EASTERN ARIZONA COLLEGE

Calculus I

Course Design

2019-2020

Course Information

Division	Mathematics
Course Number	MAT 220 (SUN# MAT 2220)
Title	Calculus I
Credits	5
Developed by	Adam Stinchcombe/Revised by Ray Orr
Lecture/Lab Ratio	5 Lecture/0 Lab

Transfer Status

ASU	NAU	UA
MAT 270, MAT 265 Mathematics (MA) Note: Will fulfill MAT 265 requirement for Engineering Majors.	MAT 136; Science & Applied Science [SAS] --and-- Elective Credit	MATH 122B

Activity Course	No
CIP Code	27.0101
Assessment Mode	Final Exam (15 Questions/100 Points)
Semester Taught	Fall and Spring
GE Category	Mathematics
Separate Lab	No
Awareness Course	No
Intensive Writing Course	No
Diversity and Inclusion Course	No

Prerequisites

MAT 181 with a grade of "C" or higher or MAT 187 with a grade of "C" or higher or placement test score as established by District policy and ENG 091 with a grade of “C” or higher or reading placement test score as established by District policy

Educational Value

Students majoring in Mathematics, Science, the Arts, and Engineering

Description

Real numbers, limits and continuity for functions of a single real variable. Differentiability and applications of the derivative. Introduction to integral calculus and applications of the integral.

Supplies

Scientific calculator; TI-83 or TI-84 recommended

Competencies and Performance Standards

1. Demonstrate and use limit notation.

Learning objectives

What you will learn as you master the competency:

a. Define a limit of a function of a single real variable as the independent variable approaches a finite value.

b. Discuss the notion of limit.

Performance Standards

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two hour cumulative final exam

Your performance will be successful when:

- learner can define and discuss the limiting process

2. Calculate from first principles elementary limits.

Learning objectives

What you will learn as you master the competency:

a. Compute limits from the definition for simple cases.

Performance Standards

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two hour cumulative final exam

Your performance will be successful when:

- learner can calculate limits in elementary cases using the definition

3. Demonstrate the idea of continuity of a function of a single real variable.

Learning objectives

What you will learn as you master the competency:

a. Define continuity of a function of a single real variable at a point in its domain.

b. List three ways in which a function can fail to be continuous at a point.

c. Extend the definition of continuity of a function of a single real variable from a point to an open subset of the real line.

Performance Standards

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two hour cumulative final exam

Your performance will be successful when:

- o learner can demonstrate why or why not a function is continuous

4. **Define the derivative of a function of a single real variable.**

Learning objectives

What you will learn as you master the competency:

a. Define the derivative of a function of a single real variable at a given point in its domain.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can define the derivative of a function of a single real variable

5. **Compute the derivatives of elementary functions from the definition.**

Learning objectives

What you will learn as you master the competency:

a. Use the definition to compute the derivatives of elementary functions.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can compute derivatives of elementary functions from the definition

6. Use the rules of the differential calculus of a function of a single real variable.

Learning objectives

What you will learn as you master the competency:

a. Compute derivatives of reasonably complicated functions of a single real variable.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can apply the rules of differential calculus correctly

7. Apply the differential calculus to the solution of nontrivial problems in Mathematics, the Arts, and Science.

Learning objectives

What you will learn as you master the competency:

a. Solve problems in Science, Mathematics, the Arts, and Engineering using differential calculus.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can solve nontrivial derivative problems

8. Demonstrate the relationship between an indefinite integral and an anti- derivative.

Learning objectives

What you will learn as you master the competency:

a. Use the known derivatives of elementary functions to obtain corresponding integrals.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can invert the differentiation process to obtain elementary indefinite integrals

9. Demonstrate the definite integral as a process of summation.

Learning objectives

What you will learn as you master the competency:

a. Evaluate Riemann integrals as the common limit of the upper and lower Riemann sums.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can compute upper and lower Riemann sums and evaluate them in a limiting process

10. Demonstrate an ability to use the fundamental properties of the integral to evaluate elementary integrals.

Learning objectives

W*hat you will learn as you master the competency:*

a. Evaluate integrals.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can evaluate integrals correctly

11. Demonstrate an ability to solve nontrivial problems in Mathematics, Science, the Arts, and Engineering.

Learning objectives

What you will learn as you master the competency:

a. Solve nontrivial problems in Mathematics, Science, the Arts, and Engineering using the integral calculus.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two hour cumulative final exam

Your performance will be successful when:

- o learner can solve nontrivial problems using integral calculus correctly

Types of Instruction

Classroom Presentation

Grading Information

Grading Rationale

Each instructor has the flexibility to develop evaluative procedures within the following parameters.

1. Written exams must represent at least 60% of the final course grade.
2. Final exam must represent at least 20% of the final course grade.
3. Other activities may represent at most 30% of the final course grade.

Grading Scale

A 90%-100%

B 80%-89%

C 70%-79%

D 60%-69%

F Below 60%