *Active*	3
MFET 101	Introduction to Manufacturing Engineering Technology *Active*	3
MFET 110	Industrial Safety *Active*	2
MFET 120	Manufacturing Processes *Active*	4
MFET 210	Statistical Process Control *Active*	3
PHYS 180A	General Physics I *Active*	4
PHYS 180B	General Physics II *Active*	4
PHYS 181A	General Physics Laboratory I *Active*	1
PHYS 181B	General Physics Laboratory II *Active*	1
PHYS 195	Mechanics *Active*	5
PHYS 196	Electricity and Magnetism *Active*	5
PHYS 197	Waves, Optics and Modern Physics *Active*	5

Total Units	18
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## **DATES & CODES**

**CIC Approval:**

**Board Approval:**

**State Approval:**

**TOP Code:** 4902.00

**State Approval (Unique) Code:** 18102

Subject Area: Liberal Arts and Sciences

Program Area: Liberal Arts and Sciences

Report Run: 12/03/2022 11:34 AM

Program ID: 4380

## CITY - THEATRE - ASSOCIATE OF ARTS DEGREE

### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Katherine Rodda

**Origination**

**Date:**09/23/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Add DRAM 205 to required electives. Revise award description.

**Attached Documents:**

[Articulation - SDSU TAP Theatre Arts Spring 2022.](#)

[Narrative\\_FA2024\\_2022-11-17](#)

### PROGRAM & AWARD INFORMATION

**Award Description:**

The Associate of Arts in Theatre provides an opportunity for students to gain practical experience in professional and community theatre work and to prepare themselves for continued higher education. Theatre productions are offered each year, allowing students to develop practical skills while earning college credit for transfer to universities.

The Theatre Arts program offers transfer courses in preparation for university theatre majors as well as fundamental skills in acting and dramatic production useful for employment or for participation in theatre productions.

**Program Description:**

The Theatre program at San Diego City College provides a breadth of course work designed to meet the needs of the serious theatre student, as well as those who wish to include theatre as part of their liberal arts education. The Theatre program at San Diego City College is one of six programs in the Visual and Performing Arts Department. Students entering into the program have the ability to pursue Associate of Arts degrees offered in Theatre and Musical Theatre; a Certificate of Achievement in Technical Theatre and Special Effects (FX) Makeup; and Certificates of Performance offered in Special Effects (FX) Makeup and Theatrical Glamour for Media and Performance. Courses are offered in acting, voice, movement, stagecraft, scene painting, costuming, playwriting, and makeup. Also offered are classes that explore theatre in a traditional academic setting. Hands-on practical experience is stressed through a wide-ranging production program, and students have the opportunity to work in all phases of production and performance. Students enjoy a unique combination of state-of-the-art facilities including two fully-equipped theatres, professional faculty and staff, and an active, respected production program which serves the campus and the community.

**Program Goals:**

This section is no longer updated in CurricUNET.

**Program Emphasis:**

**Career Options:**

Some career options listed require a baccalaureate degree. A partial list of possible career options follows: actor, director, playwright, theatre manager, stage manager, assistant director, or assistant stage manager.

<b>COURSES REQUIRED FOR THE MAJOR:</b>		<b>UNITS</b>
DRAM 105	Introduction to Dramatic Arts *Active*	3
DRAM 107	Study of Filmed Plays *Active*	3
DRAM 123	Beginning Stagecraft *Active*	3
or DRAM 143	Beginning Costuming *Active*	3
DRAM 124	Makeup for the Stage *Active*	3
DRAM 132	Beginning Acting *Active*	3
DRAM 133	Intermediate Acting *Active*	3
DRAM 134	Beginning Voice for Actors *Active*	3
DRAM 165	Introduction to Stage Movement *Active*	3

<b>SELECT THREE UNITS FROM THE FOLLOWING:</b>		<b>UNITS</b>
DRAM 103	Acting for Non-majors *Active*	3
DRAM 108	Playwriting *Active*	3
DRAM 109	Theatre and Social Issues *Active*	3
DRAM 111	Chicana/o Theatre *Active*	3
DRAM 119	Acting for Film and Television *Active*	3
DRAM 205	The American Musical on Stage and Screen *Approved*	3

