



Philadelphia University
Faculty of Science
Department of Basic Sciences and Mathematics
Second (spring) Semester 2008/2009

<u>Course Syllabus</u>			
Course Title	Intermediate Analysis	Course Code	250201
Course Level	"2"	Course Prerequisite	250102 "Calculus II"
Lecture Time	Mon. and Wed. 08:15–09:45	Credit Hours	"3"

<u>Academic Staff Specific</u>				
Name	Feras Awad Mahmoud	Office Hours	Sunday	08:10 – 09:00
Rank	Lecturer "M.Sc"		Tuesday	09:10 – 10:00
Office Number	"1019"		Thursday	11:10 – 12:00
Location	Faculty of Science		Monday	09:45 – 11:00
E – mail	fawad@philadelphia.edu.jo		Wednesday	12:45 – 02:00

Course Description:

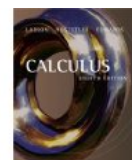
This course introduces advanced principles of calculus to form the foundation needed for student's advancement. The module deals with the following main topics: Multi dimensional Analytic Geometry, Vector - Valued Functions, Functions of Several Variables, Partial Derivatives, Gradient, Maxima - Minima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

Course Objectives:

Intermediate Analysis or Calculus III is a mathematics major requirement. It aims to extend the basic concepts of differential and integral calculus from one dimension to two and three dimensions and to gain a basic understanding of the applications of these concepts as mathematical models of physical phenomena, such as rates of change, maxima and minima, areas, volumes and centers of mass. It aims also to present a number of different techniques for the understanding of the multi-valued functions and related applications.

Course Components (Text Book):

Title : Calculus (With Analytic Geometry).
Author : Larson, Hostetler, and Edwards.
Publisher : [Brooks Cole](http://www.brookscole.com).
Edition : 8th Edition.
Year : 2005
ISBN : 061850298X



Teaching Methods:

1. To learn it is imperative for the student to take an active interest in their own education. To learn mathematics the student must read, think, and write in an analytical manner and this takes practice. Such practice is by working exercises. When troubles arise, and they will, the student must ask questions. Questions may be posed to the instructor or to other students in a variety of ways; online office hours, or in class.
2. Homework will be assigned each week; not to be collected or graded by the instructor. In addition, at the end of a chapter, challenge problems will be assigned for "work-hard" students. Further more, mathematical projects on real-life problems will be assigned to the students through out the semester.
3. Learn the students how to:

- a. Extend the ideas of calculus to two and three dimensions.
- b. Generalize the concepts of derivative and integral to vector-valued functions.
- c. 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.
- d. 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:

1. Evaluate double and triple integrals and apply them on some problems on area, volume and in physics.
2. Find the derivative and the integral of vector functions and compute the curvature and the arc length.
3. Calculate the gradient and its derivative.
4. 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.
5. Define and state the fundamental theorem for line integrals, Green's theorem and Stokes theorem and apply them.

Assessment Instruments

<u>Allocation of Marks</u>				
<u>Assessment Instruments</u>	<u>Mark</u>	<u>Expected Appointment</u>		
		<u>Date</u>	<u>Day</u>	<u>Time</u>
First Examination	20	26.03.09	Thursday	02:00 – 03:00
Second Examination	20	30.04.09	Thursday	02:00 – 03:00
Homeworks and Projects	10	On Sunday from each Week.		
Final Examination	50	31.05.09 – 14.06.09		
Total	100			

Course Academic Calendar

<u>Week</u>	<u>Basic and Support Material to be Covered</u>
(1)	<u>Chapter 11: Vectors and the Geometry of Space.</u> 1. Vectors in the plane. 2. Space coordinates and vectors in space. 3. The dot product of two vectors.
(2)	4. The cross product of two vectors in space. 5. Lines and planes in space.
(3)	6. Surfaces in space. 7. Cylindrical and spherical coordinates.
(4)	<u>Chapter 12: Vector-Valued Functions.</u> 1. Vector-valued functions. 2. Differentiation and integration of vector-valued functions. 4. Tangent vectors and normal vectors.
(5)	5. Arc length and curvature. <u>Chapter 13: Functions of Several Variables.</u> 1. Introduction to functions of several variables.
(6)	2. Limits and continuity. 3. Partial derivatives. 4. Differentials. ✦ <i>First Exam.</i>
(7)	5. Chain rules of functions of several variables. 6. Directional derivatives and gradients.
(8)	7. Tangent planes and normal lines. 8. Extrema of functions of two variables.
(9)	10. Lagrange multipliers

(10)	Chapter 14: Multiple Integration. 1. Iterated integrals and area in the plane. 2. Double integrals and volumes. 3. Change of variables: Polar coordinates.
(11)	5. Surface area. 6. Triple integrals and applications. ✦ <i>Second Exam.</i>
(12)	7. Triple integrals in cylindrical and spherical coordinates. 8. Change of variables: Jacobians.
(13)	Chapter 15: Vector Analysis. 1. Vector fields. 2. Line integrals.
(14)	3. Conservative vector fields and independence of path. 4. Green's theorem. 5. Parametric surfaces.
(15)	6. Surface integral. 7. Divergence theorem. 8. Stokes's theorem.
(16)	✦ <i>Final Exam.</i>

Expected Workload:

On average students need to spend, at least, 9 hours of study and preparation per week for this course.

Attendance Policy:

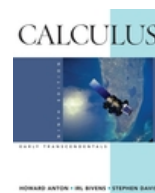
Absence from lectures shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module Reference(s):

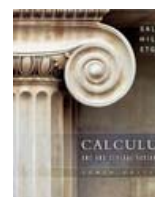
Title : Calculus: Early Transcendentals.
 Author : James Stewart.
 Publisher : [Brooks Cole](#).
 Edition : 6th Edition.
 Year : 2007
 ISBN : 0495011665



Title : Calculus Early Transcendentals Combined.
 Author : Anton, Bivens, and Davis.
 Publisher : [John Wiley & Sons, Inc.](#)
 Edition : 9th Edition.
 Year : 2009
 ISBN : 978-0-470-18345-8



Title : Calculus: One and Several Variables.
 Author : Salas, Etgen, and Hille.
 Publisher : [John Wiley & Sons, Inc.](#)
 Edition : 10th Edition.
 Year : 2007
 ISBN : 978-0-471-69804-3



Website:

<http://ecourse.philadelphia.edu.jo/login/index.php>

Remark: The user name and password, if any, is the student university number.