Course Information
Division Mathematics
Course Number MAT 240 (SUN# MAT 2241)
Title Calculus III
Credits 4
Developed by Pedro Dabalsa
Lecture/Lab Ratio 3 Lecture /2 Lab
Transfer Status

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<th>ASU</th>
<th>NAU</th>
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<tbody>
<tr>
<td>MAT 272, Mathematics (MA)</td>
<td>MAT 238</td>
<td>MATH 223</td>
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<td>Note: Will fulfill MAT 267 requirement for Engineering Majors.</td>
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Activity Course No
CIP Code 27.0101
Assessment Mode Pre/Post Test (16 Questions/100 Points)
Semester Taught Fall
GE Category Mathematics
Separate Lab No
Awareness Course No
Intensive Writing Course No

Prerequisites
MAT 230 with a grade of "C" or higher

Educational Value
Students majoring in Mathematics, the Sciences, the Arts and Engineering

Description
Continuation of MAT 230. Vectors, geometry, differentiation, and integration in Euclidean n-space. Line and surface integrals. Theorems of Green, Gauss, and Stokes.

Supplies
Scientific calculator; TI-83 or TI-84 recommended
Competencies and Performance Standards

1. Represent plane curves parametrically.

   Learning objectives
   
   What you will learn as you master the competency:
   
   a. Construct a plane curve as a map from a subset of the real line into Euclidean 2- or 3-space.

   Performance Standards
   
   You will demonstrate your competence:
   
   o on assigned activities
   o on written exams
   o on a two hour cumulative exam

   Your performance will be successful when:
   
   o you can correctly construct curves in 2- and 3-space as maps defined on subsets of the real numbers

2. Define, understand, and use vectors in Euclidean 2- and 3-space.

   Learning objectives
   
   What you will learn as you master the competency:
   
   a. Use vectors in 2- and 3-space to model problems.

   Performance Standards
   
   You will demonstrate your competence:
   
   o on assigned activities
   o on written exams
   o on a two hour cumulative exam

   Your performance will be successful when:
   
   o you can model problems using vectors in 2- and 3-space

3. Define the derivative of a function of more than one real variable and demonstrate the correct use of the rules of partial differentiation.

   Learning objectives
   
   What you will learn as you master the competency:
   
   a. Write out the definitions of the partial derivatives of a function of more than one real variable.

   Performance Standards
   
   You will demonstrate your competence:
   
   o on assigned activities
   o on written exams
   o on a two hour cumulative exam

   Your performance will be successful when:
   
   o you can compute partial derivatives from the definition
4. Define the concept of continuity for functions of more than one real variable.

**Learning objectives**

*What you will learn as you master the competency:*

a. Determine the continuity of functions of more than one real variable.

**Performance Standards**

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

- you can write out the definition of continuity for a function of more than one real variable

5. Define, understand, and use the directional derivative in 2- and 3-space.

**Learning objectives**

*What you will learn as you master the competency:*

a. Compute directional derivatives and gradients for functions defined on Euclidean 2- and 3-space.

**Performance Standards**

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

- you can compute derivatives of functions of more than one real variable in arbitrarily specified directions

6. Understand the idea of extremum in two dimensions.

**Learning objectives**

*What you will learn as you master the competency:*

a. Solve extreme value problems in two-dimensional Euclidean space.

**Performance Standards**

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

- you can apply the fundamental theorem on extrema
7. Understand multiple integrals in various coordinate systems.
   **Learning objectives**
   *What you will learn as you master the competency:*
   a. Evaluate multiple integrals in various coordinate systems.
   **Performance Standards**
   *You will demonstrate your competence:*
   o on assigned activities
   o on written exams
   o on a two hour cumulative exam
   *Your performance will be successful when:*
   o you can evaluate multiple integrals in a variety of coordinate systems

8. Understand and apply the fundamental theorems of vector calculus in 2- and 3-space.
   **Learning objectives**
   *What you will learn as you master the competency:*
   a. Solve mathematical problems in 2- and 3-space.
   **Performance Standards**
   *You will demonstrate your competence:*
   o on assigned activities
   o on written exams
   o on a two hour cumulative exam
   *Your performance will be successful when:*
   o you can solve problems using vector calculus in more than one Euclidean dimension

**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. The Post Test is to be embedded in the final exam and must represent at least 10% of the final course grade.
4. Other Activities may represent at most 20% of the final course grade.

**Grading Scale**
A 90%-100%
B 80%-89%
C 70%-79%
D 60%-69%
F Below 60%