Prince Sultan University

Deanship of Educational Services

Mathematics and General Sciences

171 Semester 2017 - 2018

INSTITUTIONAL COURSE SYLLABUS TEMPLATE

Course Code: Math225	**Course Title**: Differential Equations
Course Instructor: Prof. Dr. Jehad Alzabut	**Email**: jalzabut@psu.edu.sa
Credit Hours: 4	**Lectures**: Sunday, Monday, Tuesday, Wednesday 10.00—10.50, 11.00—11.50
Office Hours: Monday, Wednesday	HO: 9.00—10.00 and 12.00—12.45
Office:	New Building 2-B11

Mission: The Department of Mathematics and General Sciences is committed to offering a broad high quality education that will lay a durable educational foundation to meet the specialized professional development requirements in PSU degree programs. The department supports the development of student's skills that enables them to perceive patterns in complexity, render reasoned judgments, and seek the highest level of intellectual achievement and personal growth. We also encourage the students to develop personal qualities such as perseverance, initiative, self-confidence and independence.

I. Course Description: This course introduces the students to various topics in ordinary differential equations. These topics include: techniques for solving first order differential equations such as linear equations, separable equations, exact equations and integrating factors; homogeneous and general second order linear equations; higher order linear equations; power series solutions; the Laplace transform and applications in science and engineering, Fourier Series and its convergence theorem, Separation of Variables, Heat Equation, Wave Equation and Laplace equation.

II. Course Learning Outcomes:

Skills	Course Learning Outcomes	Measured by
Knowledge (Recall& Use)	1. Recognize the characteristics of various types of differential equations. 2. Apply analytical techniques to solve 1-st, 2-nd and higher order differential equations.	By homework, quizzes and exams.
Comprehension (Understanding)	NA	
Application (Applying)	1. Analyse to demonstrate models of differential equation in fields such as physics, biology and engineering.	By homework, quizzes and exams.
Evaluation	NA	
Affective Interpersonal	NA	

III. Course Content or your weekly schedule (Specific course topics to be covered within the semester).

Topics	No. of Weeks	Contact Hours
1.1 Direction Fields 1.2 Classification of Differential Equations	1 (17.9-21.9)	4
1.3 Solutions of Differential equations 2.1 Linear Equations with Variable Coefficients 2.2 Separable Equations	1 (25.9-28.9)	4
2.4 Bernoulli Equation in Exercise is included. 2.4 Linear and nonlinear equations: existence. 2.6 Exact Equations and Integrating Factors	1 (1.10-5.10)	4
2.6 Exact Equations and Integrating Factors 2.8 The Existence & Uniqueness Theorem: Picard's iterates 3.1 Homogeneous Equations with Constant Coefficients ***Quiz 1:11.10.2017**	1 (8.10-12.10)	4
3.2 Fundamental Solutions of Linear Homogeneous Equations 3.3 Complex Roots and the Characteristic Equation	1 (15.10-19.10)	4
Major I: Saturday October 21 at 13.00		
3.4 Repeated Roots; Reduction of Order 3.3 Euler Equation in Exercise is included.	1 (22.10-26.10)	4
3.5 Nonhomogeneous Equations; Method of UCs 3.6 Variation of Parameters	1 (29.10-2.11)	4
4.1,4.2, 4.3,4.4: Higher Order Linear Equations	1 (5.11-9.11)	4
5.1Series Solutions Near an Ordinary Point 5.2Series Solutions Near Regular Singular Point	1 (12.11-16.11)	4

***Quiz 2: 15.11.2017**		
5.4 Euler equation, Regular singular points 5.5 Series Solutions Near Regular Singular Point	1 (19.11-23.11)	4
Major II: Saturday November 25 at 13.00		
6.1 Definition of the Laplace Tranform 6.2 Solutions of Initial Value Problems	1 (26.11-30.11)	4
6.3 The Convolution Integral 7.1 Fourier Series 7.2 F. Series Convergence ***Quiz 3: 06.12.2017**	1 (3.12-7.12)	4
7.3 Even and Odd Functions 7.4 Separation of Variables	1 (10.12-14.12)	4
Major III: Saturday December 16 at 13.00		
7.5 Heat Equation 7.6 Wave Equation	1 (17.12-21.12)	4
7.7 Laplace Equation Review	1 (24.12-28.12)	4

IV. Course Components (Indicate the total contact hours within the semester).

Component	Contact Hours
Lecture	45
Tutorial	15
Practical/Field	

V. Teaching Strategies

Domain	Strategy
Knowledge	Lectures, Discussions, Examples & Tutorials
Cognitive Skills	
Interpersonal Skills & Responsibility	Lectures, Discussions, Examples & Tutorials
Numerical & Communication Skills	

VI. Course Requirements

Quizzes, Majors and Final Exam

VII. Student Assessment

A. Assessment Task

Domain	Assessment Task
Knowledge	Quizzes, Majors and Final Exam
Cognitive Skills	
Interpersonal Skills & Responsibility	Quizzes, Majors and Final Exam
Numerical & Communication Skills	

B. Schedule of Assessment

Assessment	Assessment Task	Week Due	Proportion of Final Assessment
1	Quiz 1	October 11, 2017	3%
2	Major I	Saturday October 21 at 13.00	17%
3	Quiz 2	November 15, 2017	3%
4	Major II	Saturday November 25 at 13.00	17%
5	Quiz 3	December 6, 2017	3%
6	Major III	Saturday December 16 at 13.00	17%
7	Final	13.01.2018 at 8.30	40%

VIII. Learning Resources

A. References

TEXTBOOK: Elementary Differential Equations and Boundary Value Problems.
Author: Boyce, W. E. and Di Prima, R. C.
Edition: Tenth.
Publisher: John Wiley and Son's

SUPP. TEXTBOOK: Differential Equations with Boundary Value Problems
Author: D. G. Zill, M. R. Cullen
Edition: Seventh
Publisher: Brooks/Cole

ELECTRONIC MATERIALS: You tube videos on differential equations.

B. Facilities Required

- Classrooms with capacity of 30 students
- Whiteboard
- Data show projector and screen
- Smart board and online course.

C. Learning Management System – LMS is efficiently used. All solutions to quizzes and Major Exams, Lecture Notes and Important instructions can be found on the university LMS at https://lms.psu.edu.sa/