



INTRODUCTION TO NUMERICAL METHODS MAT 2335 – WINTER 2025

Instructor: Diane Guignard (STM 523, dguignar@uottawa.ca)
Personal webpage: <https://mysite.science.uottawa.ca/dguignar/>
Course webpage: <https://uottawa.brightspace.com/d21/home> (Brightspace)
Classes: Mo 10:00am-11:20am in 60 University (SMD), room 222
 We 8:30am-9:50am in 65 University (MRT), room 219
Labs: Th 2:30pm-3:50pm in 145 Jean-Jacq. Luss. (LMX), room 220
Office hours: We 2:00pm-4:30pm in STM 523
 or by appointment (in person or on Zoom)

Course-related material, such as homework assignments, lecture notes and topics cover per course, will be posted on Brightspace. Important information might also be sent by emails.

Textbook:

Scientific Computing with MATLAB and Octave by A. Quarteroni, P. Gervasio, and F. Saleri, Springer, 2014.

An electronic version is available free of charge at <https://link.springer.com/book/10.1007/978-3-642-45367-0>.

Additional Reference:

Numerical Mathematics by A. Quarteroni, P. Gervasio, and F. Saleri, Springer, 2007 (see <https://link.springer.com/book/10.1007/b98885>).

Catalog Description:

Introduction to computing environments. Floating point errors. Numerical solution of nonlinear equations (bisection, fixed point, Newton, secant, gradient descent), linear and nonlinear systems. Interpolation and approximation (polynomial, spline, neural networks). Numerical differentiation and integration. Basic methods for solving first-order initial-value problems.

Prerequisites:

ITI 1120, MAT 1322, MAT 1341.

Course Objectives:

This course is an introductory survey of numerical methods that are used in science and engineering. We will not only introduce different numerical methods but also analyze key properties such as accuracy, efficiency and stability and discuss the pros and cons of the methods. The labs and the homework, which will include programming exercises, are designed to gain practical experience with the methods introduced in class.

Course Outline and Schedule (tentative):

This course will cover the following topics from the textbook. The duration is tentative. Moreover, the exact topics will be covered as time allows.

Book Chapters	Sections	Duration
Introduction		0.5 week
2. Nonlinear equations	2.1-2.6	1.5 weeks
3. Approximation of functions and data	3.1-3.5	2 weeks
4. Numerical differentiation and integration	4.1-4.5	2.5 week
5. Linear systems	5.1-5.8, 5.8-5.13	3.5 weeks
8. Ordinary differential equations	8.1-8.10	1.5 week

Homework:

Exercises will be posted weekly on Brightspace. Throughout the term, there will be about 4 assignments to be turned in on the assigned due date, directly on Brightspace. Additional problems, usually extracted from the textbook, will be given for extra practice but are not to be turned in and will not be graded. You are encouraged to work with others while solving homework problems, but you must write up your own solutions. Moreover, late homework will not be accepted except in the case of an excused absence.

Some of the problems will require the use of a computer. What software you use is up to you, but solutions will only be given in Matlab/Octave.

Exams:

There will be one midterm exam and one final *comprehensive* exam. The midterm will take place Monday, February 24 during the usual class time. The final exam will be held during the exam period (precise date to be determined). A detailed description of the material covered by each exam will be provided on Brightspace in due time.

Grading Policy:

The final grade will be based on the homework assignments, the midterm exam and the final exam. It will be computed according to the following distribution:

- Homework: 20% of your grade;
- Midterm exam: 30% of your grade;
- Final exam: 50% of your grade.

If your score on the final exam is less than 40%, then your final letter grade will be F. Otherwise, your final letter grade will be computed according to the standard university scale, namely:

A+ (90%-100%); A (85%-89%); A- (80%-84%); B+ (75%-79%); B (70%-74%); C+ (65%-69%); C (60%-64%); D+ (55%-59%); D (50%-54%); E (40%-49%); F (0%-39%).

Important Dates:

Below is a summary of the important dates for the Winter 2025 term. You will find more information at the website

<https://www2.uottawa.ca/current-students/important-academic-dates-deadlines>

January 6	First day of the term and of this class
February 16-22	Reading week (no classes)
February 24	Midterm (10:00am-11:20am in SMD 222)
April 3	Last day of this class
April 5	Last day of the term
April 8-25	Exam period (date to be determined)

Attendance and Make-up Policy:

Attendance is STRONGLY recommended, to both the lectures and the labs, but attendance will not be taken. There will be no make-up for the midterm. However, if you miss the midterm for a valid reason, then its weight will be transferred to the final exam.

Materials Copyright:

All materials generated for this class are protected by Copyright laws. Distributing copies or sale of any of these materials is strictly prohibited.

Academic Fraud:

Academic fraud is an act by a student that may result in a false evaluation. It is not tolerated by the University. Examples of academic fraud are: plagiarism, cheating of any kind or submit a work for which you are not the author, in whole or part. Any person found guilty of academic

fraud will be subject to severe sanctions. Please consult the webpage <https://www.uottawa.ca/vice-president-academic/academic-integrity/resources-students> which contains regulations and tool to help you avoid plagiarism.

Bilingualism:

Except in programs and courses for which language is a requirement, all students have the right to produce their written work and to answer examination questions in the official language of their choice, regardless of the course's language of instruction.

Academic GPS:

The Academic GPS hub is a one-stop shop for academic support. Whether you're an experienced student or just starting out, you'll find some great resources to help you succeed.

With the Academic GPS, you can:

- chat with a mentor seven days a week;
- register for study groups;
- take part in study methods workshops (note taking, time management, exam preparation, stress management, etc.);
- book an appointment with a mentor.

For more information: <https://www.u0ttawa.saea-tlss.ca/en/academic-gps>.

Health and Wellness:

Your wellness is an integral part of your success. If you don't feel well, it can be hard to focus on your studies. Dedicated professionals and fellow students who care about you are always ready to provide advice and support. Depending on your needs, many activities and services exist to accompany you during your academic journey.

Services include:

- opportunities to connect;
- counselling sessions;
- peer support;
- physical activity;
- wellness activities and workshops;
- spiritual guidance.

If you want to connect with a counsellor, you can book an appointment online or go to their walk-in clinic at 100 Marie-Curie, fourth floor. You can also drop-in to our wellness space, chat online with a peer helper, or access 24/7 professional help through the website.

For more information and to access these services, go to <https://www.u0ttawa.ca/wellness>.

Academic Accommodations:

We try to make sure all students with disabilities have equal access to learning and research environments, the physical campus and University-related programs and activities. The Academic Accommodations service works with other campus services to create an accessible campus learning environment, where students with disabilities have an equal opportunity to flourish. We offer a wide range of services and resources, provided with expertise, professionalism and confidentiality.

Services include:

- help for students with disabilities in making the transition;
- permanent and temporary accommodation measures;
- learning strategy development;
- adaptive exams;
- transcriptions of learning material;
- interpretation (ASL and LSQ);

- assistive technologies.

If you think that you might need any of our services or supports, email the Academic Accommodations service (adapt@uOttawa.ca).