National Taiwan University of Science and Technology

2019 Summer Program

MATH 300 Multivariable Calculus

Course Outline

Term: July 01-August 02,2019

Class Hours: 18:00-19:50AM (Monday through Friday)

Course Code: MATH 300

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 a lower division course in multivariable calculus with elements of analytic geometry. The course covers differential and integral calculus of functions of several variables. It provides a solid background for students who wish to continue their studies in natural sciences such as mathematics, physics, engineering, finance, economics, and computer science.
The course will start with the study of analytic geometry of vectors, lines, planes, curves, and surfaces. The next major topic is differential calculus and optimization problems, and the final topic includes multiple integrals and surface integrals.
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Required Textbooks:

Stewart: Calculus – Early Transcendentals

Grading & Evaluation:

Homework and quizzes: 30%

Midterm: 30%

Final: 40%

Course Schedule:

<u>Week 1</u>:

    Session 1: Three-Dimensional Coordinate Systems; Vectors; The Dot Product

    Session 2: The Cross Product; Equations of Lines and Planes; Cylinders and Quadric Surfaces

    Session 3: Vector Functions and Space Curves; Derivatives and Integrals of Vector Functions

<u>Week 2</u>:

    Session 1: Arc Length and Curvature; Motion in Space: Velocity and Acceleration

    Session 2: Functions of Several Variables; Limits and Continuity; Partial Derivatives

    Session 3: Tangent Planes and Linear Approximations; The Chain Rule; Directional Derivatives
        and the Gradient Vector

<u>Week 3</u>:

    Session 1: Maximum and Minimum Values; Lagrange Multipliers

    Session 2: Double Integrals over Rectangles; Double Integrals over General Regions

    Session 3: Double Integrals in Polar Coordinates; Applications of Double Integrals

Week 4:

Session 1: Surface Area; Triple Integrals; Triple Integrals in Cylindrical Coordinates

Session 2: Triple Integrals in Spherical Coordinates; Change of Variables in Multiple Integrals; Vector Fields

Session 3: Line Integrals; The Fundamental Theorem for Line Integrals

Week 5:

Session 1: Green's Theorem; Curl and Divergence

Session 2: Parametric Surfaces and Their Areas; Surface Integrals

Session 3: Stokes' Theorem; The Divergence Theorem