Cerro Coso College

Course Outline of Record Report

10/18/2021

MATHC152 : Analytic Geometry and Calculus II

General Information

Author:	• Steven Rogers • Bernsten, Dean • Bonner, Michael • Kessler, Jaclyn • Slovacek, Joseph
Course Code (CB01) :	MATHC152
Course Title (CB02) :	Analytic Geometry and Calculus II
Department:	Mathematics
Proposal Start:	Fall 2019
TOP Code (CB03) :	(1701.00) Mathematics, General
SAM Code (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000336483
Curriculum Committee Approval Date:	10/20/2017
Board of Trustees Approval Date:	12/14/2017
External Review Approval Date:	Pending
Course Description:	This course is a continuation of Analytic Geometry and Calculus I, extending the skills of differentiation and integration through the teaching of new techniques and working with the transcendental functions. Other major topics include sequences, series, polar coordinates, and parameterization of plane curves.
Submission Type:	Change to Content Additions to the topic course outline to align with c-id descriptor
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Mathematics
Alternate Master Discipline Preferred:	• Engineering • Physics/Astronomy
Bachelors or Associates Discipline Preferred:	No value
Additional Bachelors or Associates Discipline Preferred:	No value

Course Development Options

Basic Skills Status (CB08)	**Course Special Class Status (CB13)**	**Grade Options**

Course is not a basic skills course.

Course is not a special class.

- Pass/No Pass
- Letter Grade Methods

☐ Allow Students to Gain Credit by Exam/Challenge

Allowed Number of Retakes

0

Course Prior To College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

No value

Retake Policy Description

Type:|Non-Repeatable Credit

☑ Allow Students To Audit Course

Course Support Course Status (CB26)

No value

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type	Active
CC General Sciences	A.A. Degree Major	Spring 2018
CC Liberal Arts: Mathematics & Science	A.A. Degree Major	Summer 2018 to Fall 2020
Associate in Science Degree In Mathematics for Transfer	A.A. Degree for Transfer	Summer 2018
CSU General Education (CSU GE Breadth) (In Development)	Certificate of Achievement	Fall 2021
Intersegmental General Education Transfer Curriculum Certificate of Achievement (In Development)	Certificate of Achievement	Fall 2021
Economics Associate in Arts Degree for Transfer (AA-T)	A.A. Degree for Transfer	Spring 2020 to Spring 2020
CSU General Education (CSU GE Breadth)	Certificate of Achievement	Fall 2020
Intersegmental General Education Transfer Curriculum Certificate of Achievement	Certificate of Achievement	Fall 2020

Economics Associate in Arts Degree for Transfer	A.A. Degree for Transfer	Spring 2020
Liberal Arts: Mathematics & Science Associate in Arts Degree	A.A. Degree Major	Fall 2020

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

No value

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Cerro Coso General Education Requirements	Categories	Status	Approval Date	Comparable Course
Area 4.2	Language & Rationality Analytical Thinking	Approved	No value	No Comparable Course defined.

CSU General Education Certification	Categories	Status	Approval Date	Comparable Course
Area B.4	Scientific Inquiry & Quantitative Reasoning Mathematics / Quantitative Reasoning	Approved	No value	No Comparable Course defined.

Intersegmental General Education Transfer Curriculum	Categories	Status	Approval Date	Comparable Course
Area 2	Mathematical Concepts & Quantitative Reasoning	Approved	No value	No Comparable Course defined.

C-ID	Categories	Status	Approval Date	Comparable Course
Mathematics	C-ID discipline	Approved	No value	MATH 220

Units and Hours

Summary

Minimum Credit Units (CB07) 4

Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	72
Total Course Out-of-Class Hours	144
Total Student Learning Hours	216
Faculty Load	0

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Status (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Classs
Lecture Hours	4	8
Laboratory Hours	0	0
Activity Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	72
Laboratory	0
Activity	0
Total	72
Course Out-of-Class Hours	
Lecture	144
Laboratory	0
Activity	0
Total	144

Time Commitment Notes for Students

No value

Faculty Load

Extra Duties: 0

Faculty Load: 0

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

MATHC151 - Analytic Geometry and Calculus I

In Math C152 students are expected to consistently differentiate and integrate rational functions and trigonometric functions; apply the derivative in solving related rates problems; apply the derivative in solving maximum/minimum problems; apply the integral in solving area under the curve problems; apply the integral in solving for the volume of a body of revolution; apply the integral in finding the center of mass in one and two dimensions; apply the derivative or integral in solving distance, velocity, and acceleration problems; and solve first order differential equations with initial conditions. Students successfully demonstrating these Math C151 skills will be prepared for Math C152.

