Philadelphia University
Department of Basic Sciences and Mathematics

First Semester | Course Syllabus | 2014/2015

Course Title	Intermediate Analysis
Course Code	250201
Lecturer	Dr. Anas Altawallbeh
Office Room	819
Office Hours	Sun, Tue, Thu: 12:00-13:00. Mon, Wed: 10:00-11:00
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Course Description

This course introduces advanced principles of calculus to form the foundation needed for student.s advancement. The module deals with the following main topics: Multi dimensional Analytic Geometry, Vector - Valued Functions, Functions of Several Variables, Partial Derivatives, Gradient, Maxima - Minima Problems and Applications, Double and Triple Integrals; Potential Fields; Flux; Green.s Divergence and Stokes. Theorems.

Topics by the Week

Week	Topics
1	Three-Dimensional Space; Vectors: Rectangular Coordinates in 3-Space. Vectors.
2	Dot Product; Projections. Cross Product. Parametric Equations of Lines.
3	Planes in 3-Space. Quadric Surfaces. Cylindrical and Spherical Coordinates
4	Vector-Valued Functions: introduction to Vector-Valued Functions. Calculus of Vector-Valued Functions. Change of Parameter; Arc Length.
5	Unit Tangent, Normal, and Binormal Vectors. Curvature. Partial Derivatives: Functions of Two or More Variables.
6	Limits and Continuity. Partial Derivatives. The Chain Rule. Directional Derivatives and Gradients.
7	Tangent Planes and Normal Vectors. Maxima and Minima of Functions of Two Variables. Lagrange Multipliers.
8	Multiple Integrals: Double Integrals. Double Integrals over Non-rectangular Regions. Double Integrals in Polar Coordinates.
9	Triple Integrals.
10	Triple Integrals in Cylindrical and Spherical Coordinates.
11	Change of Variables in Multiple Integrals; Jacobians.
12	Topics In Vector Calculus: Vector Fields. Line Integrals.
13	Independence of Path; Conservative Vector Fields. Greens Theorem. Surface Integrals
14	Applications of Surface Integrals; Flux. The Divergence Theorem
15	Stokes Theorem.
16	Final Exams

Course Objectives

- Extend the ideas of calculus to two and three dimensions.
- Generalize the concepts of derivative and integral to vector-valued functions.
- Describe the tangent plane in terms of ideas of calculus, and learn how the concepts of derivative and integral generalize to functions of several variables.
- Understand the 2-dimensional version of the Fundamental Theorem of Calculus, Green's Theorem. This is the mathematics behind the physical notions of work and potential energy, and is a big step toward understanding electric and magnetic fields.

Learning Outcomes

- Evaluate double and triple integrals and apply them on some problems on area, volume and in physics.
- Find the derivative and the integral of vector functions and compute the curvature and the arc length.
- Calculate the gradient and its derivative.
- Apply the mean value theorem, intermediate value theorem and the chain rule on functions of several variables and to find their maximum and minimum values.
- Define and state the fundamental theorem fore line integrals, Green.s theorem and Stokes theorem and apply them.

Assessment Distribution

Students will be assessed based on a 100 total marks distributed as follows.

Exam Type	Expected Time	Points Allocated
First	19/11/2014 - 27/11/2014	20%
Second	28/12/2014 - 06/01/2015	20%
Quizzes	3 quizzes (at least)	20%
Final	01/02/2015 - 09/02/2015	40%

Textbook and References

– Howard Anton, Irl C. Bivens and Stephen Davis, **Calculus: Early Transcendentals, 10th Edition**, John Wiley & Sons, Inc. 2013.

– James Stewart, **Calculus: Early Transcendentals**, Brooks/ Cole 2012.

– Salas and Hille's, **Calculus: One and Several Variables**, Wiley, New York, 1995.

Class Attendance

Attendance is expected of every student. Being absent is not an excuse for not knowing about any important information that may have been given in class. Under the University's regulations, a student whose absence record exceeds 15% of total class hours will automatically fail the course. Students who in any way disrupt the class will be expelled from the classroom and will not be allowed to return until the problem has been resolved.

Late Exams

Late (make-up) exams will be given only to students who have a valid excuse and are able to provide a written document for its verification. The level of difficulty of a late exam is about 50% higher than that of the corresponding regular exam. All late exams will be conducted during the last week of the semester. Each student is allowed only one make-up in a semester, either for the first exam or the second, but not both. There is no make-up for a late exam.

Dishonesty

Any form of dishonest conduct will be strictly punished. A student who is caught cheating, or attempting to do so in an exam will be given a zero for the exam and a report will be written to the Dean for further action. A student who helps another student or is seen communicating with another student in an exam will be given the same penalty stated in the previous point. Students with different exam forms are not exempt from the above rules. Repeat offenders will be expelled permanently and banned from future courses.