



Philadelphia University
Faculty of Science
Department of Basic Sciences and Mathematics
Fall Semester 2010/2011

Course Syllabus			
Course Title	Ordinary Differential Equations	Course Code	250203
Course Level	"2"	Course Prerequisite	250201 "Calculus III"
Lecture Time	Sun., Tue., Thu. 12:10–13:00	Credit Hours	"3"

Academic Staff Specific				
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:

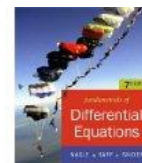
This course introduces methods, theories, and applications of differential equations. The module deals with the following main topics: Classification of differential equations, First order differential equations and their applications, Higher order differential equations and their applications, Solutions by series near ordinary points, Solving initial value problems using Laplace transform, and finally, Linear systems of differential equations.

Course Objectives:

1. To demonstrate the usefulness of ordinary differential equations for modeling physical phenomena.
2. To introduce different classifications of ordinary differential equations.
3. To introduce different forms of differential equations and show how to solve them using analytical methods.
4. To introduce systems of differential equations in normal form and show how to solve them.
5. To discuss some applications on differential equations.

Course Components (Text Book):

Title : Fundamentals of Differential Equations.
Author : Nagle, Saff, and Snider.
Publisher : Addison Wesley.
Edition : 7th Edition.
Year : 2007
ISBN : 0321410483



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.

Learning Outcomes:

1. Solve different forms of first order differential equations.
2. Solve some linear higher order differential equations.
3. Solve some linear second order initial value problems using Laplace transform.
4. Solve some linear second order differential equations using series methods.
5. Solve a linear system of differential equations in normal form.

Assessment Instruments:

Allocation of Marks				
Assessment Instruments	Mark	Expected Appointment		
		Date	Day	Time
First Examination	15	23.11.10	Tuesday	12:00 – 13:00
Second Examination	15	23.12.10	Thursday	12:00 – 13:00
Quizzes	20	Expected short exam will be on Sunday of each Week.		
Final Examination	50	23.01.2011 – 01.02.2011		
Total	100			

Course Academic Calendar:

Week	Basic and Support Material to be Covered
(1)	Chapter 01: Introduction. <ol style="list-style-type: none">Solutions and initial value problems.Direction fields.
(2)	Chapter 02: First Order Differential Equations. <ol style="list-style-type: none">Separable equations.Linear equations.Exact equations.
(3)	<ol style="list-style-type: none">Special integrating factors.Substitutions and transformations.
(4)	Chapter 04: Linear Second Order Equations. <ol style="list-style-type: none">Linear differential operators.Fundamental solutions of homogeneous equations.Reduction of order.
(5)	<ol style="list-style-type: none">Homogeneous linear equations with constant coefficients.Auxiliary equations with complex roots.
(6)	<ol style="list-style-type: none">Method of undetermined coefficients<ul style="list-style-type: none">First Exam.Variation of parameters.
(7)	Chapter 06: Theory of Higher-Order Linear Differential Equations. <ol style="list-style-type: none">Basic theory of linear differential equations.Homogeneous linear equations with constant coefficients.
(8)	<ol style="list-style-type: none">Undetermined coefficients and the annihilator method.Method of variation of parameters.
(9)	Chapter 07: The Laplace Transform. <ol style="list-style-type: none">Definition of the Laplace transforms.Properties of the Laplace transform.Inverse Laplace transforms.
(10)	<ol style="list-style-type: none">Solving initial value problems.Transforms of discontinuous and periodic functions.
(11)	<ol style="list-style-type: none">Convolution.Impulses and the Dirac Delta function.<ul style="list-style-type: none">Second Exam.
(12)	<ol style="list-style-type: none">Solving linear systems with Laplace transforms. Chapter 08: Series Solutions of Differential Equations. <ol style="list-style-type: none">Introduction: The Taylor polynomial approximation.Power series and analytic functions.
(13)	<ol style="list-style-type: none">Power series solution to linear differential equations.Equations with analytic coefficients.Special functions.
(14)	Chapter 09: Matrix Methods for Linear Systems. <ol style="list-style-type: none">Introduction.Review 1: Linear algebraic equations.Review 2: Matrices and vectors.Linear systems in normal form.Homogeneous linear systems with constant coefficients.
(15)	<ol style="list-style-type: none">Complex eigenvalues.Nonhomogeneous linear systems.The matrix exponential function.
(16)	<ul style="list-style-type: none">Final Exam.

Expected Workload:

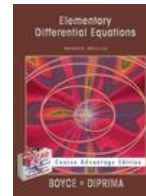
On average students need to spend, at least, 9 hours of study and preparation per week for this course.

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	:	Elementary Differential Equations.
Author	:	Boyce and Diprima.
Publisher	:	John Wiley & Sons, Inc.
Edition	:	7th Edition.
Year	:	2003
ISBN	:	0-471-30840-4



Website:

1. <http://ecourse.philadelphia.edu.jo/login/index.php> E–Course (Philadelphia University - Avicenna Center). Remark: The user name and password, if any, is the student university number.
2. http://wps.aw.com/aw_nagle_diffeq_5_7/ Companion Website for Fundamentals of Differential Equations, 7e.
3. <http://academicearth.org/subjects/mathematics> Online video courses.
4. <http://www.wolframalpha.com/> Wolfram|Alpha (Scientific knowledge engine).