Math 447 - 01
Introduction to Partial Differential Equations
Fall Semester 2018

Professor: Vianey Villamizar
Class: 12:00 - 12:50 p.m. MWF 135 TMCB
Office: 342 TMCB
Email/Phone: vianey@mathematics.byu.edu / (801)422-1754
Web page: www.math.byu.edu/~vianey

Office Hours:
Mon 2:00-3:00 pm (office),
Fri 3:00-4:00 pm (office),
Wed 5:00-6:30 pm Problem Session on XXXX

TA: Dane Grundvig
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Objectives: To provide the students with a sound and accurate knowledge of the elementary theory, applications, and techniques of partial differential equations. Physical problems have motivated the development of much of mathematics, and this is especially true of differential equations. The development of this course is well described in our Haberman’s textbook: “simple physical models (heat flow, vibrating strings, and membranes) are emphasized. Equations are formulated carefully from physical principles...Solution techniques are developed patiently and mathematical results frequently are given physical interpretations.” Many fundamental problems in science, engineering, and other areas as economics are described by differential equations and more and more problems of new and emerging technologies are

<table>
<thead>
<tr>
<th>Week #</th>
<th>Date</th>
<th>Sections</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Sep 3 – Sep 7</td>
<td>1.1 - 1.4</td>
<td>Mon Sep 3 Labor Day Work hard and enjoy learning</td>
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<tr>
<td>2</td>
<td>Sep 10 – Sep 14</td>
<td>1.4-1.5, 2.1-2.2, 2.4</td>
<td>Tuesday, Sep 11: Last day to drop the class</td>
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<tr>
<td>3</td>
<td>Sep 17 – Sep 21</td>
<td>4.2-4.4, 12.1</td>
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<td>4</td>
<td>Sep 24 – Sep 28</td>
<td>12.2-12.4</td>
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<tr>
<td>5</td>
<td>Oct 1 – Oct 5</td>
<td>Review, 12.5, 2.5</td>
<td>Midterm 1 Testing Center Oct 1-3 (Mon-Wed) Special Review Session Mon Oct 1 5:00-6:30 pm</td>
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<tr>
<td>6</td>
<td>Oct 8 – Oct 12</td>
<td>2.5, 3.1-3.3</td>
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<td>7</td>
<td>Oct 15 – Oct 19</td>
<td>3.3, 3.6, 5.2</td>
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<td>8</td>
<td>Oct 22 – Oct 26</td>
<td>5.3-5.4, Review</td>
<td>Midterm 2 Testing Center Oct 24-26 (Wed-Fri) Special Review Session Wed Oct 24 5:00-6:30 pm</td>
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<td>9</td>
<td>Oct 29 – Nov 2</td>
<td>4.5, 7.1-7.3</td>
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<td>10</td>
<td>Nov 5 – Nov 9</td>
<td>7.4-7.7</td>
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<td>11</td>
<td>Nov 12 – Nov 16</td>
<td>7.7-7.8, Review</td>
<td>Midterm 3 Testing Center Nov 16-20 (Fri-Tue) Special Review Session Wed Nov 14 5:00-6:30 pm</td>
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<tr>
<td>12</td>
<td>Nov 19 – Nov 23</td>
<td>7.9</td>
<td>Thanksgiving holiday Nov 21-23 (Wed-Fri) Tuesday Nov 20 is Friday Instruction</td>
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<tr>
<td>13</td>
<td>Nov 26 – Nov 30</td>
<td>10.1 – 10.4</td>
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<td>14</td>
<td>Dec 3 – Dec 7</td>
<td>10.4-10.6</td>
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<tr>
<td>15</td>
<td>Dec 10 – Dec 14</td>
<td>10.6, Review</td>
<td>Dec 13 Last day of class</td>
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<tr>
<td>16</td>
<td>Dec 17 – Dec 21</td>
<td></td>
<td>Final Exam Thursday Dec 20 11:00-2:00 p.m. at our regular classroom 135 TMCB</td>
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also described by differential equations. I am especially enthusiastic about this topic. My research is based on 
this material. I believe that my role as your instructor is to help and to assist you in the process of learning and 
enjoying mathematics. I will do my best to fulfill this role. I am confident that we will enjoy this class as we 
go along by making a consistent effort throughout the semester.

