MA 214 – Calculus IV, Differential Equations

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Course Website: `www.ms.uky.edu/~kate/teaching/s26_214.html`.

Office Hours Office hours will be an important resource for this class. Office hours are when you can drop by without an appointment. (If none of these times work for you send me an email and we can look for another option.)

Meeting information and expectations You are expected to attend all class meetings and to participate actively. I will start class promptly, so please be in your seat ready to begin before classtime starts.

When you come to class each day, you should bring a notebook or note-taking app to use. Working on outside tasks or assignments for other classes is not appropriate during our classtime.

To succeed in this class, you are expected to work on class material for about 6 hours a week outside of class time. You should spend that time reviewing class notes, reading the textbook, completing homework assignments, studying for assessments, and seeking help for any questions you have. It is very helpful to form a study group with whom to work and receive help, and work on class material consistently throughout the week, not just cramming as due dates approach.

Course description and learning objectives The main goal of this class is to practice problem-solving and critical thinking. The types of problems you will learn to solve are *Ordinary Differential Equations* (ODEs). Specifically you will:

- identify and solve first-order ODEs, particularly separable, linear, and autonomous equations
- identify and solve second-order linear ODEs, using the characteristic equation, variation of parameters, and undetermined coefficients
- solve linear ODEs using the Laplace transform, especially when the ODE involves a Heaviside or Dirac Delta function
- solve systems of first-order linear ODEs
- recognize applications of these types of problems, and practice modeling real-world scenarios with ODEs.

You will practice converting a real-world problem into a mathematical equation and interpreting the solution to that equation in the context of the real-world problem. From this course you will ideally gain stronger problem-solving skills, more mathematical resilience, and better technical communication.

Inclusivity and Disability Help Every student deserves to learn and participate in a classroom that is respectful and supportive. I commit to fostering such an environment for students of all identities, backgrounds, and abilities. Likewise, I expect each of you in this class to act with respect and support toward each other. If at any point you feel unwelcome or uncomfortable in this class, please reach out to me.

I aim to make this class accessible to all students. If you have trouble accessing, viewing, hearing, or responding to any of our class resources, please tell me so I can help you with them. You may seek disability support and documentation from UK's Disability Resource Center: `https://www.uky.edu/DisabilityResourceCenter/`. If you require classroom or testing accommodations (e.g.

a scribe, extended time on exams, etc.), please send me your DRC accommodation letter at least one week ahead of the first assignment you need it for.

Required materials and technology The textbooks for this course is Notes on Diffy Qs by Jiří Lebl, which you can find here: `https://www.jirka.org/diffyqs/html/intro_chapter.html`. Use the navigation menu on the left to find the the topics we're covering.

I recommend you read along and I will list the section that corresponds to each class on the course website.

Our online homework system is called WeBWorK. It is free to use, and an account has already been set up for you. To access WeBWorK, you *must* use the link attached to each homework assignment on Canvas. If you are inactive too long on WeBWorK, you will get logged out and will need to sign back in by navigating through Canvas again.

Prerequisites MA 213 Calculus III: it is recommended that the student earned a grade of C or higher in MA 213.

In this course, we will regularly use topics from previous calculus classes. We will spend some time discussing these topics in class, but it will be your responsibility to review them individually if you don't remember them well. In particular, you should be very comfortable with:

- Derivative techniques (power rule, quotient rule, chain rule, derivatives of exponential functions, trig derivatives, etc.). Ideally you can quickly identify which technique is needed.
- Integration techniques (reverse power rule, integrals of exponential and trig functions, u-substitution, integration by parts, partial fraction decomposition, etc.)
- Integration by Parts and Partial Fraction Decomposition tend to be the topics that students struggle most to remember. Take a look at these and review them if necessary.

Assignments and Grading

Homework is worth 15% of your grade. Your homework will be completed and submitted via WeBWorK. You are encouraged to work together on the homework. It is your responsibility though to make sure you are learning the material and not relying too heavily on others.

Quizzes are worth 20% of your grade. There will be several quizzes throughout the course, taking place during class time, for approximately 25 minutes. Quizzes will be taken individually, without the use of outside resources. Calculators will **not** be permitted, nor will they be necessary to solve the problems.

Exams are worth 65% of your grade. There will be three midterm exams during the semester, on **February 4, March 4, and April 8**. Exams will take place during class time, for 50 minutes. There will also be a cumulative final exam during finals week on **May 6 at 10:30**. Like quizzes, exams will be taken individually without use of calculators or outside resources. Each midsemester exam is worth 15% of your grade. The final exam is 20%.

Your overall letter grade in the class will be based on the following standard breakdown:

percentage	letter grade
90.00 and above	A
80.00 – 89.99	B
70.00 – 79.99	C
60.00 – 69.99	D
59.99 and below	E

University policies

(1) **Academic policies**: This class will adhere to all of UK's official academic policies, which you can find here: `https://ombud.uky.edu/students/academic-policies`
(2) **Integrity, Cheating and Plagiarism**: You are expected to maintain academic honesty in this course. You may work together on homework assignments, but the final submitted work must be your own. Quizzes and exams are individual assignments, and unless otherwise stated, you may not use any outside resources on these assessments. You may not discuss quiz or exam problems with other students who have not already taken the assessment yet. Remember, giving information about an assignment is considered cheating in the same way that receiving information is cheating. If you are unsure whether you are allowed to work with another person or use a certain resources on an assignment, please ask me!