Entrance Skills

Entrance Skills	Description
No value	No value

Limitations on Enrollment

Limitations on Enrollment	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Other
Rationale	Other Methods: A. Textbook readings B. Lectures C. Online course management system D. Discussions

Methods of Instruction	Lecture
Rationale	Students are taught various methods of integration and applications of the definite integral. As an example, in order to fully understand the method for calculating the volume of a solid of revolution, students need to understand how to do the following: 1. Sketch a typical cross-section 2. Find a formula for the area 3. Determine the limits of integration, and 4. Integrate. All of these procedures are best presented through a lecture format.

Methods of Instruction	Discussion
Rationale	Students deepen their understanding of the methods for determining the volumes of solids of revolution through in-class discussions addressing the following: 1. Should the disk or the shell method of integration be used? 2. Which axis is the axis of rotation? 3. What is a formula for the cross-sectional area?

Assignments

A. Daily homework assignments Example: Students work mathematics problems assigned from the text and from hand-outs to reinforce concepts and skills discussed in lecture. Sample homework problem: A right-circular cylindrical tank of height 10 ft and radius 5 ft is lying horizontally and is full of diesel fuel weighing 53 lbs per cubic ft. How much work is required to pump all of the fuel to a point 15 ft above the top of the tank? B. Online Course Management System Example: Assignments on MyMathLab.

Methods of Evaluation	**Rationale**
Participation	A. Daily in-class assignments Example: Students work mathematics problems assigned from the text and from hand-outs to reinforce concepts and skills discussed in lecture.
Tests	B. Weekly Quizzes Weekly quizzes over the previous week's lecture material, homework, and in-class assignments assess the student's understanding.As an example, students are asked to find the centroid of a thin, flat plate covering the region enclosed by two different parabolas. C. Chapter Exams Chapter exams over the previous chapter's lecture material, homework, and in-class assignments assess the student's understanding. As an example, students take a chapter exam involving the techniques of integration.
Distance Education Description: how outcomes are evaluated	A. Proctored Online Exams: As an example, students take a chapter exam involving the techniques of integration. B. Online Homework Assignments: As an example, students complete an online homework assignment where they do the following: 1. Determine if functions are one-to-one 2. Find the formula for the inverse of a function 3. Find derivatives of inverses of differentiable functions

Equipment

No Value

Textbooks

Author	**Title**	**Publisher**	**Date**	**ISBN**
Hass, Heil, Weir	Thomas' Calculus 14th ed.	Addison-Wesley Publishing Company	2017	

Other Instructional Materials

No Value

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

Evaluate definite and indefinite integrals using a variety of integration formulas and techniques.

Apply integration to areas and volumes, and other applications such as work or length of a curve.

Evaluate improper integrals.

Apply convergence tests to sequences and series.

Represent functions as power series.

Graph, differentiate and integrate functions in polar and parametric form.

CSLOs

Determine various geometric measurements including area of a region between curves, volume of a solid, arc length of a curve, and area of a surface of revolution by constructing and calculating a definite integral.
Expected SLO Performance: 70.0

Social Science IGETC PLOs	Use a complex symbol system to solve problems.
ISLOs Core ISLOs	Students who are completing a program will be able to communicate ideas, perspectives, and values clearly and persuasively while listening to others openly
Social Science PLOs for CSU GE COA	Use a complex symbol system to solve problems.

Analyze an integral to determine an appropriate method of integration and apply that method to determine the antiderivative.
Expected SLO Performance: 70.0

ISLOs Core ISLOs	Students who are completing a program will be able to think critically and creatively and apply reasoning.

Analyze an infinite series to determine an appropriate test for convergence, and apply that test to determine whether the series converges or diverges.
Expected SLO Performance: 70.0

Science Liberal Arts: Mathematics & Science AA Degree	Apply algebraic, graphical, numerical, and other methods to solve applied problems in the areas of mathematics, natural sciences, computer graphics, and computer animation.

