INTRODUCTION TO NUMERICAL METHODS
MAT 3380 – WINTER 2022

Important notice: until (at least) January 31, 2022, all the activities including the lectures and the office hours will take place online via Zoom. The links to the Zoom meetings can be found directly on Brightspace. If classes are still online at the time of the midterm, the latter will be proctored via Zoom which will require the use of two electronic devices such as a laptop/desktop and a cellphone (detailed instructions will be given in due time).

Instructor:	Diane Guignard (STEM 651, dguignar@uottawa.ca)
Personal webpage:	https://mysite.science.uottawa.ca/dguignar/
Course webpage:	on Brightspace
Classes:	Tu 08:30am-09:50am in 136 Jean-Jacques Lussier (VNR), room 3035
	Fr 10:00am-11:20am in 136 Jean-Jacques Lussier (VNR), room 3035
Office hours:	Tu 10:30am-11:30am via Zoom (see the link on Brighspace)
	Th 11:00am-12:00pm in person at STEM 651
	or by appointment (via Zoom or in person)

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

Textbook:

A first course in numerical methods by U. M. Ascher & C. Greif, SIAM, 2011.

An electronic version is available free of charge via the library of the university, see `https://biblio.uottawa.ca/en`.

Catalog Description:
Roots of nonlinear equations (fixed point, Newton, secant, bisection). Condition number of linear systems. Iterative methods for linear and non-linear systems (Gauss-Seidel, Gauss-Jacobi, SOR; fixed point, Newton) . Interpolation and polynomial approximation, numerical differentiation and integration. Numerical methods for differential equations. Error analysis.

Prerequisites:
MAT 2122, MAT 2125, (MAT 2141 or MAT 2342), (MAT 2324 or MAT 2384).

Course Objectives:
This course is an introductory survey of numerical methods that are used in science and engineering. We will analyze properties such as accuracy, efficiency and stability of classical numerical approximations. The homework will include programming exercises to gain practical experience using 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 coverd as time allows.

Book Chapters	Sections	Duration
Introduction		0.5 weeks
3. Nonlinear Equations in One Variable	3.1-3.4	1.5 weeks
10. Polynomial Interpolation	10.1-10.7	1.5 weeks
11. Piecewise Polynomial Interpolation	11.2-11.3	0.5 weeks
14. Numerical Differentiation	14.1-14.2, 14.4	1.0 week
15. Numerical Integration	15.1-15.4	1.5 weeks
5. Linear Systems: Direct Methods	5.1-5.8, 4.2	2.5 weeks
7. Linear Systems: Iterative Techniques	7.1-7.3	1.0 weeks
16. Differential Equations	16.1-16.3, 16.5-16.6	1.5 week

Homework and Quizzes:
Homework assignments will be posted on Brightspace throughout the term. The problems designated as *Hand-in* are to be turned in on the assigned due date, either on Brightspace or directly in class. 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 problem will require the use of a computer. What sofware you use it up to you, but solutions will only be given in Matlab/Octave and in Python.

Short in-class quizzes with questions related to the assigned homework problems will be given on a biweekly basis, usually on Fridays. You will not have to turn in any homework solution for the material covered by the quizzes.

There will be about 5 hand-in homework assignments and 4 quizzes throughout the term.

Exams:
There will be one midterm exam and one final *comprehensive* exam. The midterm will take place Friday, March 4, 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 Brighspace in due time.

Grading Policy:
The final grade will be based on the homework/quizzes, the midterm exam and the *comprehensive* final exam. It will be computed according to the following distribution:

- Homework/Quizzes: 35% of your grade;
- Midterm: 30% of your grade;
- Final exam: 35% of your grade.

The homework and quizzes will be weighted equally. Moreover, the lowest grade will be dropped. Homework, quiz and exam scores will be posted on Brightspace so you can monitor your progress in the course. Your final letter grade will be computed according to the standard university scale:

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 2022 term. You will find more informations at the website
    https://www2.uottawa.ca/current-students/important-academic-dates-deadlines

January 10	First day of the term
January 11	First day of this class
February 20-26	Reading week (no classes)
March 4	Midterm
April 8	Last day of the term and of this class
April 12-29	Exam period (date to be determined)

Attendance and Make-up Policy:
Attendance is STRONGLY recommended. Make-ups for missed exams will only be allowed for a university approved absence in writing (for instance a medical note from the health services of the University of Ottawa). Whenever possible, students should inform the instructor before an exam is missed.

Make-ups will NOT be given for quizzes. However, if you miss a quiz due to an authorized absence and you contact me immediately, then the missed quiz will not count.

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.

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: `uOttawa.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 `uOttawa.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.

Some services we offer:

- 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).