Math 3150-003: Partial Differential Equations for Engineers. Spring 2020

Instructor Alexander Balk
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Office Hours: We Th 3-4, or by appointment

Time and Place Mo We Fr 11:50-12:40 in WEB L114

Text

*Applied Partial Differential Equations with Fourier Series and Boundary Value Problems*, 5-th ed. by Richard Haberman
We mostly consider material in Chapters 1-4 and 10

Prerequisites “C” or better in
[Math2250 “Diff Equ & Lin Alg” OR (Math2270 “Lin Alg” AND Math2280 “Intro DEs”)]
AND
[Math2210 “Calculus III” OR Math1260 “AP Calc II” OR Math1321 “Accel Eng Calc II”]

Grading Policy The grade for the class will be based on
(1) Homework — 10%
(2) Quizzes — 50% (1 lowest score will be dropped)
(3) One 50 min midterm — 15%
(4) Comprehensive final — 25%
The (approximate) scale for the total grade (%): A (95-100), A- (90-94), B+ (85-89), B (80-84), B- (75-79), C+ (70-74), C (65-69), C- (60-64), D+ (55-59), D (50-54), D- (45-49), E (0-44)

Weekly It is impossible to learn mathematics without doing work yourself.

Homework Please solve HW problems even if solutions are available to you.
(HW) Besides the assigned problems, you might want to do similar problems. HW will be posted on Canvas; usually assigned on Friday and due Friday of next week.

Weekly In addition to the usual HW, there will be homework in the form of quizzes.

Quizzes They will be 20 min in the beginning of class usually each Friday.
(Qz) We will discuss quiz questions in class. You will be given quiz questions to prepare at home. The questions of the real, in-class, quiz will be slightly different.

Midterm (M) and Final (F) The midterm/final problems will be similar to the ones in HWs and Qzs.

Dates

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Martin Luther King Jr. Day</td>
<td>Mo, Jan 20</td>
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<tr>
<td>Presidents Day</td>
<td>Mo, Feb 17</td>
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<td>Midterm</td>
<td>Fr, Feb. 28; in class</td>
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<tr>
<td>Spring break</td>
<td>Su-Su, March 8-15</td>
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<td>Last class</td>
<td>Mo, April 20</td>
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<tr>
<td>Final</td>
<td>Mo, April 27, 10:30-12:30</td>
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(per university schedule)

You need to solve all test problems (in Qz, M, F) without books, notes, and electronics (e.g. without lecture notes, your own notes, computer, cell phone).

For any problem, just the correct answer (without derivation or explanation) hardly costs anything.

The first quiz is on the first Friday. The first HW is due the second Friday. (over, please)
Course Objectives.
1. To understand the meaning of PDEs and boundary conditions. To see that many real world problems can be formulated in terms of PDEs. To know how to derive the heat, wave, and Laplace equations.
2. To learn how to solve PDEs using the method of separation of variables. This method is the cornerstone of the course. It is connected with the Superposition Principle, and the Fourier Series.
3. To learn the Fourier transform and how to apply it in order to solve PDEs. In particular, we will obtain the fundamental solution of the heat equation and find the general solution of the wave equation.

To demonstrate what we have learned, at the end of the class we will consider cooling of a potato and cooling of Earth (how Lord Kelvin tried to determine the age of Earth). These are mathematically similar problems, but the parameters and the solution methods are different.

If something is unclear, please ask me. Otherwise, small misunderstanding can cause significant problems later. I would be very happy to discuss your questions. You can ask me during lectures (others might have similar problems, and in-class discussion would be helpful), after lectures, during office hours, or make an appointment. Discussions with fellow students can also be very helpful.

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