## MATH 1A Course Outline as of Summer 2019

# 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 appropriate placement based on AB 705 mandates.

**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 appropriate placement based on AB 705 mandates.
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:**
Upon completion of the course, students will 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 and Continuity
    A. Definitions
       1. Limit
       2. Basic limit theorems
    B. Limits from graphs
    C. Continuity of functions at real values
II.  The Derivative
    A. Definition
    B. Difference quotients
    C. Slope of tangent line
    D. Velocity, acceleration and rates of change
    E. Product, quotient, and chain rules
    F. Basic differentiation formulas for algebraic, trigonometric,logarithmic, exponential,
hyperbolic functions and inverses of functions
    G. Antiderivatives
III. Applications of the Derivative
    A. Implicit differentiation
    B. Mean value theorem
    C. Differentials
    D. Related rates
    E. Optimization
    F. Separable differential equations
    G. Other applications and modeling
    H. Indeterminate forms and L'Hospital's rule
IV. 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
V.  Applications of the Integral
    A. Area
    B. Volumes
    C. Arc length
    D. 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 (3-8 per term) including final exam.
5.  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.

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|---|---|
| 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<br>0 - 0% |

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

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|---|---|
| Homework problems | Problem solving<br>5 - 20% |

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

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|---|---|
| None | Skill Demonstrations<br>0 - 0% |

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

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|---|---|
| Final Exam: Multiple choice and free response exams; quizzes | Exams<br>70 - 95% |

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

| | |
|---|---|
| Projects | Other Category<br>0 - 10% |

## Representative Textbooks and Materials:
Calculus:  Early Transcendentals, 7 th edition.  Stewart, James.  Brooks/Cole, Cengage Learning:  2012.