

Lassen Community College Course Outline

MATH-1A Analytic Geometry and Calculus I

5.0 Units

I. Catalog Description

A first course in differential and integral calculus of a single variable: functions; limits and continuity; techniques and applications of differentiation and integration; Fundamental Theorem of Calculus. Primarily for science, technology, engineering & math majors. This course has been approved for online and hybrid delivery. This course has been approved to be web-enhanced. Access to a computer with internet access is required.

Prerequisite(s): Completion of Pre-calculus: or Math 8 College Algebra and Math 7 Trigonometry with a grade of 'C' or better or the equivalent multiple measures placement.

Math 7 Prerequisite Skills:

1. Calculate the six trigonometric functions corresponding to any given angle.
2. Graph the six basic functions, their variations, and inverses.
3. Solve trigonometric equations and use trigonometric identities in a variety of contexts and applications.
4. Use various methods to solve triangles.

Math 8 Prerequisite Skills:

1. Calculate the domain, range, and inverse of a function.
2. Find the composition of two functions.
3. Use the concepts of transformation to graph functions.
4. Find the equations of linear and quadratic functions.
5. Apply the Remainder Theorem, Factor Theorem, and the Fundamental Theorem of Algebra to solve higher-degree equations.
6. Locate all asymptotes of a function; including vertical, horizontal, and oblique asymptotes.
7. Graph polynomial, rational, exponential, and logarithmic functions.
8. Use exponential and logarithmic properties to solve equations and application problems.
9. Categorize and graph conic sections from their equations.
10. Derive the equations of conic sections.
11. Calculate terms of arithmetic and geometric sequences.
12. Calculate the sums of arithmetic and geometric series.

Transfers to both UC/CSU

General Education Area: D2

CSU GE Area: B4

IGETC GE Area: 2A

C-ID MATH 211

85 Hours Lecture, 170 Hours Expected Outside Class Work, 255 Total Student Learning Hours

Scheduled: Fall

II. Coding Information

Repeatability: Not Repeatable, Take 1 Time

Grading Option: Graded or Pass/No Pass

Credit Type: Credit - Degree Applicable

TOP Code: 170100

III. Course Objectives

A. Course Student Learning Outcomes

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

1. Analyze and solve calculus problems by the appropriate application of the principles of: limits, continuity, differentiation and integration.
2. Solve problems using numeric, graphic, and symbolic techniques.

B. Course Objectives

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

1. Compute the limit of a function at a real number.
2. Determine if a function is continuous at a real number.
3. Find the derivative of a function as a limit.
4. Find the equation of a tangent line to a function.
5. Compute derivatives using differentiation formulas.
6. Use differentiation to solve applications such as related rate problems and optimization problems.
7. Use implicit differentiation.
8. Graph functions using methods of calculus.
9. Evaluate a definite integral as a limit.
10. Evaluate integrals using the Fundamental Theorem of Calculus.
11. Use the definite integral to find areas and volumes

IV. Course Content

- A. Definition and computation of limits using numerical, graphical, and algebraic approaches.
- B. Continuity and differentiability of functions.
- C. Derivative as a limit.
- D. Interpretation of the derivative as: slope of tangent line, a rate of change.
- E. Differentiation formulas: constants, power rule, product rule, quotient rule and chain rule.
- F. Derivatives of trigonometric functions.
- G. Implicit differentiation with applications, and differentiation of inverse functions.
- H. Higher order derivatives.
- I. Graphing functions using first and second derivatives, concavity and asymptotes.
- J. Maximum and minimum values, and optimization.
- K. Mean Value Theorem.
- L. Antiderivatives and indefinite integrals.
- M. Applications of integration to areas and volumes.
- N. Definite integral; Riemann sum.
- O. Properties of the integral.
- P. Fundamental Theorem of Calculus.
- Q. Integration by substitution.

V. Assignments

A. Appropriate Readings

Students will be required to read and study the assigned chapters in the textbook. Supplemental readings are generally not assigned, but may be assigned.