Total Units	27
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## **DATES & CODES**

**CIC Approval:**

**Board Approval:**

**State Approval:**

**TOP Code:** 1007.00

**State Approval (Unique) Code:** 05257

Subject Area: Dramatic Arts

Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM

Program ID: 4457



## Previous Report

### CITY - THEATRE - ASSOCIATE OF ARTS DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Katherine Rodda

**Origination**

**Date:**06/30/2017

**Proposed Start:**Fall 2019

**Need for Proposal:**

Add DRAM 111 and DRAM 119 to required electives; remove DRAM 107 from required electives; add DRAM 107 to courses required for the major.

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Theatre Arts program offers transfer courses in preparation for university theatre majors as well as fundamental skills in acting and play production useful for employment or for participation in theatre productions.

The Theatre Arts program provides an opportunity for students to gain practical experience in professional and community theatre work and to prepare themselves for continued higher education. Theatre productions are offered each year, allowing students to develop practical skills while earning college credit for transfer to universities.

**Award Notes:**

Students who successfully complete the Associate Degree in Theatre will be able to:

- Effectively practice the theatre arts through involvement in the creation and presentation of public performances in theatre.
- Develop a structural approach to interpretation of language in dramatic text.
- Explain and practice basic production processes such as acting, scenic, costume, and make-up design, and technical operation related to production.
- Identify the historical and cultural dimension of theatre, including the works of leading playwrights, actors, directors, and designers.
- Acquire inter-cultural and multi-cultural understanding, as well as perception of the universal and timeless human conflicts presented in dramatic works.
- Augment the discipline, cooperation, accountability, and perseverance necessary for positive self-identification and success in life.

**Program Description:**

N/A

**Program Goals:**

N/A

**Program Emphasis:**

**Career Options:**

Some career options listed require a baccalaureate degree. A partial list of possible career options follows: actor, director, playwright, theatre manager, stage manager, assistant director, or assistant stage manager.

#### COURSES REQUIRED FOR THE MAJOR:

#### UNITS

DRAM 105	Introduction to Dramatic Arts *Active*	3
DRAM 107	Study of Filmed Plays *Active*	3
DRAM 123	Beginning Stagecraft *Active*	3

## Current Report

### CITY - THEATRE - ASSOCIATE OF ARTS DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Katherine Rodda

**Origination**

**Date:**09/23/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Add DRAM 205 to required electives. Revise award description.

**Attached Documents:**

[Articulation - SDSU TAP Theatre Arts Spring 2022.](#)

[Narrative\\_FA2024\\_2022-11-17](#)

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Associate of Arts in Theatre provides an opportunity for students to gain practical experience in professional and community theatre work and to prepare themselves for continued higher education. Theatre productions are offered each year, allowing students to develop practical skills while earning college credit for transfer to universities.

The Theatre Arts program offers transfer courses in preparation for university theatre majors as well as fundamental skills in acting and dramatic production useful for employment or for participation in theatre productions.

**Award Notes:**

**Program Description:**

The Theatre program at San Diego City College provides a breadth of course work designed to meet the needs of the serious theatre student, as well as those who wish to include theatre as part of their liberal arts education. The Theatre program at San Diego City College is one of six programs in the Visual and Performing Arts Department. Students entering into the program have the ability to pursue Associate of Arts degrees offered in Theatre and Musical Theatre; a Certificate of Achievement in Technical Theatre and Special Effects (FX) Makeup; and Certificates of Performance offered in Special Effects (FX) Makeup and Theatrical Glamour for Media and Performance. Courses are offered in acting, voice, movement, stagecraft, scene painting, costuming, playwriting, and makeup. Also offered are classes that explore theatre in a traditional academic setting. Hands-on practical experience is stressed through a wide-ranging production program, and students have the opportunity to work in all phases of production and performance. Students enjoy a unique combination of state-of-the-art facilities including two fully-equipped theatres, professional faculty and staff, and an active, respected production program which serves the campus and the community.

**Program Goals:**

This section is no longer updated in CurricUNET.

