Math 340 Elementary Differential Equations

"Mathematics is the language in which God has written the universe." - Galileo

Mathematics is the unique language that is precise enough to describe the world for science and engineering. In this class, we will start putting together what you have learned in calculus to use mathematics to describe population growth, spring-mass systems, electrical circuits, and a variety of other situations.

Differential equations are one of the most important tools in writing such descriptions. A differential equation is just an equation involving one or more derivatives. Differential equations are important because they let you write a description of a situation in terms of the forces acting in the situation. You can then analyze the equation (often, though not always, by finding a solution) to describe how the situation will evolve over time.

Mathematical language can be approached in several different ways. You can look at problems both algebraically and graphically. This class will push you to translate between these different approaches so you can better understand what each tells you and be better prepared to handle real problems where you may need to switch back and forth between different representations. You will also be asked not just to solve problems, but also to describe and explain mathematical and scientific ideas. In such problems, both the correctness and the clarity of your exposition (including grammar and spelling) will count.

Course Coordinator: Dr. Dinh-Liem Nguyen

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Canvas: This course has multiple components. The course is set up in Canvas using the Quiz section, 11935. Important announcements are made on Canvas. Check your Canvas as regular as possible.

Textbook: The course will follow the free online book Notes on Diffy Qs: Differential Equations for Engineers by Jiri Lebl (link http://www.jirka.org/diffyqs). We will mainly focus on Chapters 1, 2, 3 and 6 of this book. It is often helpful to have a second reference if you find things confusion. Most elementary differential equation books will work (and you are welcome to use an older edition that will be much cheaper than the current editions.) Another free online text that was used in the past for this course is available at https://onlinehw.math.ksu.edu/math340book/.

Expectations: Students are expected to attend all lectures and recitation sessions. You are in this course because you need or want to learn. Please expect to work hard; read the textbook; complete all assigned work; and ask questions when things don’t make sense. In exchange, you may expect us to do all we can to help you learn. Please do not use cell phones, ipads, or computers in class.

Course Procedures

The class is structured with two large lectures a week where new material will be introduced and old material summarized, one computer lab where you can experiment with different mathematical situations with a partner, and one recitation where you can get help on the homework and other topics in the course.

Homework: Written homework will be assigned roughly weekly and is due in the homework box by 5:00pm on the due date. Homework assignments will be posted on Canvas. Late homework may not be accepted. There will also be regular online homework assignments posted on the class web page. These assignments will be computer graded with immediate feedback. The problems are randomly generated for each student, and you may try an assignment as many times as you want before midnight of the due date. You will receive your highest score over all your attempts on each assignment.

Labs: The course has a weekly computer lab. The studio assignments will be posted on Canvas, and the labs can be accessed from Canvas. You will need to attend the lab session to get specific instructions and help on carrying out the labs. You can continue to work on the labs from any computer with a web browser (that supports Javascript) to finish your work, or to review material while writing up your lab report or while preparing for an exam. Written lab reports will be turned into the lab box by 5:00pm on the due date. Please be careful to turn homework into the homework box and labs into the lab box; different people pick up the different types of assignments.

Extra Credit: There will be a number of extra credit assignments during the term. These assignments will give you a chance to show how well you can do on more involved problems given a week's time. Assignments will be posted online.

Exams: The exams for this course will be from 7:15-8:45pm on the following Tuesdays: September 24, October 22, November 19. Exams may include material from lectures, homework, and labs. The final exam will be comprehensive and
will run from 6:20-8:10pm on Wednesday, December 18 (rooms will be announced later). Exams will be closed book, but you will be permitted one 8.5" x 11" sheet of handwritten notes. You will also be permitted a calculator (without a QWERTY keyboard). Please let me know as soon as possible (preferably in advance) if you must miss an examination. After each exam is graded, a scale will be posted listing the minimum A, B, C, and D scores on that exam.

**Grading:** Grades will be computed mechanically. We will scale written homework and online homework to 80 points each and lab scores to 60 points. Exams will be worth 80 points and the final will be worth 140 points. Extra credit will be worth between 30 and 50 points (depending on the number of assignments). We will then total your scores. We will also total the minimum A on the homeworks, labs, exams, and final. Observe that the minimum A score doesn't include extra credit assignments - those are extra credit that add to your score without changing the cutoffs. If your score is greater or equal to the minimum A score, you've earned an A. If your score is one point below the minimum A score, you've earned a B (and you should have done some extra credit). Students who have 460 points or more before the final (which is possible if you earn sufficient extra credit) will be excused from the final with an A for the course. If you are excused from the final, you will receive written notification, signed by your recitation teacher. If you don't have a signed note, you aren't excused from the final. Appeals for an extra point or two will be carefully considered and then rejected.

