Methods of Numerical Analysis

Math 371

Instructor Info —

Reginald L. McGee II, Ph.D.

Pronouns: He/Him/His

Student Hours: M 1-1:45pm, W 10:10-10:45pm, F 9:30-10:30am, or by appointment

Swords 326

x2635

https://mathcs.holycross.edu/~rmcgee/

rmcgee@holycross.edu

Course Info —

Monday & Wednesday & Friday

11:00-11:50am

O'Neil 121

Equity and Inclusion

You are all welcome and belong here. I will always work to make our classroom a safe place for everyone to contribute, learn, and grow no matter your identity, background, or circumstances. Please do not hesitate to reach out if I can do anything to improve the classroom climate. In addition, I expect our classroom to be a place where we respect one another and support each other's learning.

Overview

Math 371 is a course which has three main goals: it covers classical topics like error analysis, approximation of functions, numerical solutions of equations, numerical differentiation, numerical integration, and numerical solutions to ordinary differential equations; it introduces students to MATLAB (or improves their knowledge of MATLAB); and it uses MATLAB to solve practical problems from various areas of mathematics, physics, engineering, business, and finance. The active nature of this courses follows the principle that numerical analysis and MATLAB are best learned by doing and using it, not by reading about it. This course is taught in a computer lab and MATLAB will be used to some extent every class.

Learning Objectives

- Demonstrate understanding of the core concepts of numerical analysis
- Demonstrate familiarity with interpreting and writing code in MATLAB
- Demonstrate proficiency with proof writing, calculus, and linear algebra in applied contexts
- Exercise written and verbal communication of mathematics
- Develop both independent and collaborative problem solving skills

Material

Required Texts
Learning MATLAB and Numerical Analysis Through Examples, by Ed Overman.
A MATLAB Tutorial, by Ed Overman.
Both of these texts are available in the content section of the course Canvas page.

Other
Here are the ITS instructions for installing VPN and Remote Desktop so that you can access MATLAB through the campus license.

Grading scheme overview
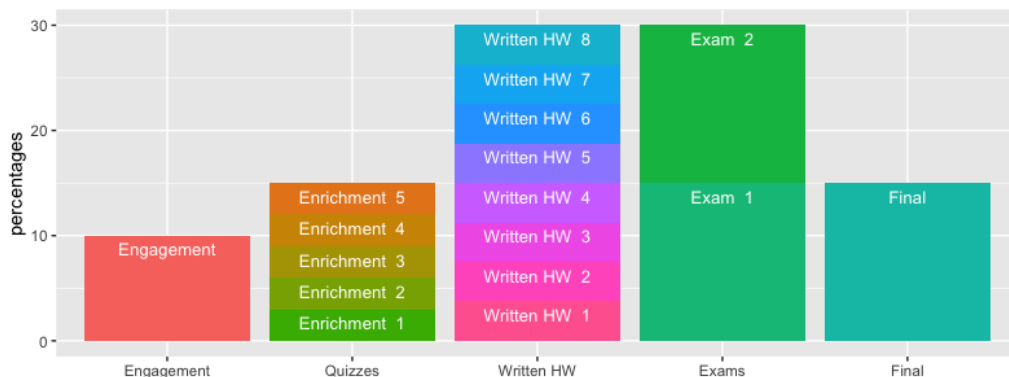
Covid-19

- If you feel sick, do not come to class.
- For the safety of everyone, masks are required over your nose and mouth during student hours. You will be asked to leave if you are noncompliant.

Accommodations for accessibility

Any student who feels the need for accommodation based on the impact of a disability should contact the Office of Accessibility Services (https://www.holycross.edu/health-wellness-and-access/office-accessibility-services) to discuss support services available. Once the office receives documentation supporting the request for accommodation, the student would meet privately with Accessibility Services to discuss reasonable and appropriate accommodations. The office can be reached by calling 508-793-3693 or by visiting Hogan Campus Center, room 505.

Grading and assignment notes

Your final course percentage will be computed as follows:

Academic Engagment	10 %
Enrichment Activities	15 %
Written Homework	30 %
Midterm Exams	30 %
Final Exam	15 %
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Total	100 %

(i) Academic engagement includes effort observed throughout the course, contributing to a positive learning environment by asking questions and collaborating during in-class coding and problem solving, attending student hours, participating in Canvas discussions, proper mask wearing during student hours, answering questions, etc.

(ii) Enrichments will include assigned readings and videos, attending virtual guest lectures, and the associated written responses. There will be $\sim$5 enrichment assignments.

