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	2018/2019
Semester Start Date	08/26/2018
Semester End Date	12/11/2018
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

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	**60.00**% - Final exam **10.00**% - Homework /Assignments **30.00**% - Tests
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 08/26/2018 Wed 08/29/2018	Introduction
2	Sun 09/02/2018 Wed 09/05/2018	Heat Equation
3	Sun 09/09/2018 Wed 09/12/2018	Heat equation
4	Sun 09/16/2018 Wed 09/19/2018	Laplace's equation
5	Sun 09/23/2018 Wed 09/26/2018	Laplace's equation
6	Sun 09/30/2018 Wed 10/03/2018	Wave equation
7	Sun 10/07/2018 Wed 10/10/2018	Wave equation
8	Sun 10/14/2018 Wed 10/17/2018	Self-similar solutions and traveling wave solutions
9	Sun 10/21/2018 Wed 10/24/2018	Self-similar solutions and traveling wave solutions
10	Sun 10/28/2018 Wed 10/31/2018	Method of characteristics
11	Sun 11/04/2018 Wed 11/07/2018	Method of characteristics
12	Sun 11/11/2018 Wed 11/14/2018	Shock waves and conservation laws
13	Sun 11/18/2018 Wed 11/21/2018	Shock waves and conservation laws
14	Sun 11/25/2018 Wed 11/28/2018	Hamilton-Jacobi equations
15	Sun 12/02/2018 Wed 12/05/2018	Hamilton-Jacobi equations
16	Sun 12/09/2018	Further topics
17		Further topics
18		

Note

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