

Western University Fall 2017 Course Outline
Applied Mathematics 3815a
Partial Differential Equations 1

Instructor:

Prof. Greg Reid

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Lectures: UCC 37 Monday, Wednesday, Friday 1:30 - 2:30 pm

It is your responsibility to regularly check the course web site for emails, grades, announcements, assignments, important dates etc (at least several times a week). Note however that some announcements will be made only in class. Always include 3815 in the subject line of emails.

Required Text: *Applied Partial Differential Equations* by David J Logan
Series: Springer Undergraduate Texts in Mathematics, 3rd ed., 2015.

See <http://www.springer.com/us/book/9783319124926> for soft/hardcover and e-book versions.
Some softcover versions are available in the book store.

Official Description and prerequisites: See

<http://www.westerncalendar.uwo.ca/2016/pg887.html#33696>

Prerequisites: (i) [Mathematics 1600A/B](#) or the former Linear Algebra 1600A/B; [Applied Mathematics 2402A](#) or the former Differential Equations 2402A; [Calculus 2303A/B](#) or [2503A/B](#); or (ii) [Calculus 2402A/B](#) and Applied Mathematics 2503A/B. In each course a minimum mark of 60% is required.

A major goal of the course is to give a balanced introductory treatment of the area of PDE so that a student appreciates the power of PDE modeling; and is aware of major techniques for their solution. The focus of the course is on analytical techniques for the classical linear PDE of physics and engineering (heat, wave and Laplace equations), and their frequent occurrence in applications. However we do just enough non-linear PDE, and numerical techniques, to place these methods in context. Computer methods (especially Maple) are used throughout the course to visualize, and sometimes determine solutions. Prior knowledge of Maple is not assumed, and only occasional programming will be used (programming experience is not assumed). Students are expected to develop their ability to write solutions and this will be a component of assessment (i.e. English description, rather than just formulae).

Topics:

- **Derivation of PDE from models:** *models, conservation laws, diffusion, vibrations.*
- Brief introduction to numerical solution of PDE and the use of computer algebra packages
- **PDE on unbounded domains:**
integral reps for solutions of heat and wave equations, Laplace and Fourier Transforms
- **Orthogonal Expansions:** *Orthogonal Expansions, Fourier Series & Sturm-Liouville Problems* PDE on bounded domains
- *Separation of variables, flux and radiation BC applied to heat, wave and diffusion type PDE, polar and spherical coordinates, sources, parameter identification (if time)*

Evaluation:

- **Assignments & Quiz** (25%)
- **1 Midterm** (25%, scheduled for 7 – 10 pm, Friday October 27)
- **Final Exam** (50%)

Graded assignments and quizzes will all be equally weighted. There will be no make-ups on missed quizzes or assignments. However, you will be able to drop your lowest two scores (e.g. if these were an assignment, and a quiz score then you would drop those two). Please let me know of legitimate reasons for missing quiz/assignments with appropriate documentation *at the time* they occur. In the case of 3 or more appropriately documented missed items the student can ask that the assessment for the final be increased to 70% and the midterm to 30%. Some Maple related questions can occur on quiz/tests/assigns. In the case of a missed midterm with appropriate documentation, the assessment will be 30% assignment and quiz and 70% for the final.

Bonus problems in hand-in assignments will be given (to a max of 3% on top of your total other assessment). Unless otherwise announced, quizzes and hand in assignments will alternate on every Friday. They cover all material given in class (and also in the text) up to and including the previous Friday unless otherwise indicated.

Addendum to all Applied Mathematics Course Outlines (the fine print)

The UWO Senate Academic Handbook has specified that the following points should be added to all course outlines:

- 1. Plagiarism:** Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).
- 2. Plagiarism Checking:** The University of Western Ontario uses software for plagiarism checking. Students may be required to submit their written work and programs in electronic form for plagiarism checking.
- 3. Prerequisites for a course:** Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.
- 4. If computer-marked multiple-choice tests and/or exams are given:** Use may be made of software to check for unusual coincidences in answer patterns that may indicate cheating.
- 5. If you are unable to meet a course requirement due to illness or other serious circumstances,** you must provide valid medical or other supporting documentation to your faculty Dean's Office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from your faculty Dean's Office immediately. For further information please see: <http://www.uwo.ca/univsec/handbook/appeals/medical.pdf>
A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: https://studentservices.uwo.ca/secure/medical_document.pdf
- 6. Please contact the course instructor if you require the material in an alternate format or for other arrangements to make this course more accessible for you.** You may also contact services for students with disabilities at X 82147.