(iii) Homework:
- Homework in this class tends to be very time consuming. It is extremely important to begin the homework early.
- There will be $\sim$8 homework assignments. Each will be posted to Canvas.
- The lowest homework score will be dropped and the total score scaled to 30% of your grade.
- Assignments will be due Thursdays at 5pm and should be uploaded to Canvas.
- There is an upload grace period on Canvas, but you should not make a habit of turning in homework late. If you anticipate you may need to submit your homework late notify me ahead of the assignment closing Friday at 11:59pm. Homework not submitted by the time the assignment closes and without notification will not be accepted.
- The filename for documents submitted should be:
  LASTNAME-FIRSTNAME-MATH371-ASSIGNMENTorENRICHMENTNUMBER-SUBMISSIONDESCRIPTION
  These filename guidelines are in part to build good submission habits for when you need to send documents for jobs, interviews, internships, etc.
- All computer code must be included, as well as all output unless otherwise stated.
- In general, code will be graded on the standards: Does the code run? Is it correct? Is it well documented?
- Longer codes must include enough test output to "prove" your code works. Generally, this means three test cases of valid input, aside from special cases.
- All work (especially plots) must be clearly labeled.
- You may be asked to explain (in writing or orally) how a piece of code you wrote is supposed to work. Failure to competently do so may result in loss of credit up to and *including all credit for the assignment that contains this code.*
- I reserve the right to give in-class pop quizzes that would replace the lowest homework score. These can not be made up and are not guaranteed to ever happen.

(iv) Midterm exams will be timed for 60 minutes and held in Haberlin 219. The first midterm covers material starting with the beginning of the course; the second midterm covers material starting with material covered since the first midterm exam.

Midterm 1	Mon. October 2nd	evening 6:30pm
Midterm 2	Wed. November 29th	evening 6:30pm

(v) The final exam is a comprehensive exam scheduled during exam period.

NOTE: I will follow universal design principles and allow every student time and a half on exams and quizzes.

NOTE: Any end of semester travel arrangements must be made for after the final exam period.

When life happens

Life happens to all of us and it is important to recognize each other's humanity. The dropped homework mentioned above is built into the course for exactly when life happens. If you need to miss an exam, please let me know as soon as you become aware of the conflict. More advance notice helps the amount of options that can be considered. If there is an ongoing situation in your life, please let me and your Class Dean know as soon as possible so that we can try to accommodate.

Calculators

Graphing calculators have become the de facto norm for high school and college mathematics and science courses. The use of calculators is allowed during in-class activities and homework, but are prohibited on quizzes and exams. Quizzes and exams will be written so that calculators are not required. Keep in mind that while it is useful to be fluent in the use of calculators, calculator fluency alone is not a substitute for understanding.

How to do well in this course

- Attend class, participate, and ask questions. Having questions means that you are processing the material, never hesitate to ask questions.
- Go over your lecture notes as soon after class as possible. Google Ebbinghaus forgetting curve for more on why.
- Start working on homework as soon as it is assigned.
- Visit student hours, even if you don't have questions it's good to simply discuss material.
- Read and work through the textbook and previous notes in preparation for class.
- Study topics iteratively and work towards developing a growth mindset.

Academic Integrity

While you are allowed and encouraged to work on homework problems with your classmates, the solutions and code you turn in to be graded should be your own. Take care to write up solutions in your own words. You may however discuss problems with other students and render help in debugging. Plagiarism will not be tolerated, especially when it comes to code. Do not copy your code from other students, online sources, or anyone else, and do not give your code to anyone else to copy. If any portion of your code is inspired by something you came across online, you should cite the website in a comment near that portion.

Exceptions: You are permitted to use code from the textbook or presented during class, but you must still be able to explain how it is supposed to work.

The Department of Mathematics and Computer Science has drafted a policy on academic integrity to precisely state our expectations of both students and faculty with regards to cheating, plagiarism, academic honesty, etc. You are required to read this policy and sign a pledge agreeing to uphold it. A violation of the Departmental Policy on Academic Integrity will result in a 0 for that assignment (or exam) and a letter describing the occurrence of academic dishonesty will be sent to your Class Dean.

The College's Academic Integrity Policy can be found: `https://catalog.holycross.edu/node/1381#AHP`

NOTE: There will be a ritual before every exam where we all turn off our phones and places them inside our bags. If you have a potential emergency where you need to have your phone on discuss with me before the exam.

E-mail Policy

I will only respond to class-related emails from your "g.holycross.edu" address. In the subject line of your email, you MUST include the name or number of the course so that I know to respond in an appropriate timeframe. Please begin with a salutation and also identify yourself in your email, and do not send attachments without first discussing it with me. It is sufficient to send the attachment in a separate email after describing it in a prior email. Emails that do not follow basic email etiquette may be ignored.

Disclaimer

The schedule listed on the course calendar is tentative, and topics covered on a given day may change slightly depending on the pace set for the course. The following may be changed, but only in the event of an emergency such as school closure: due dates for homework, dates for exams, and topics covered on each exam. If this occurs, it will be announced as soon as possible electronically and in class. I reserve the right to correct typographical errors on this syllabus without comment.