

Western University
Course Outline
Applied Mathematics 9505b, Winter 2017
Partial Differential Equations

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Schedule: TBA

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Topics:

Emphasis will be placed on understanding solutions and major phenomena for PDE. The course will be a balanced treatment about modeling and problem solving with PDE. Maple will be used to numerically and analytically solve problems. It will also be used to graph solutions to illustrate phenomena encountered during the course. This will be mostly through the use of programs that I will provide. No prior knowledge of Maple will be assumed. There will be some guest lectures in the course from the department, to emphasize the breadth and unity of the subject.

Topics include:

- ODE and algebraic equation models; introduction to manifolds - their geometry; fixed point and Newton iteration; qualitative and fundamental models; introduction to computer tools for the course.
- PDE models from conservation laws and constitutive relations; characteristics; transformations of differential equations and symmetry; tensors and higher dimensional models; Variational principles; diffusion, wave and elliptic PDE.
- Solution techniques for linear PDE; separation of variables and Fourier transform techniques.
- Shocks, discontinuous and weak solutions.
- Reaction diffusion PDE and applications especially in Mathematical Biology.
- Nonlinear elliptic PDE (models, eigenvalue problems, stability & bifurcation, existence & uniqueness, well-posedness); Turing pattern formation.

Evaluation: Final Exam 50% Other details TBA.

The fine print – Addendum to all Applied Mathematics Course Outlines

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

A. Prerequisites: an introductory course in PDE, or equivalent, is required as a prerequisite (e.g. am 3815a at UWO).

B. Medical/Compassionate Excuses: Students missing work for valid medical or other reasons are governed by the regulations <https://studentservices.uwo.ca/secure/index.cfm>

C. Accessibility Statement: Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation. 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's 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's Dean's Office immediately.

D. Calculators: No calculators on tests. However on some of the quizzes you may have access to the symbolic software Maple.

E. Academic Offences: Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: // http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

F. Plagiarism on Term Paper: All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

G. Support Services: Support is available from the Registrar: <http://www.registrar.uwo.ca>, via the university students council (<http://westernusc.ca/services/>) and at Student Development Services (<http://www.sdc.uwo.ca/>).

H. Mental or Emotional Health: Students who are in emotional/mental distress should refer to Mental Health@Western <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.