Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Fall 2020

Type of Action:
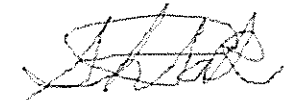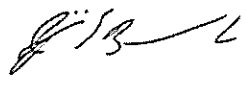
__	New
X	Modification
__	Move to Inactive (Stop Out)
__	Cancellation

Course Alpha and Number: MA203

Course Title: Basic Calculus

Reason for initiating, <u>revising</u>, or canceling:
This course is being modified to change in credit hours, assessment measures, student learning outcomes, prerequisite, and the textbook.

"Sean" Seung Ho Pak   1.14.21

Proposer	Date

Velma C. De Leon Guerrero   1/14/2021

Department Chair	Date

Adam Walsh   01.14.21

Language & Format Review Specialist	Date

Ajani Burrell   1.14.21

Academic Council Chair	Date

Charlotte Cepeda   01/15/2021

Dean of Learning & Student Success	Date

1. **Department**
   Science, Mathematics, Health, and Athletics

2. **Purpose**
   The purpose of this course is to enable students to: (1) develop proficiency in basic calculus, (2) discover applications of calculus by constructing models to solve real-world problems, and (3) offer an entry-level calculus course for students intent on transferring to earn an advanced degree in the sciences, business, or mathematics.

3. **Description**

   A. **Required/Recommended Textbook(s) and Related Materials**
      Required:

      Stewart, James (2019). *Single Variable Calculus: Concepts and Context, Enhanced Edition, 4th Edition.* Cengage.
      ISBN-13: 978-1-337-68780-5, ISBN-10: 1-337-68780-4

      TI-82, TI-83, or TI-89 graphing calculator or technologic equivalent

   B. **Contact Hours**
      1. **Lecture:** 4 per week / 60 per semester
      2. **Lab:** 0
      3. **Other:** None

   C. **Credits**
      1. **Number:** 4
      2. **Type:** Regular Degree Credits

   D. **Catalogue Course Description**
      This course is a study of single variable Calculus and introduces students to the basic theory and applications of calculus; introduction to differential and integral calculus of on variable functions with applications and an introduction to transcendental functions. Topics covered include: limits, infinity, continuity, differentiation, application of derivatives, integration, and application of integration. Problem solving and the use of graphing utilities are emphasized throughout.

   E. **Degree or Certificate Requirements Met by Course**
      A "C" grade or better in this course satisfies a core course requirement in mathematics for an NMC associate-level degree program.

F. Course Activities and Design
Course activities include: lecture, discussions, homework assignments, tests, quizzes, and a comprehensive final exam.

4. Course Prerequisite(s); Concurrent Course Enrollment
Prerequisites: MA162 (College Trigonometry) score of "C" or better
Concurrent Course Enrollment: N/A

Required English/Mathematics Proficiency Level(s):
English Placement Level: EN095
Mathematics Placement Level: MA132

5. Estimated Cost of Course; Instructional Resources Needed
Cost to the Student: Tuition for a 4-credit course; cost of textbook; cost of a TI-82, TI-83, or TI-89 graphing calculator with manual, and instructor's edition textbook with supplemental materials.

Cost to NMC: Instructor's salary; a classroom.

Instructional resources needed for this course include: whiteboard, markers, and eraser; an electronic projection device, television, or other viewing device for calculator demonstrations; a TI-82, TI-83, or TI-89 graphing calculator with manual and instructor's edition textbook with supplemental materials.

6. Method of Evaluation
Evaluation methods will include quizzes, tests, homework assignments, and a comprehensive final exam. NMC's grading and attendance policies will be followed.

7. Course Outline

This is a topical outline and does not necessarily indicate the sequence in which the material will be presented.

1.0 Functions and Models
    1.1 Polynomial functions
    1.2 Rational functions
    1.3 Exponential functions
    1.4 Logarithmic functions
    1.5 Trigonometric functions
    1.6 Graphs and their inverses

2.0 Limits and Derivatives
    2.1 Tangent and velocity
    2.2 Limits and functions
    2.3 Continuity
    2.4 Derivatives and rates of change

3.0. Differentiation Rules
    3.1 Derivatives of polynomials and exponential functions
    3.2 Derivatives of trigonometric and logarithmic functions
    3.3 Product, quotient, and chain rules
    3.4 Inverse trigonometric functions
    3.5 Rate of change in the natural and social sciences
    3.6 Linear approximations and differentials

4.0 Applications of Differentiation
    4.1 Maximum and minimum values
    4.2 Derivatives and the shapes of curves
    4.3 Indeterminate forms
    4.4 L'Hôpital's rule and Newton's method

5.0 Integrals
    5.1 Areas and distances
    5.2 Definite integrals
    5.3 Fundamental theorem of calculus
    5.4 Substitution rule
    5.5 Integration by parts
    5.6 Additional techniques of integration
    5.7 Improper integrals

6.0   Applications of Integration
      6.1   Volumes by cylindrical shells
      6.2   Arc length
      6.3   Average value of a function
      6.4   Applications to physics, engineering, economics, and biology

8. Instructional Goals

The course will introduce students to:

1.0 Function and Models;

2.0 Limits and Derivatives;

3.0 Differentiation Rules;

4.0 Applications of Differentiation;

5.0 Integrals; and

6.0 Applications of Integration.

9. Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1.0 Demonstrate the basic ideas concerning functions, graphs, and the ways of transforming and combining them;

2.0 Find limits graphically, numerically, analytically, and derivatively of functions using the limit definition;

3.0 Find derivatives' maximum and minimums using various differentiation rules;

4.0 Solve applications of differentiations;

5.0 Analyze the connection between integral calculus and differential calculus; and

6.0 Solve applications of the definite integral to compute measurements in curves, solids, gravity, and force, as well as quantities of interest in biology, economics, and statistics.

10. Assessment Measures of Student Learning Outcomes

Assessment of student learning may include, but not be limited to, the following:

1.0 Quizzes;

2.0 Chapter Tests;

3.0 Homework Assignments; and

4.0 Final Comprehensive Examination