Northern Marianas College
CURRICULUM ACTION REQUEST

Course: MA203 Basic Calculus

Effective Semester / Session: Spring 2024

Type of Action:

__ New
_X_ Modification
__ Move to Inactive (Stop Out)
__ Cancellation

Course Alpha and Number: MA203

Course Title: Basic Calculus

Reason for initiating, revising, or canceling:
This course is being modified to update Section 3. and letter D. is modified to "Offered in Spring semester."

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"Sean" Seung Ho Pak Feb 7, 2024

Proposer Date

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Department Chair Date

Adam Walsh 02.04.24

Language & Format Review Specialist Date

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Academic Council Chair Date

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Interim Dean of Academic Programs & Services 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. **Catalog 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. Prerequisite(s): MA162. (Offered in Spring).

   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: EN101
Mathematics Placement Level: MA162

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

MA203.2

Final Audit Report 2024-02-07

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