University of International Business and Economics
International Summer School

MAT 230 Multivariable Calculus (Calculus III)

Term: July 10 – August 4, 2017
Instructor: SEMA SALUR
Home Institution: UNIVERSITY OF ROCHESTER
Email: semasalur@gmail.com
Class Hours: Monday through Friday, 120 minutes each day (2,400 minutes in total)
Office Hours: TBD

Teaching Assistant: TBD
Email: TBD
Discussion session: 2 hours each week

Total Contact Hours: 64 contact hours (45 minutes each, 48 hours in total)
Credit: 4 units

Course Description

Equations of lines and planes, quadric surfaces, space curves, partial derivatives, linear approximation, directional derivatives, extrema, lagrange multipliers, double/triple integrals including cylindrical and spherical coordinates. Line, surface, and volume integrals, divergence theorem, Stokes' theorem.

Course Goals

This course extends the calculus techniques to handle functions of more than one variable. It also concentrates increasingly on the geometric aspect of calculus, the ability to picture what the symbols stand for. This ability to picture the information contained in the equations is particularly important for applying calculus to problems in physics, engineering (e.g. hydrodynamics), computer graphics and in upper level mathematics subjects such as differential geometry.

Required Text

Calculus: Early Transcendentals, 8th edition by James Stewart

Attendance

Students are expected to be present at all class meetings and examinations.

Grading Policy

There will be daily quizzes, two midterms and one final exam in this class. All exams will be closed-book. No notes, calculators, or other electronic devices will be allowed, and having such a device in view during the exam is an academic honesty violation.

Assignments and examinations will be graded according to the following grade scale:
A   90-100
A– 85-89
B+ 82-84
B   78-81
B– 75-77
C+ 72-74
C   68-71
C– 64-67
D   60-63
F   below 60

Grading Scale

The course grades will be calculated based on the following percentages:
✧ Quizzes: 20%
✧ Midterm 1: 20%
✧ Midterm 2: 20%
✧ Final Exam: 40%
The final exam will be cumulative. There will be no make-up exams.

Course Hours

The course has 20 class sessions in total. Each class session is 120 minutes in length for a total of 2,400 minutes of class time. The course meets from Monday to Friday.

Class Rules

All academic work should be done with the high level of honesty and integrity. Academic misconduct of any kind may result in a grade penalty or the assignment of a failing grade.

Course Schedule

Week of July 10

Topics
Section 12.1: Three-Dimensional Coordinate Systems
Supplementary Problems: 7-17 odd, 23, 29, 41
Section 12.2: Vectors
Supplementary Problems: 19, 21, 23, 27
Section 12.3: The Dot Product
Supplementary Problems: 3, 5, 7, 15, 17, 19, 23, 29, 39, 41, 43
Section 12.4: The Cross Product
Supplementary Problems: 1, 3, 5, 7, 19, 29, 31
Section 12.5: Equations of Lines and Planes
Supplementary Problems: 1 (all), 3, 5, 13, 19-39 odd, 45, 51, 53, 55, 57
Section 13.1: Vector Functions and Space Curves
Supplementary Problems: 3, 5, 21-26, 27, 41, 43
Section 13.2: Derivatives and Integrals of Vector Functions
Supplementary Problems: 9-25 odd, 35, 37, 49
Section 13.3: Arc Length and Curvature

Supplementary Problems: 1, 3, 5, 15, 17, 19, 23, 25, 47
Section 13.4: Motion in Space: Velocity and Acceleration
Supplementary Problems: 9, 11, 13, 15, 17a, 19, 37, 39, 41
Section 14.1: Functions of Several Variables
Supplementary Problems: 13, 15, 17, 32, 43, 47, 59-64, 65, 67
Section 14.2: Limits and Continuity
Supplementary Problems: 5-15 odd, 19, 29, 31
Section 14.3: Partial Derivatives
Supplementary Problems: 15-37 odd, 43, 53, 55, 59, 63, 65, 67, 71
Section 14.4: Tangent Planes and Linear Approximations
Supplementary Problems: 1, 3, 5, 11, 13, 17, 19, 21

Week of July 17

Midterm 1: Date TBD
Topics
Section 14.5: The Chain Rule
Supplementary Problems: 1-33 odd
Section 14.6: Directional Derivatives and the Gradient Vector
Supplementary Problems: 7-29 odd, 41, 43, 45, 51
Section 14.7: Maximum and Minimum Values
Supplementary Problems: 1, 5-19 odd, 29, 31-49 odd
Section 14.8: Lagrange Multipliers
Supplementary Problems: 3-11 odd, 21, 29-39 odd
Section 15.1: Double Integrals over Rectangles
Supplementary Problems: 11, 13
Section 15.2: Double Integrals over General Regions
Supplementary Problems: 1-9 odd, 15-21 odd, 43-53 odd
Section 15.3: Double Integrals in Polar Coordinates
Supplementary Problems: 1-27 odd

Week of July 24

Midterm 2: TBD
Section 15.6: Triple Integrals
Supplementary Problems: 1-13 odd, 19-31 odd, 39
Section 15.7: Triple Integrals in Cylindrical Coordinates
Supplementary Problems: 1-12 all, 17-29 odd
Section 15.8: Triple Integrals in Spherical Coordinates
Supplementary Problems: 1-6 all, 9, 15, 19-29 odd, 35, 39, 41
Section 15.9: Change of Variables in Multiple Integrals
Supplementary Problems: 1-19 odd
Section 16.1: Vector Fields
Supplementary Problems: 1, 5, 11-14, 21, 23, 29, 31
Section 16.2: Line Integrals
Supplementary Problems: 1-21 odd, 39
Section 16.3: The Fundamental Theorem for Line Integrals
Supplementary Problems: 3-23 odd

Week of July 31

Section 16.4: Green's Theorem
Supplementary Problems: 1-11 odd, 17
Section 16.5: Curl and Divergence
Supplementary Problems: 1-7 odd, 13-19 odd
Section 16.6: Parametric Surfaces and their Areas
Supplementary Problems: 1, 13-25 odd, 33, 35, 39-49 odd
Section 16.7: Surface Integrals
Supplementary Problems: 5-31 odd
Section 16.8: Stokes' Theorem
Supplementary Problems: 1-9 odd
Section 16.9: The Divergence Theorem
Supplementary Problems: 1-13 odd
Final Exam