

# Partial Differential Equations

MATH 4373.001 | Fall 2024

**Instructor:** Dr. Deborah Koslover

**Office:** RBN 4010

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**Classroom:** RBN 4019

**Meeting Time:** MWF 1:25 – 2:20 PM

**Office Hours:** MWF 11 AM -12 PM, TTh  
1 PM -2 PM or by appointment.

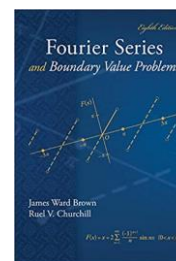
## Course Description

In this course we will develop the mathematical ideas needed to solve problems in the physical sciences, using partial differential equations. Surprisingly, you will find that you already know much of the background. We will look at mathematics that you have already seen and interpret it in new ways. This will allow us to solve problems in heat conduction and wave propagation. We will study Laplace's equation, separation of variables (a new type, not the type you've see in ODEs) and transform methods to solve boundary value problems. We will also develop Sturm-Liouville Theory. Prerequisites: MATH 3305, MATH 3203 or MATH 3315, and MATH 3404.

## Textbook

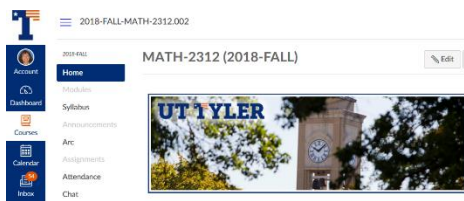
No textbook. However, if you would like a backup book, I recommend the following. It covers the same material that you will see in our class, but in a more formal fashion. Any edition will be fine. The eighth is the most recent.

*Fourier Series and Boundary Value Problems*, 8<sup>th</sup> edition, by Churchill, McGraw Hill 2012. ISBN-13: 978-0078035975 ISBN-10: 007803597X  
The math department will give you a copy of this book. You do not need to buy one unless you want.



## Website

You will be using Canvas. Go to [www.uttyler.edu/canvas](http://www.uttyler.edu/canvas) to log into Canvas using your regular patriots account. If you have enrolled in the course, you should have access to the website. You will find important documents, grades, lecture notes, and announcements on Canvas.



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*Attendance is mandatory and attendance records will be kept. Notify Dr. Koslover in advance if you must miss a class, be late for a class or leave early. (Official University Policy: Class attendance is the responsibility of the student. When a student has a legitimate absence, the instructor may permit the student to complete missed assignments. In many cases class participation is a significant measure of performance, and non-attendance may adversely affect a student's grade. When a student's absences become excessive, the instructor may recommend that the student initiate a withdrawal.)*

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# Learning Outcomes

At the conclusion of this course, you will be able to

1. Define orthogonal and orthonormal sets, eigenvalues and eigenfunctions, superposition of solutions, Gibbs phenomena, boundary value problems, Gamma functions, Bessel functions and Legendre polynomials.
2. Find Fourier series, determine when they converge and understand their properties.
3. Use separation of variables to solve partial differential equations.
4. Interpret the solutions of boundary value problems with emphasis on problems from physics involving heat, vibration and potential.
5. Solve Sturm-Liouville problems as they arise in physics This includes appropriately choosing appropriate coordinate systems, and understanding and using Fourier series, Bessel functions and Legendre polynomials.

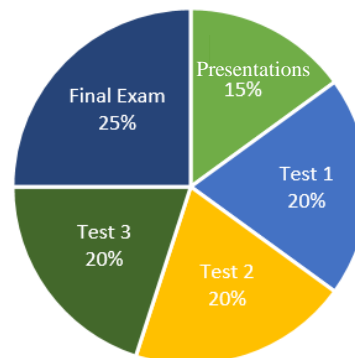
## Course Evaluation

At the end of the semester, you will find your final grade on my.uttyler.edu. It will also be posted on Canvas.

A final course grade of

- 90% is guaranteed to be at least an A
- 80% is guaranteed to be at least a B
- 70% is guaranteed to be at least a C
- 60% is guaranteed to be at least a D.

All grades below 60% will be F.



