MTH 303:
Differential Equations

Instructor: William O. Bray
Office: Cheek 8M
Office Hours: MWF 1:30-2:30 PM & by appointment
EMAIL
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> *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, *Elementary Differential Equations*, 10th edition, Wiley, ISBN: 9780470458327

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 of the aforementioned text, the core of the course is contained in Chapters 2, 3, 5, and 7 with topics from Chapters 4, 7, and 8.

Assessment

Homework 20% We will have regular homework due online via Webwork; details will be provided in class and/or email. Written assignments will be given occasionally and collected. You are expected to work suggested problems from the text that typically will not be graded (although may be part of the written assignments); this is for your own mastery of the material in preparation for exams.

In Class Exams 60% 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 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 To request academic accommodations for a disability, contact the Director of the Disability Resource Center, Plaster Student Union, Suite 405, (417) 836-4192 or (417) 836-6792 (TTY), www.missouristate.edu/disability. Students are required to provide documentation of disability to the Disability Resource Center prior to receiving accommodations. The Disability Resource Center refers some types of accommodation requests to the Learning Diagnostic Clinic, which also provides diagnostic testing for learning and psychological disabilities. For information about testing, contact the Director of the Learning Diagnostic Clinic, (417) 836-4787, http://psychology.missouristate.edu/ldc.

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 awareness 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.