MTH 482/582, Applied Partial Differential Equations

Catalog Description: Partial differential equations, Bessel’s and Legendre’s equations, Fourier analysis, separation of variables, transform methods.

Credits: 3 (This course combines approximately 90 hours of instruction and assignments.)

Terms offered: W

Prerequisites: Enforced: MTH 481/581 or MTH 480 with C- or better.

Meets: Three 50 minute lectures weekly.

Course Content: Two-point boundary value problems, Fourier series for partial differential equations, separation of variables for partial differential equations.

Learning Resources: The required course text is Elementary Differential Equations and Boundary Value Problems, by Boyce and DiPrima (9th edition, Wiley).

Student Learning Outcomes for MTH 482: A successful student in MTH 482 will be able to:

1. Solve eigenvalue problems for elementary two-point boundary value problems.
2. Calculate the Fourier series approximation of a function on an interval from the eigenfunctions of a two-point boundary value problem.
3. Apply the method of separation of variables to solve initial boundary-value problems for heat and wave equations.
4. Differentiate between mean-square convergence and uniform convergence of series of functions.

Student Learning Outcomes for MTH 582: A successful student in MTH 582 will be able to:

1. Analyze and solve eigenvalue problems for elementary two-point boundary-value problems.
2. Calculate and analyze the Fourier series approximation of a function on an interval from the eigenfunctions of a two-point boundary value problem.
3. Identify initial boundary value problems for heat and wave equations and apply the method of separation-of-variables to derive solutions.

4. Identify both mean-square convergence and uniform convergence of series of functions and differentiate between the two types of convergence.

**Evaluation of Student Learning:** Your grade and measurement of your progress on the course outcomes will be based on written homework (assigned in class and collected approximately weekly) along with written midterm and final exam. Additional in-class activities will include problem sessions with blackboard presentations. Student learning will be evaluated using the differentiated learning outcomes of Math 482 and Math 582.

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Midterm Exam I</td>
<td>25%</td>
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<tr>
<td>Midterm Exam II</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>40%</td>
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You may collaborate on homework but you should write up your own solutions in your own words. If you use external sources, you should cite them. The midterms and final exams will be closed book.

**Students With Disabilities:** Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098. Consult [http://ds.oregonstate.edu/home](http://ds.oregonstate.edu/home).

**Academic Honesty and Student Conduct:** Students are expected to be familiar with the Homework and Exam policies stated in this syllabus, as well as Oregon State University's Student Conduct Code.