



## University of International Business and Economics International Summer School

### MAT 230 Calculus III

**Term: July 8 – August 2, 2019**

**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**

**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 Textbook:**

Calculus: Early Transcendentals, 8th edition by James Stewart

#### **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.

### 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.

Assignments and examinations will be graded according to the following grade scale:

<b>A</b>	90-100	<b>C+</b>	72-74
<b>A-</b>	85-89	<b>C</b>	68-71
<b>B+</b>	82-84	<b>C-</b>	64-67
<b>B</b>	78-81	<b>D</b>	60-63
<b>B-</b>	75-77	<b>F</b>	below 60

### 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 8

#### 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

### **Week of July 15**

**Midterm 1: Date TBD**

#### **Topics**

Section 14.4: Tangent Planes and Linear Approximations

Supplementary Problems: 1, 3, 5, 11, 13, 17, 19, 21

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 22**

**Midterm 2: Date TBD**

#### **Topics**

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 29**

#### **Topics**

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

Section 6.4: Hermitian Matrices

#### **Final Exam**