Prerequisite:  A grade of “C” or better in Math 2203 and Math 2306


References:


The first reference is at the level of the textbook and is useful for additional examples and exercises. The second reference is an excellent resource for the study of PDEs from modeling to theory - a smooth transition to advanced partial differential equations.

To be covered: We will cover most of chapters 1--5 and some sections of chapters 7, 10.

Course Description: This course is an introduction to partial differential equations (PDEs), their applications in the sciences and the techniques that have proved useful in analyzing them. The techniques include separation of variables, Fourier series and Fourier transforms, orthogonal functions and eigenfunction expansions, Bessel functions, and Legendre polynomials. The student will see how the sciences motivate the formulation of partial differential equations as well as the formulation of boundary conditions and initial conditions. Parabolic, hyperbolic, and elliptic PDEs will be studied.

The following is tentative daily plan. Based on class pace, the sections may be reshuffled, but you will be notified of the change in class if any. Please read the sections and get familiar with at least terminology, definitions, laws in physics before coming to class. The symbol (R) next to a section number means that the section a reading assignment.
Tentative Schedule:

<table>
<thead>
<tr>
<th>Day</th>
<th>Section</th>
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<tbody>
<tr>
<td>Aug 20</td>
<td>1.1(R),1.2</td>
<td>Oct 10</td>
<td>5.3</td>
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<tr>
<td>Aug 22</td>
<td>1.3, 1.4</td>
<td>Oct 15</td>
<td>5.4, Review</td>
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<td>Aug 27</td>
<td>1.5, 2.1(R)</td>
<td>Oct 17</td>
<td>Test 2</td>
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<td>Aug 29</td>
<td>2.2, 2.3</td>
<td>Oct 22</td>
<td>5.5</td>
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<td>Sep  3</td>
<td>2.4</td>
<td>Oct 24</td>
<td>5.6</td>
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<tr>
<td>Sep  5</td>
<td>2.5</td>
<td>Oct 29</td>
<td>5.7</td>
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<tr>
<td>Sept 10</td>
<td>3.1(R),3.2</td>
<td>Oct 31</td>
<td>5.8, 7.1(R)</td>
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<tr>
<td>Sept 12</td>
<td>3.3, Review</td>
<td>Nov  5</td>
<td>7.2</td>
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<tr>
<td>Sept 17</td>
<td>Test 1</td>
<td>Nov  7</td>
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<td>Sept 19</td>
<td>3.4,3.5</td>
<td>Nov 12</td>
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<td>Sept 24</td>
<td>3.5,3.6</td>
<td>Nov 14</td>
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<td>Sept 26</td>
<td>4.1 (R),4.2</td>
<td>Nov 19</td>
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<td>Oct 1</td>
<td>4.3, 4.4</td>
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<td>10.5</td>
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<td>Oct 3</td>
<td>4.5</td>
<td>Dec  3</td>
<td>10.6</td>
</tr>
<tr>
<td>Oct 8</td>
<td>5.1(R),5.2</td>
<td>Dec  5</td>
<td>Review</td>
</tr>
</tbody>
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Cumulative Final Exam (Tuesday, Dec 10, 2019, 10:30 AM - 12:30 PM)

Note: Additional material will be covered if time permits. The label (R) next to a section means that the section is assigned for your reading and that it should be read before the next section is covered.

Learning Outcomes: Upon completing this course, students should be able to

1. know what a PDE is, understand the importance of initial and boundary conditions, know the classification of PDEs (parabolic, elliptic, hyperbolic);
2. be able to derive a PDE as well as the initial and boundary conditions corresponding to problems which arise in the sciences and engineering;
3. recognize Sturm-Liouville equations, be aware of the existence and uniqueness properties of boundary value problems, and demonstrate the orthogonality property of solutions of Sturm-Liouville equations;
4. solve PDEs using standard techniques including separation of variables, eigenfunction expansions, Fourier series, Fourier and other integral transforms.

Homework: There will be two types of homework assignments in this course. The first one is for you to exercise for a deeper understanding of topics covered in class. This assignment will not be collected for grading; however, it is imperative that you complete it to develop skills needed for the second type which will be collected for grading. All assignments will be dynamically posted on D2L as the course progresses.

