



Course Syllabus: Applied Mathematics I - AMCS 201

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	AMCS 201
Course Title	Applied Mathematics I
Event Details	Lecture AMCS 201
Academic Semester	Spring
Academic Year	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
Class Schedule (Days & Time)	01:00 PM - 02:30 PM Sun Thu

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Lajos Mihaly Loczi	lajos.loczi@kaust.edu.sa		4200-CU12, Level 4, Building 1, 1, Al- Khawarizmi (bldg. 1)	By appointment

Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	<p>AMCS 201 and 202 may be taken separately or in either order. This course is part of a fast-paced two-course sequence in graduate applied mathematics with emphasis on analytical techniques.</p> <p>Fourier series and their convergence.</p> <p>Linear homogeneous and nonhomogeneous ordinary differential equations (ODEs) of first, second and higher order. Systems of ODEs. Matrix functions. Phase plane. Linear differential operators, Sturm-Liouville problems for second-order ODEs, Green's functions. Series expansions of solutions to ODEs. Some special functions.</p> <p>Second-order linear partial differential equations (PDEs) of parabolic, hyperbolic, and elliptic type. The heat equation, the wave equation and Laplace's equation. Solutions via the separation of variables and Fourier series. The method of characteristics for first-order linear and quasilinear PDEs.</p>
Course Description from Program Guide	<p>Prerequisites: Advanced and multivariate calculus and elementary complex variables. AMCS 201 and 202 may be taken separately or in either order. Part of a fast-paced two (2)-course sequence in graduate applied mathematics for engineers and scientists, with an emphasis on analytical technique. A review of practical aspects of linear operators (superposition, Greens functions, and eigenanalysis) in the context of ordinary differential equations, followed by extension to linear partial differential equations (PDEs) of parabolic, hyperbolic, and elliptic type through separation of variables and special functions. Integral transforms of Laplace and Fourier type. Self-similarity. Method of characteristics for first-order PDEs. Introduction to perturbation methods for nonlinear PDEs, asymptotic analysis, and singular perturbations. No degree credit for AMCS majors.</p>
Goals and Objectives	<p>Solving and analyzing the solutions of certain classes of first- or second-order linear ordinary or partial differential equations with initial and boundary conditions.</p>

Required Knowledge	Advanced and multivariate calculus and elementary complex variables
Reference Texts	D. G. Zill, M. R. Cullen: Advanced Engineering Mathematics (3rd edition, 2006) E. Kreyszig: Advanced Engineering Mathematics (9th edition, 2006) R. Haberman: Applied Partial Differential Equations
Method of evaluation (Percentages & Graded content such as Assignments, Oral quizzes, Projects, Midterm exam, Final Exam, Attendance and participation, etc.)	26.00% - Final exam 24.00% - Homework /Assignments 25.00% - Exam 2 25.00% - Exam 1
Nature of the assignments (assigned reading, case study, paper presentation, group project, written assignment, etc.)	There will be 8 homework assignments during the semester; the students should work out the details of the problems individually. During the course there will be two midterm exams and a final exam; all exams are closed-note, closed-book exams, however, a handwritten formula sheet of size A4 can be used. At the end of the course, a standard letter grade is obtained.
Course Policies (Absences, Assignments, late work policy, etc.)	Students are expected to attend all classes and exams. They are required to submit every assignment on time. Incomplete grade (I) for the course will only be given under extraordinary circumstances (such as sickness).
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week/Lecture	Topic
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Note

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