JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Applied Mathematics & Statistics 553.781
Numerical Analysis
Fall, 2017 (4 credits)

Instructor
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Teaching Assistant
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Office hours: Mondays 9:00–11:00 am

Meetings
Tuesday, Thursday, 9:00–10:15 am, Gilman 377

Textbook
Recommended: Numerical Analysis : *Mathematics of Scientific*
Computing (3rd edition). W. Cheney, D. Kincaid

Online Resources
Please log in to Blackboard for all materials related to this course.

Course Information

- This course will introduce the mathematical foundations of numerical analysis
and illustrate its importance for various problems in sciences. The core topics that
shall be addressed deal with numerical methods for the resolution of equations
(linear and nonlinear), eigenvalue problems, interpolation of functions and
approximation of integrals, each subject coming with a rigorous examination of
convergence results and error analysis. Following these, we will examine several
topics specific to the approximation of solutions to linear second order partial
differential equations arising in various contexts.
All methods studied throughout the course will be illustrated with concrete
algorithms and simulations using MATLAB.
- **Prerequisites**
Calculus 3 (AS.110.202 or the equivalent)
Linear Algebra (AS.110.201 or the equivalent)

Course Goals

- Learn the fundamental results of numerical analysis and the mathematical methods behind them.
- Be able to prove convergence results, analyze approximation errors and computational complexity of numerical methods.
- Implement and evaluate empirically different algorithms and methods using MATLAB (or other programming language of choice).

Course Topics

- Number representation in computers, floating point arithmetic.
- Resolution of non-linear equations.
- Numerical matrix analysis: solutions of linear systems and eigenvalue problems.
- Approximation and interpolation of functions.
- Numerical integration.
- Numerical methods for partial differential equations.

Course Expectations & Grading
Final grade will be obtained from the average of assignments' grade (total of around six Assignments).

Assignments & Readings
One assignment approximately every two weeks, available on Blackboard. Homework will include questions requiring simple programming in MATLAB.

Ethics
The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.
Report any violations you witness to the instructor.

You can find more information about university misconduct policies on the web at these sites:

- For undergraduates: http://e-catalog.jhu.edu/undergrad-students/student-life-policies/
- For graduate students: http://e-catalog.jhu.edu/grad-students/graduate-specific-policies/

Students with Disabilities
Any student with a disability who may need accommodations in this class must obtain an accommodation letter from Student Disability Services, 385 Garland, (410) 516-4720, studentdisabilityservices@jhu.edu .