THEORY AND APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS
MATH 5337
DEPARTMENT OF MATHEMATICS AND STATISTICS
Spring 2016

A. COURSE INFORMATION
Course number/section: MATH 5337.001
Class meeting time: TR 5:30-6:45
Class location: CI-108
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
Instructor: Dr. Diane Denny
Office location: CI-313
Office hours: MW 1:30-3:00, TR 3:30-5:00 or by appointment
Telephone: (361) 825-3485
e-mail: diane.denny@tamucc.edu
Appointments: request appointments from the instructor in person

C. COURSE DESCRIPTION
The purpose of this course is to study the mathematical theory and real-world applications of the three major categories of partial differential equations: elliptic equations, parabolic equations, and hyperbolic equations. Specific topics to be covered include: first-order equations, second-order elliptic equations, second-order parabolic equations, and second-order hyperbolic equations. There will be a focus on understanding the physical meaning and mathematical properties of solutions of elliptic, parabolic, and hyperbolic partial differential equations. Methods include fundamental solutions and transform methods for problems on the line, Green’s functions, and series solutions for problems in regions with boundary.

D. PREREQUISITES AND COREQUISITES
Prerequisites

MATH 4301, MATH 3311, MATH 3315, or by permission of instructor.

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
The required textbook for the course is Partial Differential Equations, An Introduction: by Walter A. Strauss. Handouts will be provided which supplement the material in the textbook.
F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course students should be able to:

1. Solve general first-order equations, second-order elliptic equations, second–order parabolic equations, and second-order hyperbolic equations, and understand the physical meaning and mathematical properties of these solutions.
2. Use methods such as fundamental solutions; transform methods, series solutions, Green’s functions, and computational techniques to solve problems.
5. Make an oral presentation on the contents of a scientific research paper in the field of partial differential equations.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Methods and activities for instruction include: lectures, oral presentations by students, and a student research project.

H. MAJOR COURSE REQUIREMENTS AND GRADING

The student learning outcomes will be measured using exams, homework, an oral presentation, a research project, and a cumulative final exam.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Exams</td>
<td>45%</td>
</tr>
<tr>
<td>Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Oral Presentation</td>
<td>5%</td>
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<tr>
<td>Research Project</td>
<td>10%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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</tbody>
</table>
I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Examples of PDEs</td>
<td>1.1</td>
<td>TBA</td>
</tr>
<tr>
<td>2</td>
<td>First Order PDEs</td>
<td>1.2, 1.3, 1.4</td>
<td>TBA</td>
</tr>
<tr>
<td>3</td>
<td>Second Order PDEs</td>
<td>1.5, 1.6, 2.1</td>
<td>TBA</td>
</tr>
<tr>
<td>4</td>
<td>Wave Equation</td>
<td>2.2, 2.3, 2.4</td>
<td>TBA</td>
</tr>
<tr>
<td>5</td>
<td>Wave Equation, Test 1</td>
<td>2.5</td>
<td>TBA</td>
</tr>
<tr>
<td>6</td>
<td>Diffusion Equation</td>
<td>3.1, 3.2, 3.3</td>
<td>TBA</td>
</tr>
<tr>
<td>7</td>
<td>Diffusion Equation</td>
<td>3.4, 3.5, 4.1</td>
<td>TBA</td>
</tr>
<tr>
<td>8</td>
<td>Boundary Problems</td>
<td>4.2, 5.1, 5.3</td>
<td>TBA</td>
</tr>
<tr>
<td>9</td>
<td>Spring Break</td>
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<td>TBA</td>
</tr>
<tr>
<td>10</td>
<td>Fourier Series</td>
<td>5.6</td>
<td>TBA</td>
</tr>
<tr>
<td>11</td>
<td>Laplace’s Equation</td>
<td>6.1, 6.2, 6.3</td>
<td>TBA</td>
</tr>
<tr>
<td>12</td>
<td>Laplace’s Equation</td>
<td>6.4, 7.1, 7.2</td>
<td>TBA</td>
</tr>
<tr>
<td>13</td>
<td>Green’s Functions, Test 3</td>
<td>7.3, 7.4,</td>
<td>TBA</td>
</tr>
<tr>
<td>14</td>
<td>Transforms</td>
<td>12.3, 12.4</td>
<td>Oral Presentation</td>
</tr>
<tr>
<td>15</td>
<td>Review</td>
<td>12.5</td>
<td>Research report due</td>
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<tr>
<td>16</td>
<td>Final Exam (May 10)</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Homework:

Homework will be assigned every week, and is due at the start of class one week after the day the homework was assigned.
Late Work:

Late homework will receive a 15% late penalty and will only be accepted if it is turned in before the start of class on the next class day after the day it was due; otherwise, late homework will not receive any credit.

Missed Exam:

If you have to miss an exam, it is your responsibility to contact me no later than the day after the exam. A valid written excuse is required in order to make up a missed exam. Any student missing the final exam for any reason will get a score of zero. Any excused absences from the final exam may be made up in the next semester by eligible students; a grade of I will be temporarily assigned.

Grading Scale:

A = 90.00 -- 100%
B = 80.00 -- 89.99%
C = 70.00 -- 79.99%
D = 60.00 -- 69.99%
F = below 60%

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

• Classroom/Professional Behavior
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic
• **Statement of Civility**
Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation **WILL NOT** automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that **must** submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• **Disability Services**
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or
visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**

  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**D. OTHER INFORMATION**

- **Academic Advising**

  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.