## The Plan



Presentations and class discussions (15%)

Homework will be assigned daily. Assignments will appear on Canvas. Homework, in the form of presentations or class discussions, will be due two class periods after it is assigned. Students will be asked to get up and present one or two problems. You may show your paper on the overhead projector or start from scratch and demonstrate by writing what you did. You will be graded on correctness of work, clarity of

presentation and your answers to questions asked. Each student will be allowed one “pass” per class but will receive a zero on the assignment if they ask for two passes. When we have class discussions, students will be graded on meaningful participation. Agreeing that another person is right or saying “good job” is nice, but does not count as meaningful participation.

Students watching the presentations will be awarded points for insightful questions or comments. If you have done a problem in a significantly different fashion than the presenter, you may ask to show your solutions for credit.

Solutions will be posted on Canvas. Do not sell to Chegg or similar websites. Do not pass down to future generations of students.

**TESTS** There will be three tests (20% each) and a final exam (25%). These exams will test your knowledge of the material taught in the class and practiced on the homework. Test problems will be similar to homework problems, but generally shorter. The final exam will be comprehensive, but will emphasize material in the final third of the course.

The dates and times of these exams are as follows:

- **Test 1:** Friday, September 13, 2024
- **Test 2:** Friday, October 11, 2024
- **Test 3:** Friday, November 8, 2022

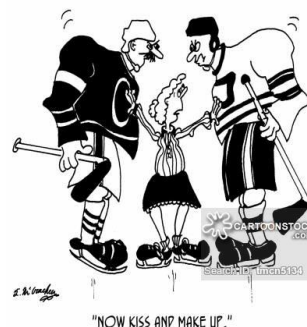


## FINAL EXAM

**Final Exam:** Monday, December 9, 2024, 12:30 – 2:30 PM

## Make-ups

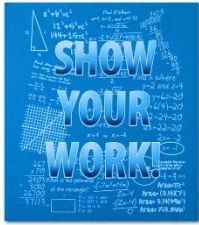
Make-ups for **documented** absences that are **required** as part of a UT Tyler obligation (e.g. athletes participating in an event, participating in a debate contest, etc.) or for religious observation will be granted. For all make-ups of this type, prior notification of at least one week and documentation are required. Other make-ups are granted only in extreme cases such as hospitalization and at the sole discretion of the instructor.



Make-ups will be allowed for the following excused absences.

- 1) Illnesses, with a doctor’s note, no exceptions.
- 2) Your child’s illness, with a doctor’s note.
- 3) Court appearances, including citizenship court, with documentation
- 4) Weddings, funerals or military advancement with documentation **and** a photograph showing that you attended the event.

# Other Details



**Calculator Policy:** Non-graphing calculators may be used on tests. You may not use your phone. However, all work must be shown.

**Cell phones, IPODs and other electronic devices:** Please set your cell phones and pagers to silent mode. If you are expecting an emergency call, please notify the instructor in advance, sit near the door, and answer the phone outside. You will not be allowed to wear an IPOD or other electronic devices during an exam. During tests, cell phones must be turned off and placed in sight on your desk.



**AI is not permitted in this course at all.:** I expect that all work submitted by students for this course to be their own. I have carefully designed all assignments and class activities to support your learning. Doing your own work, without human or artificial intelligence assistance, is best for your efforts in mastering course learning objectives. For this course, I expressly forbid using ChatGPT or any other artificial intelligence (AI) tools for any stages of the work process, including brainstorming. Deviations from these guidelines will be considered a violation of UT Tyler’s Honor Code and academic honesty values.

## Calendar

AUGUST		
MON	WED	FRI
26	28	30
First Day		

DECEMBER		
MON	WED	FRI
2	4	6

December 9  
Final Exam  
12:30 - 2:30 PM

SEPTEMBER		
MON	WED	FRI
2	4	6
Labor Day		
9	11	13
Census date		Test 1
16	18	20
23	25	27
30		

OCTOBER		
MON	WED	FRI
	2	4
7	9	11
		Test 2
14	16	18
21	23	25
28	30	

NOVEMBER		
MON	WED	FRI
		1
4	6	8
Drop Day		Test 3
11	13	15
18	20	25
25	27	22
Thanksgiving		