**Homework:**
Homework consists of written problems (marked boldface in syllabus) and practice problems (non-boldface). 
The written problems constitute 60% of your grade and the practice 40%. You should report in your written 
homework (a line) how much of the 40% you did. Homework will be collected each week on Friday by 6 pm. 
Please place completed homework in the manila folder entitled “Math 447 Homework” on the plastic basket 
by my office door. You are strongly encouraged to work on homework problems everyday. You should be 
willling to put in at least three to four hours outside the classroom for each hour of class (The PDE problems 
 normally require a dedicated work. In most cases each problem is different from others). **I expect that you do 
not work on your homework during the class period.** A discussion of the solutions of homework problems 
will be held during a **weekly problem session on Wednesday evenings.** Late homework won’t be accepted. 
To make up for this, your two lowest weekly homework scores will be dropped. Discussion of homework 
assignments is allowed, but you should keep in mind that homework is an individual work. If you can reach 
the point where you can do fresh problems without help in all sections, I can anticipate that you will be able to 
successfully solve all problems on the midterms and final exam.

**Homework Format (PLEASE ADHERE TO THE FOLLOWING HOMEWORK FORMAT):** Use one 
side only of standard letter-sized paper. Put your name at the top of each sheet. Keep problems in order, and 
label each problem with its number and page. Place only one problem in any horizontal space; visually 
separate consecutive problems by drawing a line between them entirely across the page. If the problem has a 
numerical answer, highlight it in some way. If the answer to a problem involves a sequence of logical steps, 
set them clearly. Use correct grammar and complete sentences.

To submit homework, stack the sheets in order and fold the stack lengthwise to form a “book” with the back 
of the last sheet on the outside. On the front of the “book,” write your name, and the section of the text from 
which these problems are taken. Homework set should contain problems from only one section of the text. 
Homework problems to be graded will be chosen among the whole set of problems. Incomplete homework 
will receive partial credit according to the amount of problems worked out.

**Exams:** The Midterm exams will be based on the material (theory and homework problems) covered until the 
previous lecture and not covered by the previous exam. The final exam will be comprehensive. The Midterm 
exams (three in total) will be given in the testing center according to the above schedule. They won’t have a 
time limit. The final exam will be in our regular classroom with a limit of three hours. **Only basic scientific 
calculators (no graphic or symbolic ones) will be allowed in all exams.** No books or notes will be allowed. 
The questions will be similar to those discussed in class, or those assigned as homework, but some of them 
will require a good understanding of the concepts and techniques. The best way to prepare for the exams is to 
go over the homework problems and the examples worked in class (they constitute your **best study guide** 
and then try to solve related problems that you haven’t seen before.

**Grading:** Grades will be based on cumulative points earned as follows: 
Homework 21 %, Midterms 18% / 18% /18%, and Final exam 25 %.

At the end of the semester, I will make an average of each one of the above forms of evaluations with their 
corresponding weights. Then a Gaussian curve will help me to determine your final grade. In any event, the 
Gaussian curve will not hurt your grade. I will guarantee the following letter grades:

\[
\begin{align*}
B+ &= 89-87\% , \\
A &= 100-93\% , \\
A- &= 92-90\% ,
\end{align*}
\]
\[
\begin{align*}
C+ &= 79-77\% , \\
C &= 76-73\% , \\
C- &= 72-70\% ,
\end{align*}
\]
\[
\begin{align*}
D+ &= 69-67\% , \\
D &= 66-63\% , \\
D- &= 62-60\% .
\end{align*}
\]

Keep in mind that a good grade is the end result of a good learning process. All of you can get a good grade 
by successfully experiencing this learning process.

**Honor Code:** In keeping with the principles of the BYU Honor Code, students are expected to be honest in 
all of their academic work. Academic honesty means, most fundamentally, that any work you present as your
own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university's expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

**Sexual Harassment:** Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education and pertains to admissions, academic and athletic programs, and university-sponsored activities. Title IX also prohibits sexual harassment of students by university employees, other students, and visitors to campus. If you encounter sexual harassment or gender-based discrimination, please talk to your professor or contact one of the following: the Title IX Coordinator at 801-422-2130; the Honor Code Office at 801-422-2847; the Equal Employment Office at 801-422-5895; or Ethics Point at http://www.ethicspoint.com, or 1-888-238-1062 (24-hours).

**Student Disability:** Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability, which may impair your ability to complete this course successfully, please contact the University Accessibility Center (UAC), 2170 WSC or 422-2767. Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. The UAC can also assess students for learning, attention, and emotional concerns. Services are coordinated with the student and instructor by the UAC. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures by contacting the Equal Employment Office at 422-5895, D-285 ASB.

