جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Applied Partial Differential Equations I - AMCS 231

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	AMCS 231
Course Title	Applied Partial Differential Equations I
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	10:30 AM - 12:00 PM | Sun Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Diogo Gomes	Diogo.Gomes@KAUST.EDU.SA	+966128080208	4116, 1, Al-Khawarizmi (bldg. 1)	TBA
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Teaching Assistant(s)

Name	Email
TBA	TBA

Course Information

Comprehensive Course Description	First part of a sequence of courses on partial differential equations (PDE) emphasizing theory and solution techniques for linear equations. Equations of diffusion, heat conduction, and wave propagation. The method of characteristics. Introduction to quasi-linear PDE, shock waves and Hamilton-Jacobi equations.
Course Description from Program Guide	First part of a sequence of courses on partial differential equations (PDE) emphasizing theory and solution techniques for linear equations. Origin of PDE in science and engineering. Equations of diffusion, heat conduction, and wave propagation. The method of characteristics. Classification of PDE. Separation of variables, theory of the Fourier series and Fourier transform. The method of Greens functions. Sturm-Liouville problem, special functions, eigenfunction expansions. Higher dimensional PDE and their solution by separation of variables, transform methods, and Greens functions. Introduction to quasi-linear PDE and shock waves.
Goals and Objectives	Basic techniques in partial differential equations.Special solutions methods (traveling waves and self-similar solutions). Solution methods for linear equations. Method of characteristics. Shock-waves and Rankine-Hugoniot conditions.
Required Knowledge	Multivariable calculus, ordinary differential equations, and linear algebra.
Reference Texts	L.C. Evans - Partial Differential Equations
Method of evaluation	**30.00**% - Tests **10.00**% - Homework /Assignments **60.00**% - Final exam

Nature of the assignments	Homeworks.
Course Policies	No late homeworks. No make-up exams or midterms.
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 08/25/2019 Wed 08/28/2019	Introduction
2	Sun 09/01/2019 Wed 09/04/2019	Distributions
3	Sun 09/08/2019 Wed 09/11/2019	Distributions
4	Sun 09/15/2019 Wed 09/18/2019	Laplace's equation
5	Sun 09/22/2019 Wed 09/25/2019	University holiday
6	Sun 09/29/2019 Wed 10/02/2019	Laplace equation
7	Sun 10/06/2019 Wed 10/09/2019	Heat equation
8	Sun 10/13/2019 Wed 10/16/2019	Heat Equation
9	Sun 10/20/2019 Wed 10/23/2019	Wave Equation
10	Sun 10/27/2019 Wed 10/30/2019	Mid-semester break
11	Sun 11/03/2019 Wed 11/06/2019	Wave Equation
12	Sun 11/10/2019 Wed 11/13/2019	Method of Characteristics
13	Sun 11/17/2019 Wed 11/20/2019	Conservation laws and Rankine Hugoniot conditions
14	Sun 11/24/2019 Wed 11/27/2019	Hamilton-Jacobi equations
15	Sun 12/01/2019 Wed 12/04/2019	Further topics
16	Sun 12/08/2019	Exams

Note

The instructor reserves the right to make changes to this syllabus as necessary.