Course: Honors Differential Equations

Professor: Lyudmyla Barannyk
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e-mail: barannyk@umich.edu
Office Hours: Mo We Fr 11:00 am - 12:00 pm or by appointment or drop-in whenever my office door is open
Course Assistant: Alexander Cepo, acepo@umich.edu
Sunday 6-7:30 pm, Monday 5-6:30 pm
Nesbitt Undergraduate Common Room (2851 East Hall)


Time: Mo We Fr 10:00 AM - 11:00 AM
Location: 4153 USB

Recommended textbooks:


Course website:
http://www.math.lsa.umich.edu/~barannyk/Math286/Math286_W2020.html

Course Description

Prerequisites: Math 285 or permission of instructor.

Alternatives: Math 216 (Intro. to Differential Equations) and Math 316 (Differential Equations) cover much of the same material.

Credits: 3 Credits. Credit is granted for only one course among Math 216, 286, and 316.

Background and Goals: The sequence Math 185-186-285-286 is an introduction to calculus at the honors level. It is taken by students intending to concentrate in mathematics, science, or engineering as well as students heading for many other fields who want a somewhat more theoretical approach. Although much attention is paid to concepts and solving problems, the underlying theory and proofs of important results are also included. This sequence is not restricted to students enrolled in the LS&A Honors Program. Content: Topics include first-order differential equations, higher-order linear differential equations with constant coefficients, an introduction to linear algebra, linear systems, the Laplace Transform, series solutions and other numerical methods (Euler, Runge-Kutta). If time permits, we will also introduce some qualitative theory of differential equations.

Subsequent Courses: Math 471 (Intro. to Numerical Methods) and/or Math 572 (Numer. Meth. for Sci. Comput. II) are natural sequels in the area of differential equations, but Math 286 is also preparation for more theoretical courses such as Math 451 (Advanced Calculus I).
Topics

- Introduction (Chapter 1)
- First-Order Differential Equations (Chapter 2)
- Second-Order Differential Equations (Chapter 3)
- Higher-Order Differential Equations (Chapter 4)
- Series Solutions of Second-Order Differential Equations (Chapter 5)
- The Laplace Transform (Chapter 6)
- Linear Algebra Review
- Systems of First-Order Linear Differential Equations (Chapter 7)
- Numerical Methods (Chapter 8)
- Nonlinear Differential Equations and Stability (Chapter 9)

Exams:  
- *Exam 1*: Friday, February 14 in class  
- *Exam 2*: Friday, March 20 in class  
- *Final Exam*: Monday, April 27, 4-6 pm

Homework: There will be weekly homework assignments that include assigned and suggested homework problems chosen from the textbook. Homework assignments are available on the course website. The assigned problems will be collected for grading. A random selection of problems will be graded. Students are required to solve all homework problems after each lecture in order to gain a better understanding of the course material and prepare for exams.

Course Grade:

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<th>Component</th>
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<tr>
<td>Exam 1</td>
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