


Philadelphia University	 <b>PHILADELPHIA UNIVERSITY</b> THE WAY TO THE FUTURE	Approval date:
Faculty of Science		Issue:
Department of Math		Credit hours: 3
Academic year 2021/2022		<b>Course Syllabus</b>

### Course information

Course#	Course title	Prerequisite
250203	Ordinary Differential Equations	Calculus 3 250202
<b>Course type</b> <input type="checkbox"/> University Requirement <input type="checkbox"/> Faculty Requirement <input checked="" type="checkbox"/> Major Requirement <input type="checkbox"/> Elective <input checked="" type="checkbox"/> Compulsory		<b>Class time</b> ST 09:45-11:15
		<b>Room #</b> 21009

### Instructor Information

Name	Office No.	Phone No.	Office Hours	E-mail
Feras Awad	822	2132	ST 11:15–12:30 MW 09:45–11:00	<a href="mailto:fawad@philadelphia.edu.jo">fawad@philadelphia.edu.jo</a>

### Course Delivery Method

Course Delivery Method			
<input checked="" type="checkbox"/> Physical	<input type="checkbox"/> Online	<input type="checkbox"/> Blended	
Learning Model			
Precentage	Synchronous	Asynchronous	Physical
	0%	0%	100%

### Course Description

The module introduces the main concepts of differential equations. The module covers the following main topics: Classification, solutions and initial value problems, direction field, first order ordinary differential equations and solutions. Second and higher order differential equations. Laplace transforms for solving initial value problems. Series Solutions near ordinary points, linear systems of differential equations.

### Course Learning Outcomes

Number	Outcomes	Corresponding Program outcomes
<b>Knowledge</b>		
K1	Understand the basic concepts, classifications, methods, and the theory of solving ordinary differential equations.	K <sub>p1</sub>
K2	Modeling of real-life problems using ODEs.	K <sub>p3</sub>
<b>Skills</b>		
S1	Use computer software like GeoGebra to solve ODEs.	S <sub>p4</sub>
<b>Competencies</b>		
C1	Thinking reasonably and the ability to make decisions.	C <sub>p1</sub>
C2	Work in a team to implement one of the tasks of the course.	C <sub>p2</sub>

## Learning Resources

<b>Course textbook</b>	Zill, D., Wright, W. (2013) Differential Equations with Boundary-Value Problems (8 <sup>th</sup> ed.). Brooks/Cole
<b>Supporting References</b>	<ul style="list-style-type: none"> <li>• Nagle, K., Saff, N., Snider, A. (2012) Fundamentals of Differential Equations. (8<sup>th</sup> ed.). Addison Wesley.</li> <li>• Boyce, W., Richard D. (2010) Elementary Differential Equations and Boundary Value Problems. (9<sup>th</sup> ed.). Wiley.</li> </ul>
<b>Supporting websites</b>	GeoGebra: <a href="https://www.geogebra.org/">https://www.geogebra.org/</a>
<b>Teaching Environment</b>	<input checked="" type="checkbox"/> Classroom <input type="checkbox"/> laboratory <input type="checkbox"/> Learning platform <input type="checkbox"/> Other

## Meetings and Subjects Timetable

Week	Topic	Learning Methods	Tasks	Learning Material
1	Explanation of the study plan for the course, and what is expected to be accomplished by the students.	Lecture		Course Syllabus
2	<b>Introduction To Differential Equations</b> 1. Definitions and Terminology 2. Initial-Value Problems	Lecture		Chapter 1
3	<b>First-Order Differential Equations</b> 2. Separable Equations 3. Linear Equations	Lecture	Quiz	Chapter 2
4	4. Exact Equations 5. Solutions by Substitutions	Lecture	Quiz	Chapter 2
5	<b>Higher-Order Differential Equations</b> 1. Preliminary Theory—Linear Equations a. Initial-Value and Boundary-Value Problems b. Homogeneous Equations c. Nonhomogeneous Equations	Lecture		Chapter 4
6	2. Reduction Of Order 3. Homogeneous Linear Equations with Constant Coefficients	Lecture	Quiz	Chapter 4
7	4. Undetermined Coefficients - Superposition Approach 5. Undetermined Coefficients - Annihilator Approach	Lecture		Chapter 4
8	6. Variation Of Parameters 7. Cauchy-Euler Equation	Lecture	Midterm Exam	Chapter 4
9	8. Green's Functions a. Initial-Value Problems b. Boundary-Value Problems	Lecture		Chapter 4
10	<b>Series Solutions of Linear Equations</b> 2. Solutions About Ordinary Points	Lecture		Chapter 6
11	3. Solutions About Singular Points	Lecture	Quiz	Chapter 6
12	<b>The Laplace Transform</b> 1. Definition Of the Laplace Transform	Lecture		Chapter 7
13	2. Inverse Transforms and Transforms of Derivatives 3. Operational Properties I	Lecture		Chapter 7