There will be four sets of homework assignments which will be collected for grading. The assignments are due at the start of the class on due dates. Homework submitted after its due date but before it has been returned to class may be accepted with a heavy penalty (usually 25, 50%, 75%; depending upon magnitude of the lateness of the submission; it will be the instructor’s judgment call). Homework handed in after the class has received the graded homework will not be accepted under any circumstances.
You will be required to trust my professional judgment made for grading homework assignments, tests and final exam by using the following rubric:

- 100% credit for correct solutions with coherent reasoning and with absolutely no errors;
- 90% credit for correct solutions, but with incorrect order of arguments, incomplete analysis and/or unclear interpretations;
- 80% credit for mostly correct with no “damaging” errors; but needing fixes;
- 70% credit for mostly correct, but needing a rewrite because of “damaging” errors;
- 60% credit for moderately correct; at least the beginning being correct, but the argument losing its track afterwards; and
- no credit warranted for incorrect, indecipherable and incomplete solutions.

Homework submission guidelines:

- All homework to be graded should be stapled together (credit may be deducted if not).
- Email submissions are not accepted.
- Write your name legibly at the top of the first page.
- All problems must be clearly labeled.
- Homework is due at the beginning of the class.
- From each graded homework sets, only selected problems will be graded.

Students are encouraged to collaborate on homework assignments. However, you are expected to write up your solutions independently. If solutions are found identical to ones of your fellow classmates, you may receive no credit, and may be considered having Academic Misconduct as defined under Code of Academic Integrity as briefed below.

**Academic Integrity Statement:** Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section 5c of the Student Code of Conduct addresses the University’s policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional issue of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an “informal” resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct’s minimum one semester suspension requirement. See also [https://web.kennesaw.edu/scai/content/ksu-student-code-conduct](https://web.kennesaw.edu/scai/content/ksu-student-code-conduct)

**Grading and Evaluation/Makeup Policy:**

Participation = 5%, Homework = 15%, Test 1 = 20%, Test 2 = 20%, Test 3 (take-home) = 20%, Final Exam (cumulative) = 20%

All tests and the cumulative final exam are closed book and closed notes. Make-up tests will only be allowed for a university approved excuse in writing. Wherever possible, you should inform me prior to missing a test. Everyone must take the final. The final exam percentage will be used to replace your one lowest test score if it helps your average. There will be no extra credit in this course, and therefore please do not ask for one.
**Participation:** Your class attendance will be recorded on every class day. Class roll will be passed around the class. Make sure you sign in. There will be **five** participation points for each class day. The points will be based on
- your class attendance for the entire duration of class time;
- participating in course content related discussions erupted in class;
- refraining from unwarranted use of electronic devices (e.g. texting, surfing websites).

Moreover, the participation grade for an unexcused absence will be a zero. Repeated use of electronic devices for purposes unrelated to the learning of the course will result in your participation grade of zero, and you will be asked to leave classroom. Excused absences will not count against your participation grade. The two lowest participation grades will be dropped, and the rest will be averaged for 5% participation grade.

**Grading Scale:**
- A for [90%, 100%], B for [80%, 90%), C for [70%, 80%), D for [60%, 70%), F for [0, 60%]

**Notice on Course Withdrawal:** Students are responsible for maintaining and managing their enrollment status in their classes. A persistent nonattendance does not imply a withdrawal. Per university policy, I will assign a grade of WF to all students who cease to attend the class and do not participate in graded items during or prior to the last two weeks of the semester. The last date of attendance is required to be reported when assigning a grade of WF. Note that my compliance with this policy may affect your financial aid.

**Student Disability Services:** Any student with a documented disability needing academic adjustments is requested to notify the instructor as early in the semester as possible. Verification from KSU Student Disability Services is required. All discussions will remain confidential.

**Classroom Behavior:** All phones, tablets, laptops must be put silent for the duration of each class. Music players cannot be used for the duration of class or testing. You are expected to arrive in class on time, be prepared for learning, and not be disruptive during the class. You may be asked to leave classroom for any misconduct or inappropriate behavior.

The instructor of the course reserves the right to make changes on pages 1-4 of this syllabus and will notify students at their students.kennesaw.edu address at least one week prior to the date the changes take effect if it is necessary to account for ineluctable circumstances.