B. Appropriate Writings

1. Prepare for class and review material and concepts presented in class.
2. Complete homework assignments, including applications of representative symbol systems and/or word problems.
3. Understand and apply the theories and techniques taught in the class.

C. Expected Outside Assignments

Students are expected to spend a minimum of 2 hours outside of class in practice and preparation for each hour of class. Assignments may include: reading the text, application of formulas and theorems, practice problems from the text.

D. Specific Assignments that Demonstrate Critical Thinking

Students will be required to interpret mathematical principles and techniques to solve broader and more difficult problems than those presented in class. Students will solve a variety of problems, including those that demand the application of principles in a number of different contexts. Multiple measures of student performance including in-class, out-of-class work, multiple exams, and final exam.

VI. Methods of Evaluation

Traditional Classroom Delivery

Tests, examinations, homework or projects where students demonstrate their mastery of the learning objectives and their ability to devise, organize and present complete solutions to problems and a comprehensive final.

Web-enhanced course

Additional information and resources may be made available to students online, and students may be required to do research and complete and/or submit assignments online. Quizzes may be administered online, but exams and summative assessments must be administered face-to-face.

Online Evaluation

A variety of methods will be used, such as: research papers, asynchronous and synchronous discussions (chat/forum), online quizzes and exams, postings to online website, email communications, and digital homework completions.

Hybrid Evaluation

All quizzes and exams will be administered during the in person class time. Students will be expected to complete online assignments and activities equivalent to in class assignments and activities for the online portion of the course. Electronic communication, both synchronous and asynchronous (chat/forum) will be evaluated for participation and to maintain effective communication between instructor and students.

VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

Traditional Classroom Delivery

Web-enhance course

Hybrid Delivery Online Delivery Correspondence Delivery

Traditional Classroom Delivery

Traditional Classroom Instruction consisting of (but not limited to) lecture, questions and answers, demonstrations, and discussion.

Web-enhanced course

Same as face to face with additional information and resources made available to students online, and students may be required to do research and complete and/or submit assignments online. Quizzes may be administered online, but exams and summative assessments must be administered face-to-face.

Online Delivery

Online instruction will be utilized. 85 hours will be instructed online through the technology platform adopted by the District. Online delivery will consist of participation in forum-based discussions and posts, web links, email communications, lecture posts, exams and online lectures. Adding extra resources and other media sources as appropriate.

Hybrid Delivery

A combination of traditional classroom and online instruction will be utilized. Each semester a minimum of 17 hours, or 1/3 of the lecture hours, will be taught face-to face by the instructor and the remaining hours will be instructed online through the technology platform adopted by the District. Traditional class instruction will consist of exercises/assignments, lectures, visual aids, and practice exercises. Online delivery will consist of exercises/assignments, lecture posts, discussions, adding extra resources and other media sources as appropriate.

VIII. Representative Texts and Supplies

Traditional Classroom Course

WebAssign Instant Access for Larson/Edwards' Calculus, Single-Term, current edition, ISBN: 9781337879644 WebAssign access code provides the student with access to the latest edition e-book for the class: Larson/Edwards, Calculus, current edition, Brooks/Cole.

Web-enhanced Course

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Online Course

WebAssign Instant Access for Larson/Edwards' Calculus, Single-Term, current edition, ISBN: 9781337879644. WebAssign access code provides the student with access to the latest edition e-book for the class: Larson/Edwards, Calculus, current edition, Brooks/Cole.

Hybrid Course

WebAssign Instant Access for Larson/Edwards' Calculus, Single-Term, current edition, ISBN: 9781337879644. WebAssign access code provides the student with access to the latest edition e-book for the class: Larson/Edwards, Calculus, current edition, Brooks/Cole.

IX. Discipline/s Assignment

Mathematics

X. Course Status

Current Status: Active

Original Approval Date: 5/8/1990

Revised By: Natalia McClellan

Curriculum/Academic Standards Committee Revision Date: 02/15/2022