**Respectful Environment:** “Sadly, from time to time, we do hear reports of those who are at best insensitive and at worst insulting in their comments to and about others... We hear derogatory and sometimes even defamatory comments about those with different political, athletic, or ethnic views or experiences. Such behavior is completely out of place at BYU, and I enlist the aid of all to monitor carefully and, if necessary, correct any such that might occur here, however inadvertent or unintentional. "I worry particularly about demeaning comments made about the career or major choices of women or men either directly or about members of the BYU community generally. We must remember that personal agency is a fundamental principle and that none of us has the right or option to criticize the lawful choices of another." President Cecil O. Samuelson, Annual University Conference, August 24, 2010 "Occasionally, we ... hear reports that our female faculty feel disrespected, especially by students, for choosing to work at BYU, even though each one has been approved by the BYU Board of Trustees. Brothers and sisters, these things ought not to be. Not here. Not at a university that shares a constitution with the School of the Prophets." Vice President John S. Tanner, Annual University Conference, August 24, 2010
### HOMEWORK ASSIGNMENTS
Math 447 Introduction to Partial Differential Equations – Fall 2018
Instructor: Vianey Villamizar

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<thead>
<tr>
<th>Due Date</th>
<th>Sections</th>
<th>Problems</th>
<th>Due Date</th>
<th>Sections</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 7</td>
<td>1.2</td>
<td>1.2.1, 1.2.3, 1.2.5, 1.2.8, 1.2.9</td>
<td>Oct 22</td>
<td>3.6</td>
<td>3.6.1-2</td>
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<tr>
<td>Sep 14</td>
<td>1.3 / 1.4</td>
<td>1.3.1, 1.3.2 / 1.4.1e, 1.4.1f, 1.4.2, 1.4.3, 1.4.6, 1.4.12</td>
<td>Nov 2</td>
<td>5.3 / 5.4</td>
<td>5.3.1, 5.3.2, 5.3.4, 5.3.5, 5.3.9 / 5.4.1, 5.4.2, 5.4.3, 5.4.5, 5.4.6 / 4.5.1-2</td>
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<tr>
<td>Sep 21</td>
<td>1.5</td>
<td>1.5.1, 1.5.2, 1.5.3, 1.5.7, 1.5.12-13 / 2.2.2-2.2.4, 2.2.5 / 2.3.1b,c, 2.3.2d, 2.3.3b, 2.3.8 / 2.4.1a, 2.4.1d, 2.4.2, 2.4.3, 2.4.4, 2.4.6</td>
<td>Nov 9</td>
<td>7.2 / 7.3</td>
<td>7.2.1-3 / 7.3.1(d), 7.3.2b, 7.3.4(a), 7.3.6, 7.3.7c / 7.4.1, 7.4.2</td>
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<tr>
<td>Sep 28</td>
<td>4.2 / 4.4</td>
<td>4.2.1-2, 4.2.4 / 4.4.1-2, 4.4.3, 4.4.6-7, 4.4.9, 4.4.10(a,c), 4.4.12 / 12.2.1, 12.2.3-4, 12.2.5a, 12.2.5b, 12.2.5c</td>
<td>Nov 16</td>
<td>7.5 / 7.6</td>
<td>7.5.1, 7.5.2(a), 7.5.4, 7.5.8, 7.5.9, 7.6.1-2, 7.6.4 / 7.71, 7.7.3, 7.7.6, 7.7.10, 7.7.12(d,e)</td>
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<tr>
<td>Oct 1</td>
<td>12.3</td>
<td>12.3.1, 12.3.3, 12.3.5-6</td>
<td>Nov 30</td>
<td>7.8 / 7.9</td>
<td>7.8.1, 7.8.2, 7.8.4, 7.8.7, 7.8.8 / 7.9.3(b,c), 7.9.4(b), 7.9.5</td>
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<tr>
<td>Oct 5</td>
<td>12.4</td>
<td>12.4.1-4</td>
<td>Dec 7</td>
<td>10.2</td>
<td>10.2.1-2 / 10.3.2, 10.3.5, 10.3.6 / 10.3.7, 10.3.8, 10.3.11, 10.3.18 / 10.4.1, 10.4.3, 10.4.6, 10.4.9, 10.4.7, 10.4.10</td>
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<tr>
<td>Oct 12</td>
<td>12.5</td>
<td>12.5.1, 12.5.3-4 / 2.5.1(e), 2.5.2, 2.5.3, 2.5.4, 2.5.8(a), 2.5.9a, 2.5.9b, 2.5.16(a,b), 2.5.17</td>
<td>To be evaluated But not due</td>
<td>10.5.1-2, 10.5.6-7, 10.5.11, 10.5.14, 10.6.1(a), 10.6.3, 10.6.12a</td>
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<tr>
<td>Oct 19</td>
<td>3.2 / 3.3</td>
<td>3.2.2(c,b,g), 3.2.4 / 3.3.1c, 3.3.1e, 3.3.2(c), 3.3.5a, 3.3.8, 3.3.11, 3.3.13, 3.3.18</td>
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Remark: To emphasize some PDE aspects not included in the above list of problems, I might make minor changes to this homework assignments during the semester.