MATH 1A Course Outline as of Fall 2021

CATALOG INFORMATION

Dept and Nbr: MATH 1A Title: CALCULUS 1
Full Title: Calculus, First Course
Last Reviewed: 9/14/2020

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	5.00	17.5	Lecture Scheduled	87.50
Minimum	5.00	Lab Scheduled	0	8	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	5.00		Contact Total	87.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 175.00 Total Student Learning Hours: 262.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Limits and continuity, differentiation, applications of the derivative, integration, applications of the integral.

Prerequisites/Corequisites:
Completion of MATH 27 or higher (MATH); OR Course Completion of MATH 25 and MATH 58; OR AB705 placement into Math Tier 4

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Limits and continuity, differentiation, applications of the derivative, integration, applications of the integral. (Grade Only)
Prerequisites/Corequisites: Completion of MATH 27 or higher (MATH); OR Course Completion of MATH 25 and MATH 58; OR AB705 placement into <a href='https://assessment.santarosa.edu/understanding-your-math-placement'

class='NormalSiteLink' target='_New'>Math Tier 4
Recommended:
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
	B	Communication and Analytical Thinking	Fall 1981	
	MC	Math Competency		
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B4	Math/Quantitative Reasoning	Fall 1981	
IGETC:	**Transfer Area**		Effective:	Inactive:
	2A	Mathematical Concepts & Quantitative Reasoning	Fall 1981	

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1981	Inactive:

CID:
CID Descriptor: MATH 900S Single Variable Calculus Sequence
SRJC Equivalent Course(s): MATH1A AND MATH1B

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. State and apply basic definitions, properties, and theorems of first semester calculus.
2. Calculate limits, derivatives, definite integrals, and indefinite integrals of algebraic and transcendental functions.
3. Model and solve application problems using derivatives and integrals of algebraic and transcendental functions.

Objectives:
At the conclusion of this course, the student should be able to:
1. Calculate limits and use limit notation.
2. Determine continuity of a function at a real value.
3. Determine derivatives of polynomial, rational, algebraic, exponential, logarithmic, and trigonometric functions.
4. Use techniques of differentiation, including product, quotient, and chain rules; determine derivatives implicitly and determine derivatives of inverse functions.
5. Apply derivatives to graphing, optimization, and science problems.
6. Determine antiderivatives of polynomial, rational, algebraic, exponential, logarithmic, and trigonometric functions.
7. Use limits of Riemann sums to evaluate definite integrals to find areas.

8. Evaluate definite integrals using the fundamental theorem of calculus.
9. Use Trapezoidal and Simpson's Rules to approximate definite integrals.
10. Apply definite integration to compute area, volumes, and arc length, and to solve problems in science and related fields.
11. Evaluate integrals with the use of tables or a computer algebra system.

Topics and Scope:

I. Limits
- A. Definition
- B. Limits from graphs
- C. Limits evaluated analytically
  1. Limit laws
  2. Limits at infinity
  3. Infinite limits
  4. Indeterminate forms

II. Continuity
- A. Definition
- B. Determining continuity from definition
- C. Continuity from graphs

III. The Derivative
- A. Difference quotient
  1. Slope of the secant line
  2. Average rate of change
- B. Limit definition and evaluating the derivative from the definition
- C. Interpreting the derivative
  1. Slope of the tangent line
  2. Instantaneous rate of change, velocity, acceleration
- D. Rules of differentiation
- E. Product, quotient, and chain rules
- F. Basic differentiation formulas
  1. Algebraic
  2. Trigonometric
  3. Exponential
  4. Logarithmic
  5. Hyperbolic
  6. Inverses of functions
- G. Antiderivatives

IV. Applications of the Derivative
- A. Implicit differentiation
- B. Mean value theorem
- C. Graphing curves
- D. Linearization and differentials
- E. Related rates
- F. Optimization
- G. Other applications and modeling
- H. L'Hospital's rule

V. The Integral

A. Definite integrals as limits of Riemann sums
B. Definite and indefinite integrals
C. Fundamental theorem of calculus
D. Integration of polynomial, logarithmic, exponential, and trigonometric functions
E. Integration by substitution
F. Numerical integration using Trapezoidal and Simpson's Rules
G. Evaluation by tables or computer algebra systems

VI. Applications of the Integral
A. Area
B. Volumes
C. Arc length
D. Separable differential equations
E. Other applications and modeling

Assignment:

1. Daily reading outside of class (20-50 pages per week)
2. Problem set assignments from required text or supplementary materials chosen by the instructor (1-6 assignment sets per week)
3. Quizzes (0-4 per week)
4. Exams (2-7 per term)
5. Final Exam
6. Projects, for example, computer explorations or modeling activities (0-10 per term)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.	Writing 0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Problem sets	Problem solving 5 - 20%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, exams, final exam	Exams 70 - 95%

Other: Includes any assessment tools that do not logically fit into the above categories.

Projects	Other Category 0 - 10%

Representative Textbooks and Materials:
Calculus: Early Transcendentals. 8th ed. Stewart, James. Cengage Learning. 2016 (classic)