MATH 120 - Calculus I Course Outline

Approval Date: 03/10/2022
Effective Date: 08/12/2022

SECTION A

Unique ID Number	CCC000561098
Discipline(s)	Mathematics
Division	Mathematics
Subject Area	Mathematics
Subject Code	MATH
Course Number	120
Course Title	Calculus I
TOP Code/SAM Code	1701.00 - Mathematics, General / E - Non-Occupational
Rationale for adding this course to the curriculum	COR update.
Units	5
Cross List	*N/A*
Typical Course Weeks	18

Total Instructional Hours

	Contact Hours
Lecture	90.00
Lab	0.00
Activity	0.00
Work Experience	0.00
Outside of Class Hours	180.00

Total Contact Hours	90
Total Student Hours	270
Open Entry/Open Exit	No
Maximum Enrollment	35
Grading Option	Letter Grade Only
Distance Education Mode of Instruction	On-Campus Hybrid

Entirely Online
Online with Proctored Exams

SECTION B

General Education Information:

SECTION C

Course Description

Repeatability May be repeated 0 times

Catalog Description Math 120 is the first semester of a three course sequence in differential and integral calculus. Topics include functions, limits and continuity, techniques and applications of differentiation and integration, and the Fundamental Theorem of Calculus. Primarily for students majoring in mathematics, engineering or sciences. Transfers to both UC/CSU

Schedule Description Math 120 is the first semester of a three course sequence in differential and integral calculus. Topics include functions, limits and continuity, techniques and applications of differentiation and integration, and the Fundamental Theorem of Calculus. Primarily for students majoring in mathematics, engineering or sciences.

SECTION D

Condition on Enrollment

1a. Prerequisite(s)

- MATH 108 with a minimum grade of C or better and
- MATH 106 with a minimum grade of C or better or
- appropriate placement

1b. Corequisite(s): *None*

1c. Recommended: *None*

1d. Limitation on Enrollment: *None*

SECTION E

Course Outline Information

1. Student Learning Outcomes:

A. Compute derivatives of elementary functions and their algebraic combinations.
B. Solve applications involving derivatives.
C. Evaluate definite and indefinite integrals using the Fundamental Theorem of Calculus.
D. Write mathematical proofs.

2. Course Objectives: Upon completion of this course, the student will be able to:

A. Compute the limit of a function at a real number;
B. Determine if a function is continuous at a real number;
C. Find the derivative of a function as a limit;
D. Find the equation of a tangent line to a function;
E. Compute derivatives using differentiation formulas;
F. Use differentiation to solve applications such as related rate problems and optimization problems;
G. Use implicit differentiation;
H. Graph functions using methods of calculus;
I. Evaluate a definite integral as a limit;
J. Evaluate integrals using the Fundamental Theorem of Calculus;
K. Apply integration to find area.

L.

3. Course Content

1) Definition and computation of limits using numerical, graphical, and algebraic approaches;
2) Continuity and differentiability of functions;
3) Derivative as a limit;
4) Interpretation of the derivative as: slope of tangent line, a rate of change;
5) Differentiation formulas: constants, power rule, product rule, quotient rule and chain rule;
6) Derivatives of transcendental functions such as trigonometric, exponential or logarithmic;
7) Implicit differentiation with applications, and differentiation of inverse functions;
8) Higher-order derivatives;
9) Graphing functions using first and second derivatives, concavity and asymptotes;
10) Maximum and minimum values, and optimization;
11) Mean Value Theorem;
12) Antiderivatives and indefinite integrals;
13) Area under a curve;
14) Definite integral; Riemann sum;
15) Properties of the integral;
16) Fundamental Theorem of Calculus;
17) Integration by substitution;
18) Indeterminate forms and L'Hopital's Rule;

4. Methods of Instruction:

Discussion:
Lecture:
Other: Practice problems

5. Methods of Evaluation: Describe the general types of evaluations for this course and provide at least two, specific examples.

Typical classroom assessment techniques

Exams/Tests --
Quizzes --
Projects --
Home Work --
Final Exam --

Additional assessment information:

The Mathematics Department maintains a commitment to diverse teaching methods in courses emphasizing vital quantitative skills and qualitative reasoning ability (PEP Program Mission Statement, 2011). To that end, it is expected that sufficient formative assessments will be given to students that in frequency, length and rigor adequately assess both quantitative skills and qualitative reasoning.

Examples:

1) An exam including differentiation where the student would be expected to calculate derivatives using a variety of techniques (power rule, product rule, quotient rule, and the chain rule).

2) An exam including integration where the student would be expected to find antiderivatives for a variety of functions using manipulation and u-substitutions and calculate definite integrals using area of rectangles and the Fundamental Theorem of Calculus.

Letter Grade Only

6. Assignments: State the general types of assignments for this course under the following categories and provide at least two specific examples for each section.

A. Reading Assignments
   Read sections from the text, for example:
   1. Read the section on the chain rule for derivatives
   2. Read the section on the Mean Value Theorem

B. Writing Assignments
   Daily homework will be completed from the text, for example:
   1. Find the largest open-top box that can be constructed with 200 square feet of cardboard.
   2. Find the area under f(x) = x between x = 0 and x = 1 as the limit of a sum.

C. Other Assignments
   Other assignments such as research into applications or group projects assigned at instructors' discretion.

7. Required Materials

A. EXAMPLES of typical college-level textbooks (for degree-applicable courses) or other print materials.

Book #1:

Author:	Stewart, James
Title:	Calculus, Early Transcendentals
Publisher:	Cengage
Date of Publication:	2020
Edition:	9th

B. Other required materials/supplies.

- This text may be accompanied by an online homework component in the platform of the publisher.