Math 3150 - 001, Partial Differential Equations for Engineers

SPRING 2018

Instructor: Ornella Mattei
E-mail address: mattei@math.utah.edu
Office phone number: (801) 581-6851
Office location: JWB 128
Office hours: Mondays 3.00pm–4.00pm, Wednesdays 3.00pm–4.00pm, or by appointment
Class schedule: Mondays 10.45am–11.35am, Wednesdays 10.45am–11.35am, Fridays 10.45am–11.35am, WEB L110
Prerequisites: Math 2250 and either Math 1260 or Math 2210

In this course, we will discuss partial differential equations (PDEs) starting from the modeling of physical problems and the derivations of the equations, and introducing the approaches that lead to Fourier series or Fourier transform representations of the solutions, and use the classic ideas as stepping stones to explore practical solutions for problems encountered in the real world.

Expected Learning Outcomes:

1. Become knowledgeable about PDEs arising from classic physical problems and their classifications, be able to derive heat and wave equations based on the idea of flux balancing.

2. Distinguish the roles played by time and spatial variables, and initial vs. boundary conditions for the PDE problem.

3. Appreciate the importance of boundary conditions, and use separation of variables technique for PDEs in finite rectangular regions to reduce the problem to several ODE problems.

4. Understand the ideas of equilibrium and steady solutions, and make a connection between the heat equation and the Laplace equation.

5. Learn about representing functions by Fourier series, as candidates for PDE solutions, and furthermore understand the principle behind the formulas for the coefficients.

6. Understand the concept of series convergence and its relevance to PDE solutions.

7. Understand the idea of Fourier transform in conversion of a PDE problem involving unbounded regions.

8. Be familiar with the technique of Fourier transform and use it to solve PDEs in unbounded regions.

Important dates:
First class: Monday, January 8
Last class: Monday, April 23
Spring break: Monday–Friday, March 19–23
Martin Luther King Jr. Day: Monday, January 15
Presidents Day: Monday, February 19
Midterm 1: Friday, February 16
Midterm 2: Friday, April 13
Final Exam: Friday, April 27, 10.30am12:30pm (see: http://registrar.utah.edu/academic-calendars/final-exams-spring.php). The location will be announced in class.

Homework: Weekly assignments will be posted on Canvas each Monday, and collected in class on the following Monday. No late homework is accepted, unless it has been requested and approved in advance for extreme circumstances.

Quizzes: There will be a quiz every Friday except the first Friday of the semester and on midterm days, for a total of 10 quizzes. There will not be any "make up" quiz. If you miss a quiz you will receive a "0" on that quiz. However, the three lowest quiz scores will be dropped. Quizzes are open book and open notes.

Exams: There will be two midterm exams and a final exam. There will not be any "make up" exam: if you miss an exam you will receive a "0" on that exam. No exam scores will be dropped. Calculators, cell phones, books and notes will not be allowed. Cheating will not be tolerated.

Grades: The break-up for the grades is the following:
15% homework
15% quizzes
20% Midterm 1
20% Midterm 2
30% Final exam
The conversion from numerical scores (N) to letter scores is the following:

<table>
<thead>
<tr>
<th>Numeric Score</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ≥ N ≥ 90</td>
<td>A</td>
</tr>
<tr>
<td>90 &gt; N ≥ 85</td>
<td>A-</td>
</tr>
<tr>
<td>85 &gt; N ≥ 80</td>
<td>B+</td>
</tr>
<tr>
<td>80 &gt; N ≥ 75</td>
<td>B</td>
</tr>
<tr>
<td>75 &gt; N ≥ 70</td>
<td>B-</td>
</tr>
<tr>
<td>70 &gt; N ≥ 65</td>
<td>C+</td>
</tr>
<tr>
<td>65 &gt; N ≥ 60</td>
<td>C</td>
</tr>
<tr>
<td>60 &gt; N ≥ 55</td>
<td>C-</td>
</tr>
<tr>
<td>55 &gt; N ≥ 45</td>
<td>D</td>
</tr>
<tr>
<td>N &lt; 45</td>
<td>E</td>
</tr>
</tbody>
</table>

TAs contacts and Tutoring: I encourage you to come to office hours every time you need it. I am also available to meet students by appointment. You can also seek help at the tutoring
center located in room 155 of the T. Benny Rushing Mathematics Center. It is open from Monday to Friday, from 8am to 8pm, except on Fridays when it closes at 6pm. Their website is http://www.math.utah.edu/ugrad/tutoring.html.

**ADA Statement:** The Americans with Disabilities Act requires that reasonable accommodations be provided for students with physical, cognitive, systemic learning, and psychiatric disabilities. The student needs to have such a disability approved by the Disability Service Office (162 Olpin Union Building, (801) 581-5020) in order to have the accommodations provided. The instructor needs to be informed about such a disability and approved accommodations at the beginning of the semester.

**Disclaimer:** This syllabus has been created as a preview to the course and I have tried to make it as accurate as possible. However, I reserve the right to make reasonable changes to the above policies. Any such changes will be announced in class.