

MTH 303: Differential Equations

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Office Hours: MW 10-11, F 1:30-2:30 PM & by appointment

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Fall 2019

If one looks at the different problems of the integral calculus which arise naturally when one wishes to go deep into the different parts of physics, it is impossible not to be struck by the analogies existing. Whether it be electrostatics or electrodynamics, the propagation of heat, optics, elasticity, or hydrodynamics, we are led always to differential equations of the same family. (Henri Poincare, circa 1890)

Text W. E. Boyce, R.C. DiPrima, D.B. Meade, *Elementary Differential Equations*, 11th edition, J. Wiley & Sons.

Software Throughout the course we will make use of [Mathematica](#) (blue = hyperlink) for the purposes of graphic illustration and computation. For some homework assignments the use of Mathematica will be advantageous. Mathematica is available on all campus clusters and student [software licenses](#) are available. (NOTE: You will have to create an account at this link with Wolfram Research.) A great screencast introduction to using Mathematica is found at: [Hands-on Start to Mathematica](#). Other useful screencasts are at: [Mathematica Screencasts](#). Mathematica notebooks will be used at various times in class and will be posted for your use and reference.

Overview

Course Description Ordinary differential equations; their solutions and applications. Introduction to operators and the Laplace transformation.

Expansion Broad learning objectives for the course include:

- Understand differential equations qualitatively via geometrical methods.
- Understand the role of differential equations in physical models such as: population models, electric circuits, Newton's laws of motion.
- Master analytic techniques for solving linear differential equations including power series techniques and Laplace transforms.

To this end, after brief study of Chapter 1 (essentially a reading assignment) of the aforementioned text, the core of the course is contained in Chapters 2 (2.1,-2.6), 3 (3.1-3.7), 5 (5.1-5.4), and 6 (6.1-6.4) with topics from Chapters 4, 7, and 9.

Expectations My role as course instructor is one of a guide through the material outlined above.

Your role is to become actively engaged in learning this material. I suggest the following steps.

1. The textbook is your primary resource. READ IT. A good approach is:
 - a) Skim the section, pick out bold or italicised items, theorem statements, definitions—skim to get the overall “big picture” of what the section is about.
 - b) Your second reading should be in detail taking notes as you go.
 - c) Attempt to work the examples before reading the solution.
 - d) If there is something you do not understand, formulate a question regarding it and write it down.
2. Work all the assigned problems. Attempt solution on your own before search for a “similar” example in the text.
3. Ask questions.

Assessment

Homework Homework will be assigned from every section of the text we cover. This will not be graded; I expect you to work the suggested problems as part of your learning process and assist in preparation for the exams.

Quizzes 15% There will be weekly quizzes to check your mastery of the material and to help keep you on track.

In Class Exams 65% Three exams will be given during the semester. Makeup exams are not given except under extraordinary documented circumstances. I will announce the exam dates at least one week before the exam.

Final, 20% Given at the assigned time set by the Registrar during finals week.

Miscellaneous

Attendance/Participation I expect you to attend every class and become engaged in discussion periods and problem solving. If you need to miss class due to illness, family emergency, or other reasonable reason, please let me know.

Nondiscrimination Missouri State University is an equal opportunity/affirmative action institution, and maintains a grievance procedure available to any person who believes he or she has been discriminated against. At all times, it is your right to address inquiries or concerns about possible discrimination to the Office for Institutional Equity and Compliance, Park Central Office Building, 117 Park Central Square, Suite 111, (417) 836-4252. Other types of concerns (i.e., concerns of an academic nature) should be discussed directly with your instructor and can also be brought to the attention of your instructor's Department Head. Please visit the OED website at www.missouristate.edu/equity/.

Disability Accommodation If you are a student with a disability and anticipate barriers related to this course, it is important to request accommodations and establish an accommodation plan with the University. Please contact the Disability Resource Center (DRC) at the Disability Resource Center website, Meyer Library, Suite 111, 417-836-4192, to initiate the process to establish your accommodation plan. The DRC will work with you to establish your accommodation plan, or it may refer you to other appropriate resources based on the nature of your disability. In order to prepare an accommodation plan, the University usually requires that students provide documentation relating to their disability. Please be prepared to provide such documentation if requested. Once a University accommodation plan is established, you may notify the class instructor of approved accommodations. If you wish to utilize your accommodation plan, it is suggested that you do so in a timely manner, preferably within the first two weeks of class. Early notification to the instructor allows for full benefit of the accommodations identified in the plan. Instructors will not receive the accommodation plan until you provide that plan, and are not required to apply accommodations retroactively.

Academic Dishonesty Missouri State University is a community of scholars committed to developing educated persons who accept the responsibility to practice personal and academic integrity. You are responsible for knowing and following the university's student honor code, Student Academic Integrity Policies and Procedures and also available at the Reserves Desk in Meyer Library. Any student participating in any form of academic dishonesty will be subject to sanctions as described in this policy.

Cell Phones Let's keep it simple: they are disruptive and interfere with the learning process. Leave them off/on vibrate and put away.

Emergency Response At the first class meeting, students should become familiar with a basic emergency response plan through a dialogue with the instructor that includes a review and aware-

ness of exits specific to the classroom and the location of evacuation centers for the building. All instructors are provided this information specific to their classroom and/or lab assignments in an e-mail prior to the beginning of the fall semester from the Office of the Provost and Safety and Transportation. Students with disabilities impacting mobility should discuss the approved accommodations for emergency situations and additional options when applicable with the instructor. For more information go to <http://www.missouristate.edu/safetran/51597.htm> and <http://www.missouristate.edu/safetran/erp.htm>.