

Math 4205 - Partial Differential Equations

Course Outline

S. Rodney, Cape Breton University Mathematics

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1 Course Information

- **Instructor:** Prof. S. Rodney, A129-B Cape Breton University Dept. Mathematics, Physics, & Geology
- **Contact:** scott_rodney@cbu.ca
- **Text:** None. **Helpful Reading:**
 - Partial Differential Equations, W. Strass and Fourier Series and Boundary Value Problems by Brown and Churchill.
 - Partial Differential Equations with Fourier Series and Boundary Value Problems, N. H. Asmar - 2nd Edition.
- **WEBSITE:** <https://srodney.ca/4205.html>

2 Course Design:

This course will have in-person lectures, take-home homework and tests supported by online course materials and office hours. With this, to be successful, there are a few things you should do

1. Check the course web page [www.http://faculty.cbu.ca/srodney/4205.html] often (every other day) for updates, new readings, homework, etc...
2. Attend all lecture sessions
3. Do your homework
4. Use course office hours! I am happy to meet with you via Microsoft Teams, Zoom, or Skype. It's really easy to set up an appointment! Just send me an email at

scott_rodney@cbu.ca

to make an appointment.

5. For questions sent via email: I will answer messages within 24 hours.

2.1 Attending Lectures vs. Being Sick

In recent years my partner was diagnosed with a rare illness making her very sensitive to certain conditions. As such, I ask that **if you are feeling unwell, please stay home**. Let me know that you are unwell and I will send you the required materials to be caught up.

2.2 Handing In Your Work:

All homework must be turned in using the following process:

1. Write your solution by hand in your own words.
2. Scan your work to a .PDF file named as follows: Lastname-studentID-ItemRef.pdf
 - **Ex 1:** David MacDonald, student ID# 1234567, hands in his midterm test. His file is called:
[MacDonald-1234567-Midterm.pdf](#)
 - **Ex 2:** Liana Kovach, student ID# 9876543, hands in her 3rd bonus problem. Her submitted file is called:
[Kovach-9876543-Bonus3.pdf](#)
3. Email the .PDF file to me at scott_rodney@cbu.ca before the deadline.
4. **No .JPG or other image files will be accepted** - please use your scanners "scan to pdf" function or Microsoft's print to PDF driver - free with any computer.

3 Course Content:

This course is focuses finding solutions to classical boundary value problems in Physics, Mathematics and more. We will study famous equations like the Heat equation, Wave equation, and Poisson equations in fine detail. As part of this, you will learn about the fundamental contributions of Fourier and Helmholtz to the study of such objects. As part of this journey, you will also be exposed to Maple and it's capabilities of modeling the motion of solutions. Below is a table describing specific content we will cover.

Course Part	Content Descriptor
Part 1	What is a PDE? First Order Equations in 2D - the method of characteristics, higher dimensional considerations
Part 2	Second Order Equations: Classification, development of the Wave and Heat equations from physics. The solution of D'Alembert, and more.
Part 3	Fourier and other infinite series expansions
Part 4	Applications of Fourier Series Boundary Value problems for PDEs in 2D Heat distributions on a plate Waves in a circular pond.
Part 5	Higher dimensional versions and more!

4 Evaluation

In this course, your knowledge of course material will be evaluated through use of homework and a final exam. Here is the breakdown:

- [Homework \(60%\)](#)
- [Final Exam Take Home Assignment\(40%\)](#)

Some modifications to this scheme may be made at the discretion of Dr. Rodney. Any modification made will be to the benefit of all students.

It is your responsibility to make certain homework is attempted, and tests written/passed in at the scheduled times. It is strongly recommended that you do your best to meet these expectations.

Weather: It is possible that classes will be canceled due to poor weather conditions. See the *CBU Inclement Weather Policy* in the current academic calendar for more information.

Other Course Problems: If you are experiencing problems with the structure/delivery of course content, make an appointment with Dr. Rodney to attempt a resolution at "scott.rodney@cbu.ca". If no resolution can be found, you may contact the office of the Dean of Science and Technology.