Applied Mathematics I — Course Syllabus

Course Number: AMCS 132

Course Title: Applied Mathematics I

Academic Semester:	Spring	**Academic Year:**	2015/2016
Semester Start Date:	Jan 24, 2016	**Semester End Date:**	May 19, 2016

Class Schedule: Sun & Thu, 13:00-14:30

Classroom Number:

Instructor(s) Name(s): Lajos Loczi
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Teaching Assistant name:
Email:

Office Location: Bldg 1, MCSE, 4307-CU03
Office Hours: By appointment

COURSE DESCRIPTION FROM PROGRAM GUIDE

Applied Mathematics I (3-0-3) (Equivalent to AMCS 201)
Part of a fast-paced two-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, Green's 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.

COMPREHENSIVE COURSE DESCRIPTION

AMCS 132 and 153 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.

Fourier series and their convergence.

A review of linear homogeneous and nonhomogeneous ordinary differential equations (ODEs) of first, second and higher order.

Linear differential operators, Sturm-Liouville problems for second-order ODEs, Green's functions.

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.

Series expansions of solutions to ODEs. Some special functions. Asymptotic analysis and perturbation methods.

GOALS AND OBJECTIVES

Solving or analyzing the solutions of certain classes of first- or second-order linear ordinary or partial differential equations with initial and boundary conditions.

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

— C. M. Bender, S. A. Orszag: Advanced Mathematical Methods for Scientists and Engineers I, Asymptotic Methods and Perturbation Theory

METHOD OF EVALUATION

Percentages	Graded content
24% **25%** **25%** **26%**	**Homework assignments** **Exam 1** **Exam 2** **Final exam**

COURSE REQUIREMENTS

Assignments

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.
To pass the course with a Satisfactory grade (S), one should obtain at least 70% (where Homework assignments + Exams = 100%).

Course Policies

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).

NOTE

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