**Program Emphasis:**

**Career Options:**

Some career options listed require a baccalaureate degree. A partial list of possible career options follows: actor, director, playwright, theatre manager, stage manager, assistant director, or assistant stage manager.



or	DRAM 143	Beginning Costuming *Active*	3
	DRAM 124	Makeup for the Stage *Active*	3
	DRAM 132	Beginning Acting *Active*	3
	DRAM 133	Intermediate Acting *Active*	3
	DRAM 134	Beginning Voice for Actors *Active*	3
	DRAM 165	Introduction to Stage Movement *Active*	3

SELECT THREE UNITS FROM THE FOLLOWING:			UNITS
	DRAM 103	Acting for Non-majors *Active*	3
	DRAM 108	Playwriting *Active*	3
	DRAM 109	Theatre and Social Issues *Active*	3
	DRAM 111	Chicana/o Theatre *Active*	3
	DRAM 119	Acting for Film and Television *Active*	3

Total Units	27
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## DATES & CODES

**CIC Approval:** 12/14/2017

**Board Approval:** 02/08/2018

**State Approval:** 05/27/2018

**TOP Code:** 1007.00

**State Approval (Unique) Code:** 05257

Subject Area: Dramatic Arts

Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM

Program ID: 3448

COURSES REQUIRED FOR THE MAJOR:			UNITS
	DRAM 105	Introduction to Dramatic Arts *Active*	3
	DRAM 107	Study of Filmed Plays *Active*	3
	DRAM 123	Beginning Stagecraft *Active*	3
or	DRAM 143	Beginning Costuming *Active*	3
	DRAM 124	Makeup for the Stage *Active*	3
	DRAM 132	Beginning Acting *Active*	3
	DRAM 133	Intermediate Acting *Active*	3
	DRAM 134	Beginning Voice for Actors *Active*	3
	DRAM 165	Introduction to Stage Movement *Active*	3

SELECT THREE UNITS FROM THE FOLLOWING:			UNITS
	DRAM 103	Acting for Non-majors *Active*	3
	DRAM 108	Playwriting *Active*	3
	DRAM 109	Theatre and Social Issues *Active*	3
	DRAM 111	Chicana/o Theatre *Active*	3
	DRAM 119	Acting for Film and Television *Active*	3
	DRAM 205	The American Musical on Stage and Screen *Approved*	3

Total Units	27
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## DATES & CODES

**CIC Approval:**

**Board Approval:**

**State Approval:**

**TOP Code:** 1007.00

**State Approval (Unique) Code:** 05257

Subject Area: Dramatic Arts

Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM

Program ID: 4457

## Previous Report

### CITY - THEATRE - ASSOCIATE OF ARTS DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Katherine Rodda

**Origination**

**Date:**06/30/2017

**Proposed Start:**Fall 2019

**Need for Proposal:**

Add DRAM 111 and DRAM 119 to required electives; remove DRAM 107 from required electives; add DRAM 107 to courses required for the major.

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Theatre Arts program offers transfer courses in preparation for university theatre majors as well as fundamental skills in acting and play production useful for employment or for participation in theatre productions.

The Theatre Arts program provides an opportunity for students to gain practical experience in professional and community theatre work and to prepare themselves for continued higher education. Theatre productions are offered each year, allowing students to develop practical skills while earning college credit for transfer to universities.

**Award Notes:**

Students who successfully complete the Associate Degree in Theatre will be able to:

- Effectively practice the theatre arts through involvement in the creation and presentation of public performances in theatre.
- Develop a structural approach to interpretation of language in dramatic text.
- Explain and practice basic production processes such as acting, scenic, costume, and make-up design, and technical operation related to production.
- Identify the historical and cultural dimension of theatre, including the works of leading playwrights, actors, directors, and designers.
- Acquire inter-cultural and multi-cultural understanding, as well as perception of the universal and timeless human conflicts presented in dramatic works.
- Augment the discipline, cooperation, accountability, and perseverance necessary for positive self-identification and success in life.

**Program Description:**

N/A

**Program Goals:**

N/A

**Program Emphasis:**

**Career Options:**

Some career options listed require a baccalaureate degree. A partial list of possible career options follows: actor, director, playwright, theatre manager, stage manager, assistant director, or assistant stage manager.

