Information Sheet for Math 430 and Math 530 Winter 2025

Class meets: MTRF 9:00 am - 9:50 am in BH 319

Credits: four credits

Teacher: Branko Ćurgus, Proofessor of Mathematics

Office: BH 184A

Office Hours: MTRF at 11:00 am or by appointment (in-person or see the class Canvas page for a Zoom link)

Email: curgus@wwu.edu

Class website: https://faculty.curgus.wwu.edu/Courses/430_202510/430.html

Text: *(Elementary) Applied Partial Differential Equations With Fourier Series and Boundary Value Problems* (3rd, 4th, or 5th Edition) by Richard Haberman

Material covered: WThe course will cover a selection of topics from Chapters 1, 2, 3, 4, 5, 7, 8, 12 of the textbook.

Student Learning Outcomes: The successful student will demonstrate: (1) a geometric understanding of the method of characteristics, how to use it to solve quasi-linear first order PDEs and how to apply it to the one-dimensional wave equation to derive d'Alembert's formula; (2) a knowledge of the physical laws and mathematical facts used in derivation of the diffusion, heat and wave equation and an ability to use those laws and facts to derive those equations; (3) an understanding of the physical meaning and the role of boundary conditions for PDE, in particular Dirichlet, Neumann and mixed boundary conditions; (4) an ability to solve the wave, heat and Laplace equations in the one-dimensional setting via separation of variables for a variety of boundary conditions; (5) an ability to expand a (piece-wise smooth) function in its Fourier (sine, cosine, full, complex) series on a finite interval; (6) an understanding of the statements of convergence of Fourier series including when such series can be differentiated or integrated term by term to yield a convergent series; (7) an ability to use differentiation to apply the method of eigenfunction expansion to solve the heat and wave equations; (8) an ability to apply the method of separation of variables to the wave, heat and Laplace equations in higher dimensional settings, for example on a rectangle or a disk in the plane.

Homework: Your daily homework should consist of studying the material covered in class. My presentations will often differ significantly from those in the textbook. Compare your class notes, the class website, and the textbook to understand the similarities and differences. This will help you internalize the concepts and the methods that are being studied. Exercises in the book are there to enhance and challenge the learning process. Almost every day, I will post something on the website. You should try to do all the assigned exercises in the textbook. Post questions about difficult exercises in the **Discussions on Canvas**.

Assignments: There will be four assignments, three during the class and the final assignment. For each assignment you will have at least one week to finish. Assignments will be posted on the class Canvas page, with due dates provided there. The final assignment will be posted at the beginning of the last week of classes and will be due by 11:59 pm on Friday, March 21, 2025. The work that you submit in your assignments must be your own. You can ask clarifying questions about the assignment problems in **Discussions on Canvas**. If your question involves a part of your solution, you can ask me during office hours. You can discuss problems on the assignments with other students in general terms only. You should not share your solutions with others.

On Your Written Work: Your assignments should be submitted as pdf files electronically through Canvas Assignments. I cannot grade work submitted by email.

Please make sure that you produce a high-quality, readable pdf file of your work. LaTeX is a free software designed for typesetting high-quality mathematical documents. I encourage you to learn LaTeX and use it for your writing. I created Getting Started with LaTeX page to help you with this.

If you submit your handwritten work, write neatly on paper with a light-colored background using a dark pencil or ink. Please use a good scanning app to produce a high-quality, readable pdf file.

Since you will have enough time to work on each assignment, your assignments should be well-written. Presenting calculations alone, without context or explanations, is insufficient for full credit. I believe that writing mathematics in complete sentences organized in meaningful paragraphs enhances the learning process. As a guide for writing, you can use examples in the textbook or my writing on the class website.

Grading: Each assignment will be graded by an integer between 0 and 100. The final grade (`FG`) will be calculated using the following formula

$$\texttt{FG} = \left\lceil (\texttt{A1} + \texttt{A2} + \texttt{A3} + \texttt{A4})/4 \right\rceil,$$

where `A1`, `A2`, `A3`, and `A4` are the grades for each of the four assignments. Your letter grade will be assigned according to the following table.

F : 0 - 39	D−: 40 - 44	D : 45 - 49	D+: 50 - 54	C−: 55 - 59	C : 60 - 64
C+: 65 - 69	B−: 70 - 74	B : 75 - 79	B+: 80 - 84	A−: 85 - 89	A : 90 - 100

Technology: I believe that mathematical explorations enhance learning mathematics. In this class, for mathematical explorations, we will use the computer algebra system *Mathematica* version 12, which is available in in the following computer labs: BH 215, HH 233 and in the Math Center BH 209/211A. I will provide ample information on how to use *Mathematica* and welcome questions about it during my office hours. Most assignments will include a *Mathematica* component. To get started with *Mathematica* read my webpage *Mathematica* at WWU.

How to succeed: Attend classes regularly and do all the suggested homework problems. Read the book before each class and ask questions if there is anything that is not clear. Keep organized notes of all your work. Make sure that you *fully understand* how to do each assigned problem. Do not hesitate to ask questions whenever something does not make sense.

Diversity, Equity, Inclusion: Welcome to my class. I promise to keep my mind open to the mathematical experiences you bring to this class. I want to help you use those personal experiences creatively to build your own understanding of the material studied in this class. I will bring diverse approaches to most concepts. I understand that each of you comes to this class with a different mathematical background. Please let me know if you are unsatisfied with your understanding of a particular topic, that is a prerequisite for this class. We can meet outside of class and discuss that topic and find some study material for you. The goal is to create an environment where you can succeed in this class and be proud of your achievements.

Remarks: This is a fast-paced course. It is essential that you keep up with the material presented every day. Do the exercises that I will assign on the class web-page. Look for help if you encounter difficulties.

Academic Honesty Policy: Academic dishonesty is not tolerated at Western Washington University. Representing the work of another as one's own is an act of academic dishonesty. For a full description of the academic honesty policy and procedures at Western, see Appendix D in the University Catalog.

Flexibility Statement: This syllabus is subject to change. Any changes will be announced in class or online, and students are responsible for keeping up with these updates.

Sylabii@WWU: Please go to `https://syllabi.wwu.edu/` where you will find Syllabi Policies for Students and Campus Resources for Students

The Branko Ćurgus Mathematical Experience: Mathematics has always been a personal experience for me: **The Branko Ćurgus Mathematical Experience**. I want to create an environment where you can embrace mathematics as your personal experience. How can this be achieved? Begin by acknowledging what you don't understand without fear. Discuss challenges openly with others. Open your mind, ask questions. Generously share your questions with others like precious gems. Questions are the gateway to deeper understanding. Indeed, questions serve as a bridge from confusion to clarity.