University of Victoria
Faculty of Science | Department of Mathematics and Statistics
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Course Outline
MATH 348: Numerical Methods

Instructor

Lecturer David Goluskin, Assistant Professor

Research Area Nonlinear differential equations, computational methods, fluid dynamics

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Phone 250-721-7450 (emergencies only)

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General Course Information

Number of Units 1.5

Pre-requisites MATH 110 or MATH 211; and one of MATH 200 and MATH 201, MATH 200 and MATH 204, MATH 202.

Note Credit will be granted for only one of MATH 348, CSC 340, CSC 349A.

Office Hours (subject to change)

Monday 3:30 pm to 5:00 pm, DTB A539

Wednesday 1:00 pm to 2:30 pm, DTB A539

By appointment Email to schedule. No unscheduled drop-ins please.

Learning Objectives

- You will be introduced to scientific computing: the computing of approximate numerical solutions to math problems that are too complicated to solve exactly "by hand". The vast majority of problems encountered in the practice of science, engineering, and even mathematics are of this type.
- You will learn computational methods for solving various common types of math problems, as well as how to analyze the performance of these methods in terms of both precision and computational efficiency.
- You will learn to choose and apply computational methods to solve fairly complicated math problems.

[1] I will respond to all emails but not always immediately. Questions that are not simple should be asked at office hours instead.

- You will gain experience implementing computational methods by programming in MATLAB or Python.

Course Material and Online Resources

Textbook The recommended textbook is *Numerical Analysis*, 2nd edition, by Timothy Sauer. Most course material is standard and can be found in other textbooks also.

Course webpage `http://web.uvic.ca/~goluskin/math348`

Calculator No calculators will be allowed on exams.

Class Meetings

Lectures are MWTh 2:30-3:20 PM in Clearihue Building A212. Lectures run January 3 through April 5. There is no tutorial.

Specific Topics

The following is a tentative ordering of topics.

- Interpolation (chapter 3 in Sauer)
- Numerical differentiation and integration (chapter 5)
- Fundamentals (chapter 0)
- Algebraic equations in one variable (chapter 1)
- Systems of algebraic equations (chapter 2)
- Ordinary differential equations (chapter 6)
- Possible additional topics: optimization (chapter 13), eigenvalues (chapter 12), the fast Fourier transform (chapter 10)

Evaluation and Grading

You must score at least 40% on the final exam to pass the course. If so, your grade will be determined by the following scheme.

Homework Weekly	Midterm Feb. 22	Final Exam TBA
50%	20%	30%

Accessibility Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the Centre for Accessible Learning (CAL) as soon as possible. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations `http://uvic.ca/cal`. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Grading Percentage scores will be converted to letter grades according to the university-wide standard table.
Undergraduate:
`http://web.uvic.ca/calendar2018-01/undergrad/info/regulations/grading.html`
Graduate:
`https://web.uvic.ca/calendar2018-01/grad/academic-regulations/grading.html`

Final Examination Do not make travel plans for the final examination period until the final exam has been scheduled. Off-schedule final examinations are given only in accordance with the university policy as outlined in the Calendar. If you are unable to write a final examination due to illness, accident or family affliction, please refer to the following webpages for detailed instructions how to proceed:
Undergraduate:
`http://web.uvic.ca/calendar/undergrad/info/regulations/concessions.html`
Graduate:
`http://web.uvic.ca/calendar/grad/registration/concessions.html`
Graduate:
`http://web.uvic.ca/calendar2018-01/grad/registration/concessions.html`

Supplemental Examinations The Department of Mathematics and Statistics does not award 'E' grades or offer Supplemental Examinations in any of its courses.

Policies and Ethics

Attendance If you miss an announcement because you did not attend class, you must accept the consequences. Find out from your classmates what you missed.

Guidelines on Religious Observances Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.

Missing work If you miss the midterm for a valid reason, the final will count 50%. There will not be a makeup midterm. If you miss a homework assignment for a valid reason, your homework grade will be based on the other assignments.

Academic Integrity You are encouraged to discuss homework assignments. The work you hand in, including computer code, must be written by you and must reflect your own understanding.

The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.

The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension. It is your responsibility to understand the University's policy on academic integrity:

Undergraduate:
`http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html`

Graduate:
`http://web.uvic.ca/calendar/grad/academic-regulations/academic-integrity.html`

Course Schedule (subject to change)

16/1/18	Last day to drop with 100% fee reduction
18/1/18	Homework 1 due
25/1/18	Homework 2 due
1/2/18	Homework 3 due
6/2/18	Last day to drop with 50% fee reduction
8/2/18	Homework 4 due
12–16/2/18	Reading break (no lecture or office hours)
22/2/18	Midterm
28/2/18	Last day to drop without failure
1/3/18	Homework 5 due
8/3/18	Homework 6 due
15/3/18	Homework 7 due
22/3/18	Homework 8 due
2/4/18	Easter (no lecture or office hours)
4/4/18	Homework 9 due
5/4/18	Last lecture
9–24/4/18	Final exam will be during this period