#### COURSES REQUIRED FOR THE MAJOR:

#### UNITS

DRAM 105	Introduction to Dramatic Arts *Active*	3
DRAM 107	Study of Filmed Plays *Active*	3
DRAM 123	Beginning Stagecraft *Active*	3

## Current Report

### CITY - THEATRE - ASSOCIATE OF ARTS DEGREE

#### PROPOSAL INFORMATION

**Action Proposed:**Program Revision

**Proposal Originator:**Katherine Rodda

**Origination**

**Date:**09/23/2022

**Proposed Start:**Fall 2024

**Need for Proposal:**

Add DRAM 205 to required electives. Revise award description.

**Attached Documents:**

[Articulation - SDSU TAP Theatre Arts Spring 2022.](#)

[Narrative\\_FA2024\\_2022-11-17](#)

#### PROGRAM & AWARD INFORMATION

**Award Description:**

The Associate of Arts in Theatre provides an opportunity for students to gain practical experience in professional and community theatre work and to prepare themselves for continued higher education. Theatre productions are offered each year, allowing students to develop practical skills while earning college credit for transfer to universities.

The Theatre Arts program offers transfer courses in preparation for university theatre majors as well as fundamental skills in acting and dramatic production useful for employment or for participation in theatre productions.

**Award Notes:**

**Program Description:**

The Theatre program at San Diego City College provides a breadth of course work designed to meet the needs of the serious theatre student, as well as those who wish to include theatre as part of their liberal arts education. The Theatre program at San Diego City College is one of six programs in the Visual and Performing Arts Department. Students entering into the program have the ability to pursue Associate of Arts degrees offered in Theatre and Musical Theatre; a Certificate of Achievement in Technical Theatre and Special Effects (FX) Makeup; and Certificates of Performance offered in Special Effects (FX) Makeup and Theatrical Glamour for Media and Performance. Courses are offered in acting, voice, movement, stagecraft, scene painting, costuming, playwriting, and makeup. Also offered are classes that explore theatre in a traditional academic setting. Hands-on practical experience is stressed through a wide-ranging production program, and students have the opportunity to work in all phases of production and performance. Students enjoy a unique combination of state-of-the-art facilities including two fully-equipped theatres, professional faculty and staff, and an active, respected production program which serves the campus and the community.

**Program Goals:**

This section is no longer updated in CurricUNET.

**Program Emphasis:**

**Career Options:**

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or	DRAM 143	Beginning Costuming *Active*	3
	DRAM 124	Makeup for the Stage *Active*	3
	DRAM 132	Beginning Acting *Active*	3
	DRAM 133	Intermediate Acting *Active*	3
	DRAM 134	Beginning Voice for Actors *Active*	3
	DRAM 165	Introduction to Stage Movement *Active*	3

SELECT THREE UNITS FROM THE FOLLOWING:			UNITS
	DRAM 103	Acting for Non-majors *Active*	3
	DRAM 108	Playwriting *Active*	3
	DRAM 109	Theatre and Social Issues *Active*	3
	DRAM 111	Chicana/o Theatre *Active*	3
	DRAM 119	Acting for Film and Television *Active*	3

Total Units	27
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## DATES & CODES

**CIC Approval:** 12/14/2017

**Board Approval:** 02/08/2018

**State Approval:** 05/27/2018

**TOP Code:** 1007.00

**State Approval (Unique) Code:** 05257

Subject Area: Dramatic Arts

Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM

Program ID: 3448

COURSES REQUIRED FOR THE MAJOR:			UNITS
	DRAM 105	Introduction to Dramatic Arts *Active*	3
	DRAM 107	Study of Filmed Plays *Active*	3
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	DRAM 103	Acting for Non-majors *Active*	3
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	DRAM 205	The American Musical on Stage and Screen *Approved*	3

Total Units	27
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## DATES & CODES

**CIC Approval:**

**Board Approval:**

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**TOP Code:** 1007.00

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Subject Area: Dramatic Arts

Program Area: Visual and Performing Arts

Report Run: 12/03/2022 11:34 AM

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