

**The Johns Hopkins University**  
**EN 560.601**  
**Applied Math for Engineers**  
**Spring 2019**

**Instructor:** Felix Ye (Office: krieger 411)

**Lectures:** MW 12:00-1:15pm, in Hodson 203

**Instructor Office Hours:** Mon 2-3pm in Whitehead 302 or by appointment

**TA:** Nilaysinh Thakor (nthakor4@jhu.edu)

**TA Office Hours:** Tuesday 1-2pm in Whitehead 212.

**E-Mail Address:** xye16@jhu.edu

Email will be a major line of communication between the student and the instructor. I will send urgent announcements and important information via email. Please check your university email regularly.

**Web Page:** Check the course page in blackboard regularly. Homework assignments, course announcements, and grades will be posted there.

**Course Description:** This course presents a broad survey of the basic mathematical methods used in the solution of ordinary and partial differential equations: linear algebra, power series, Fourier series, separation of variables, integral transforms. Course is NOT open to master's students in Financial Mathematics or Applied Mathematics and Statistics. Prerequisite: Vector Calculus, Linear Algebra, Ordinary Differential Equations and any programming languages.

**Learning Objects:**

- Analyze various kinds of ODEs and system of ODEs and be able to seek theoretical or numerical solutions.
- Identify types of PDEs and be able to perform basic analysis on the solutions to those PDEs.
- Familiarize with the main ideas and methods of unconstrained and constrained optimization.
- Familiarize with numerical methods and implementation in MATLAB.

**Textbook:** Advanced Engineering Mathematics, 10th Edition (or any other edition)

The textbook is not required. I will loosely follow this book, however, I will put some additional material into it.

**Grading Policy:**

Homework	30%
Midterm 1	20%
Midterm 2	20%
Final Exam	30%

**Letter Grade Distribution in %:**

A-/A/A+	90-100%
B-/B/B+	80-89%
C-/C/C+	70-79%
D-/D/D+	60-69%
F	0-59%

**Class Meetings:** Monday, Wednesday classes will be lectures given by the instructor which cover theories and core materials. In case of missed lectures due to severe weather or instructor family reasons, the make-up class will be scheduled. (Possibly on Fri 12:00-1:15PM)

**Exams:** There will be three exams. Midterms are in class and the final is arranged by office of the registrar (May 13th 9AM-12PM). The midterm I is on Mar 13th and the midterm II is on April 17th. Both dates are subject to change. The final will be cumulative as the course material naturally builds on itself. Exams are closed book and closed notes. During each exam, you are not allowed to use calculators, however, you may bring an A4 size double-sided sheet.

Make-ups for the Midterm and Final Exams may be available if exams are missed due to illness or family emergency. Make-up exams are only available if discussed with the instructor at least 1 day before the date of the exam. If an emergency arises after that time and there is a valid excuse, then the exam will be removed from the student's total grade for the course, and the remainder reweighs accordingly. Proper documentation of the emergency must be presented before either of these options can be offered.

**Homework:** Homework assignments will be assigned regularly. There are 10 sets of homework in total. Homework will be assigned at least one week ahead and due on the coming Wednesday (except the two Midterms).

Unless discussed ahead of time with the instructor, the following rules apply to late homework: **75% credit if turned in after class but before 4pm on due day; no credit after 4pm on due day.**

If homework is not turned in during class, it **MUST** be delivered to my office in Krieger 411. If an emergency arises and there is a valid excuse, then this homework set will be removed from the student's total grade for the course, and the remainder reweighs accordingly.

**Attendance:** Although attendance will not be taken, I strongly encourage you attend and participate in every lecture. This is one of the best ways to ensure success in the course.

**Academic Misconduct:** 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.

In addition, specific ethics guidelines for this course are as follows: Students may discuss homework. However, all solutions **MUST** be written up and submitted individually. The same rules apply to computer programs. Basic ideas may be discussed but detailed codes should not be copied or shared. Finally, exams must represent the result of individual effort and communication is permitted only with the instructor and TA.

Report any violations you witness to the instructor. You may consult the associate dean of student affairs and/or the chairman of the Ethics Board beforehand. See the guide on "Academic Ethics for Undergraduates" and the Ethics Board Web site (<http://ethics.jhu.edu>) for more information.

### **Tentative Course Outline and Schedule:**

- Week 1: Advanced linear algebra. HW 1 is assigned.
- Week 2: Advanced linear algebra. HW 1 due on Feb 6th. HW 2 is assigned.
- Week 3: Advanced ODEs. HW 2 due on Feb 13th. HW 3 is assigned.
- Week 4: Laplace transforms (Chap 6). HW 3 due on Feb 20th. HW 4 is assigned.
- Week 5: Fourier analysis (Chap 11). HW 4 due on Feb 27th. HW 5 is assigned.
- Week 6: **Intro to PDEs** (Chap 12). HW 5 due on Mar 6th.
- Week 7: **Intro to PDEs** (Chap 12). Midterm 1 on Mar 13th (Week 1-5). HW 6 is assigned.
- Week 8: Spring break.
- Week 9: Intro to Numerical analysis & Numeric Linear Algebra (Chap 19& 20). HW 6 due on Mar 27th. HW 7 is assigned.
- Week 10: Numeric Linear Algebra (Chap 20).HW 7 due April 3rd. HW 8 is assigned.
- Week 11: **Numerics for ODEs and PDEs** (Chap 21). HW 8 due April 10th.
- Week 12: **Numerics for ODEs and PDEs** (Chap 21). Midterm II on April 17th (Week 6-10) HW 9 is assigned.
- Week 13: Unconstrained Optimization (Chap 22, optional). HW 9 due April 24th. HW 10 is assigned.
- Week 14: Unconstrained Optimization (Chap 22, optional) & Review. HW 10 due May 1st.