National Taiwan University of Science and Technology

2019 Summer Program

MATH 122 Calculus 2

Course Outline

Term: July 01-August 02,2019

Class Hours: 16:00-17:50PM (Monday through Friday)

Course Code: MATH 122

Instructor: Anja Bankovic

Home Institution: Boston College

Office Hours: TBA and by appointment

Email: anja289@yahoo.com

Credit: 4

Class Hours: According to the regulations of Minister of Education, R.O.C, 18 class hours could be counted as 1 academic credit in all universities in Taiwan. This course will have 72 class hours, including 40 lecture hours, professor 10 office hours, 10-hour TA discussion sessions, 2-hour review sessions, 10-hour extra classes.

Course Description:

This is the second course in calculus for engineers, physicists, computer scientists, and mathematicians. You will learn more advanced integration techniques, convergence of sequences and series, power series, and basics of differential equations.

Calculus studies the limiting behavior of functions. Functions themselves are among the most important discoveries in history, because they describe the dependence of objects and phenomena in nature. Most functions of interest exhibit a rather regular behavior which makes it possible to understand their infinitesimal properties. This enables us to describe the nature and predict its behavior.

The proper understanding of calculus plays a crucial role in careers of mathematicians, physicists, economists, engineers, programmers, and in recent years biologists and other life scientists. This course

will teach you how to think and understand the reasons behind formulas. The calculus will give meaning to your future courses and life.

Required Textbooks:

Stewart: Calculus – Early Transcendentals

Grading & Evaluation:

Homework and quizzes: 30%

Midterm: 30%

Final: 40%

Course Schedule:

Week 1:

Session 1: Areas and Distances; The Definite Integral; The Fundamental Theorem of Calculus

Session 2: Indefinite Integrals and the Net Change Theorem; The Substitution Rule

Session 3: Areas Between Curves; Volumes

Week 2:

Session 1: Integration by Parts; Trigonometric Integrals

Session 2: Trigonometric Substitution; Integration of Rational Functions by Partial Fractions

Session 3: Strategy for Integration; Improper Integrals

Week 3:

Session 1: Arc Length; Area of a Surface of Revolution

Session 2: Applications to Physics and Engineering

Session 3: Sequences; Series

National Taiwan University of Science and Technology

Week 4:

    Session 1: The Integral Test and Estimates of Sums; The Comparison Tests; Alternating Series

    Session 2: Absolute Convergence and the Ratio and Root Tests; Strategy for Testing Series; Power Series

    Session 3: Representations of Functions as Power Series; Taylor and Maclaurin Series; Applications of Taylor Polynomials

Week 5:

    Session 1: Modeling with Differential Equations; Direction Fields and Euler's Method

    Session 2: Separable Equations

    Session 3: Models for Population Growth