<b>14</b>	4. Operational Properties II 5. The Dirac Delta Function	Lecture	Quiz	Chapter 7
<b>15</b>	Review	Lecture		Chapter 7
<b>16</b>	Final Exam			

\* Includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

### Course Contributing to Learner Skill Development

<b>Using Technology</b>
<ul style="list-style-type: none"> <li>Use GeoGebra to solve ODEs graphically and analytically.</li> </ul>
<b>Communication Skills</b>
<ul style="list-style-type: none"> <li>Choose a special case ODE and present it to the students and explaining its solution method.</li> </ul>
<b>Application of Concepts Learnt</b>
<ul style="list-style-type: none"> <li>Formulate a real-life situation using ODE and completely solve it analytically.</li> </ul>

### Assessment Methods and Grade Distribution

Assessment Methods	Grade Weight	Assessment Time (Week No.)	Link to Course Outcomes
Mid Term Exam	30%	11	K1, K2
Various Assessments *	30%	Continuous	S1, C1, C2
Final Exam	40%	16	K1, K2
<b>Total</b>	<b>100%</b>		

\* Includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

### Alignment of Course Outcomes with Learning and Assessment Methods

Number	Learning Outcomes	Learning Method*	Assessment Method**
<b>Knowledge</b>			
<b>K1</b>	Understand the basic concepts, classifications, methods, and the theory of solving ordinary differential equations.	Lecture	<b>Exam</b>
<b>K2</b>	Modeling of real-life problems using ODEs.	Lecture	<b>Exam</b>
<b>Skills</b>			
<b>S1</b>	Use computer software like GeoGebra to solve ODEs.	Homework	<b>Computer Project</b>
<b>Competencies</b>			
<b>C1</b>	Thinking reasonably and the ability to make decisions.	Discussion	<b>Quiz</b>
<b>C2</b>	Work in a team to implement one of the tasks of the course.	Case Study	<b>Group Project</b>

\* Includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

\*\* Includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

## Course Policies

Policy	Policy Requirements
<b>Passing Grade</b>	The minimum passing grade for the course is (50%) and the minimum final mark recorded on transcript is (35%).
<b>Missing Exams</b>	<ul style="list-style-type: none"> <li>• Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment.</li> <li>• A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from an exam or assessment due date.</li> <li>• A student who has an excuse for missing a final exam should submit the excuse to the dean within three days of the missed exam date.</li> </ul>
<b>Attendance</b>	The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lectures days (M, W) and seven lectures (S, T, T). If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory excuse accepted by the dean of the faculty, s/he will be prohibited from taking the final exam and the grade in that course is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college, then withdrawal grade will be recorded.
<b>Academic Honesty</b>	Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as: cheating, plagiarism (academic theft), collusion, and violating intellectual property rights.

### Program Learning Outcomes to be Assessed in this Course

Number	Learning Outcome	Course Title	Assessment Method	Target Performance level
<b>Kp1</b>	The student has completed knowledge of the basic concepts, facts and theories in mathematics.	Ordinary Differential Equations	Quiz	100% of the students get 70% or more on the rubric

### Description of Program Learning Outcome Assessment Method

Number	Detailed Description of Assessment
<b>Kp1</b>	The student is given an ODE, to distinguish this equation in terms of type, degree and linearity, and then choose the appropriate solution method, and review all other possible ways to solve the equation.

## Assessment Rubric of the Program Learning Outcome

<b>Poor (1 pt.)</b> Student is very confused and does not understand the topic, nor is able to clearly grasp how to apply it or when to use it.	<b>Fair (2 pts)</b> Student has a decent grasp of the process but makes some major mistakes.	<b>Good (3 pts)</b> Student is almost perfect in their understanding of the topic, with some minor confusion or mistakes.	<b>Excellent (4 pts)</b> Student understands the concept perfectly.
<ul style="list-style-type: none"> <li>• You may be confused about the skill and/or concept, used incorrect reasoning, and/or made one or more algebraic errors that completely change the nature of the problem.</li> <li>• You may have forgotten or failed to use a critically important algebraic technique, or differentiation or antidifferentiation technique, which made it impossible to complete the problem.</li> </ul>	<ul style="list-style-type: none"> <li>• You may be confused about some aspect of the concept or skill, did not completely answer the question, did not use consistent notation, used terminology incorrectly, failed to adequately explain your work, and/or made more than one slight algebraic or calculus error.</li> </ul>	<ul style="list-style-type: none"> <li>• You have demonstrated full understanding of the concepts involved, but you may have made a very small algebraic error (a sign error or arithmetic error, for example) that does not change the nature of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>• You have demonstrated full understanding of the concepts involved. You clearly show all steps of your reasoning. Your notation is flawless. You wrote clear prose, and have made no algebraic errors or calculus errors.</li> </ul>