**Boilerplate**

**Statement Regarding Academic Honesty**

Kansas State University has an Honor System based on personal integrity, which is presumed to be sufficient assurance that, in academic matters, one's work is performed honestly and without unauthorized assistance. Undergraduate and graduate students, by registration, acknowledge the jurisdiction of the Honor System. The policies and procedures of the Honor System apply to all full and part-time students enrolled in undergraduate and graduate courses on-campus, off-campus, and via distance learning. The honor system website can be reached via the following URL: www.k-state.edu/honor. A component vital to the Honor System is the inclusion of the Honor Pledge which applies to all assignments, examinations, or other course work undertaken by students. The Honor Pledge is implied, whether or not it is stated: "On my honor, as a student, I have neither given nor received unauthorized aid on this academic work." A grade of XF can result from a breach of academic honesty. The F indicates failure in the course; the X indicates the reason is an Honor Pledge violation. In this class, you are authorized to work together on homework, labs, and extra credit, as you see fit unless otherwise instructed on that particular assignment. You will be asked to sign the honor pledge on assignments where you are required to work alone, such as exams.

**Statement Regarding Students with Disabilities**

Students with disabilities who need classroom accommodations, access to technology, or information about emergency building/campus evacuation processes should contact the Student Access Center and/or their instructor. Services are available to students with a wide range of disabilities including, but not limited to, physical disabilities, medical conditions, learning disabilities, attention deficit disorder, depression, and anxiety. If you are a student enrolled in campus/online courses through the Manhattan or Olathe campuses, contact the Student Access Center at accesscenter@k-state.edu, 785-532-6441; for Salina campus, contact the Academic and Career Advising Center at acac@k-state.edu, 785-826-2649.

**Statement Defining Expectations for Classroom Conduct**

All student activities in the University, including this course, are governed by the Student Judicial Conduct Code as outlined in the Student Governing Association By Laws, Article V, Section 3, number 2. Students who engage in behavior that disrupts the learning environment may be asked to leave the class.

**Statement for Copyright Notification**

All lectures copyright 2019 Dinh-Liem Nguyen. During this course, students are prohibited from selling notes to or being paid for taking notes by any person or commercial firm without the express written permission of the professor teaching this course.

**Campus Safety Statement**

Kansas State University is committed to providing a safe teaching and learning environment for student and faculty members. In order to enhance your safety in the unlikely case of a campus emergency make sure that you know where and how to quickly exit your classroom and how to follow any emergency directives. To view additional campus emergency information go to the University's main page, www.k-state.edu, and click on the Emergency Information button.

**Academic Freedom Statement**

Kansas State University is a community of students, faculty, and staff who work together to discover new knowledge, create new ideas, and share the results of their scholarly inquiry with the wider public. Although new ideas or research results may
be controversial or challenge established views, the health and growth of any society requires frank intellectual exchange. Academic freedom protects this type of free exchange and is thus essential to any university’s mission.

Moreover, academic freedom supports collaborative work in the pursuit of truth and the dissemination of knowledge in an environment of inquiry, respectful debate, and professionalism. Academic freedom is not limited to the classroom or to scientific and scholarly research, but extends to the life of the university as well as to larger social and political questions. It is the right and responsibility of the university community to engage with such issues.

Hale Library Statement

On May 22, 2018, a fire in Hale Library resulted in significant smoke and water damage. While the building will be closed for the 2018-2019 school year, library and IT services are available, including Ask a Librarian and the IT Help Desk, which is located in the Student Union. Online resources such as databases, ebooks, and journals are available, but most physical collections that were in Hale during the fire will not be accessible during the 2018-2019 school year. Students should request books and articles that are not available through the Libraries’ free interlibrary loan service. They will work to get these items from other libraries for you. Alternate computer, printing, and study locations have also been identified. For more information about the fire and alternate study locations, visit the Hale Library Recovery website at www.k-state.edu/hale.