Outline

Course Outline

The Mathematics Department has adopted the following best practices for teaching this course: offering or awarding extra-credit is forbidden, the allowance of multiple attempts at exams is forbidden, and an approved on-site proctor for online course exams is required.

A. Applications of the Definite Integral
1. Area Under a Curve
2. Area Between two Curves
3. Volume of a Body of Revolution
   a. Cylindrical Shell Method
   b. Disk Method
   c. Washer Method
4. Length of a Plane Curve
5. Moments and Center of Mass

B. Transcendental Functions
1. Trigonometric Functions and their Inverses
   a. Domain, range, graphs.
   b. Derivatives and integrals.
2. Natural Logarithm
   a. Definition and properties
   b. Domain, range, and graphs.
   c. Derivatives and integrals.
3. Exponential Function, base “e”
   a. Definition and properties
   b. Domain, range, and graphs.
   c. Derivatives and integrals.
4. Exponential and logarithmic functions of base “a”
   a. Definitions
   b. Derivatives
   c. Logarithmic differentiation
5. Hyperbolic and Inverse Hyperbolic Functions
   a. Definitions and Identities
   b. Domain, range, and graphs.
   c. Derivatives and Integrals.
6. Applications
   a. Rate of growth or decay (differential equations)
   b. Area, volume, and arc length
   c. The Hanging Cable

C. Methods of Integration
1. Fundamental Formulas and Substitutions
2. Powers of Trigonometric Functions
3. Trigonometric Substitution
4. Integrals involving Quadratic Polynomials
5. Partial Fractions
6. Integration by Parts
7. Improper Integrals
   a. Two types
   b. Convergent, divergent
8. Using Integral Tables
9. Applications of Integration
   a. Work applications
   b. Hydrostatic pressure and forces
10. Numerical Integration
    a. Trapezoidal and Simpson's Rule

D. Plane Analytic Geometry
1. Curves and Equations
   a. Symmetry
   b. Extent
   c. Intercepts
2. Equations of Loci; Distance
3. The Circle
4. The Parabola
5. The Ellipse
6. The Hyperbola
7. Second Degree Curves
   a. Rotation and Translation
   b. Invariants and the disciminant
8. Parameterizations of Curves and Applications

E. Polar Coordinates
1. Relations between Polar and Rectangular Coordinates
2. Graphs in Polar Coordinates
3. Conic Sections
4. Length of a curve in polar coordinates
5. Plane Area

F. Infinite Series
1. Sequences and Series
   a. Geometric series
   b. Taylor series
   c. Power series
2. Convergence and Divergence
   a. Integral test
   b. Ratio test
   c. Comparison test
   d. nth root test
   e. Limit Comparison test

3. Limits using infinite series
4. Absolute and Conditional convergence
5. Power Series
   a. Radius of convergence
   b. Interval of convergence
   c. Differentiation and integration of power series
6. Taylor and Maclaurin, with applications

Delivery Methods and Distance Education

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings ("Hybrid") -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

Online with some required face-to-face meetings
Interactive video = Face to face course with significant required activities in a distance modality
Online course with on ground testing
Face to face

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section?

The assignments and evaluations will be the same no matter what delivery method is used. The outcomes for this course, both for on-ground and online classes, will be evaluated and assessed using multi-part exam questions allowing for partial credit. The artifacts used to assess the outcomes may be put on chapter exams throughout the semester or on a comprehensive final exam at the end of the semester.

Effective Student-Instructor Contact: Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Moodle Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV -Interactive Video -Other (specify)

Student-Instructor contact will include the following: discussion forums, learning management system messages, announcements, and feedback for each student's work. Student-Instructor contact MAY include the following: chat/Zoom, newsgroup/discussion board, phone, and iTV.
Student-Student contact will include the following: discussion forums. Student-Student contact MAY include the following: chat/Zoom, learning management system messages, group work, and peer reviewed assignments.

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

For sections using Pearson MyMathLab, certain web browsers may perform better than others with the course online management system. Current versions of Adobe and Java may also need to be installed to gain full access to all of the Pearson help aids. Technical support is provided by Pearson via a toll free student technical assistance phone number.

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology.

Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

The Pearson learning management system is accessible and compatible with the Canvas site. Faculty will use the Canvas accessibility checker, along with other resources provided by our Distance Education Director, to ensure all learning materials are accessible, including but not limited to documents, pdfs, OERs, external websites, and videos.

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

class_size Hybrid 45