University of Washington

AMATH 301

Beginning Scientific Computing

Spring 2020

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Teaching Assistants:

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Course Description: Introduction to the use of computers to solve problems arising in the physical, biological, and engineering sciences. Application of mathematical judgment, programming architecture, and flow control in solving scientific problems. Introduction to MATLAB routines for numerical programming, computation, and visualization. Prerequisite: either MATH 125, Q SCI 292, or MATH 135. Offered: AWSpS.

Content Learning Goals:

By the end of this course, students will learn to:

- **(Mathematical Methods)** identify and recognize common mathematical problems and propose appropriate mathematical methods to solve them
- **(Numerical Analysis)** explain strengths and weaknesses of mathematical algorithms and apply this knowledge when solving new problems
- **(Programming)** write programs and code to solve mathematical problems and perform tasks using MATLAB and built-in MATLAB functions
- **(Interpretation and Presentation)** interpret, format, and present results including visualizations of data

The above are general themes or course-level learning goals that will appear throughout the course. In addition, content-specific component skills will be given each week in Canvas. Some examples are:

- Perform basic mathematical operations involving scalars, vectors, and matrices in MATLAB (Week 1)
- Program loops to execute iterative tasks (Week 2)
- Explain the benefit of LU decomposition over Gaussian Elimination (Week 3)
- Implement Jacobi iteration to solve linear systems (Week 4)

Cognitive Learning Goals:

By the end of this course, students will learn to:

- identify and fix their mistakes
- view mathematical concepts from both an analytical and computational perspective
- collaborate productively with others

Affective Learning Goals:

By the end of this course, students will:

- increase their expectations for success in mathematics
- develop a growth mindset instead of a fixed mindset
- increase their confidence in their ability to learn a new programming language on their own
- increase their interest in mathematics and its applications
- increase their comfort level in interacting with others in an online learning environment
- continue to grow their "mathematical maturity" which is, in part, the understanding of and recognition of the interconnected nature of mathematics

Lectures: Typically, this course has a mixture of online video lectures and in-class lectures. This quarter, the "in-class lectures" will be pre-recorded using Panopto. The videos can be viewed at any time. You will not have to attend class live. I would strongly encourage you to watch them on the day they are posted so that you do not fall behind. Links to the video lectures will be posted in Canvas. They will be organized by the date by which you are suggested to watch them.

Video Questions: For each video lecture, there will be a Poll Everywhere Q&A (linked with the video) for you to be able to ask questions about confusing parts of the video. You can also upvote or downvote other people's questions. Each Friday, I will address some of the most common or upvoted questions about the videos.

Activities: This class includes activities that were designed to be completed in class in small groups. Students will still complete the activities, but they will now be done online. You are encouraged to form groups of 2-3 students and complete them together, but you are allowed to work alone. They can be completed at any time during the week they are posted.

Typical Weekly Schedule: The class is scheduled to meet four times per week. The schedule may vary week-to-week, but a typical week will look like the following:

- **Monday:** Panopto Lecture
- **Tuesday:** Activity
- **Wednesday:** Panopto Lecture
- **Friday:** Miscellaneous (additional lecture, activity, Q&A, etc.)

Web Page: https://canvas.uw.edu/courses/1371090
Check the canvas course page regularly. Homework assignments, course announcements, video lectures, and grades will be posted there.

Textbook: There is no required textbook for this class, but the course material comes from the textbook listed below. It is a useful resource and should be available through the University bookstore.
Data-Driven Modeling & Scientific Computation: Methods for Complex Systems & Big Data by J. Nathan Kutz.

Communication: The main source of communication for this course will be Canvas.

- **Course Announcements:** The instructor will regularly post course announcements with information about what was posted in Canvas as well as upcoming due dates and scheduling changes. You are responsible for reading all of the announcements.
- **Piazza Discussion Board:** This course will use Piazza for the discussion board. You can access Piazza directly or via Canvas. You should receive an email to activate your account during the first week of class. Due to the size of the course, questions about homework or about the structure of the course will not be answered by email. Instead, they should be posted to the discussion board. You are encouraged to answer each other's questions, but the instructor and TAs will also regularly answer questions on the discussion board. While discussions about the homework are encouraged on the discussion board, no solutions should be posted. If a post contains code that can be copied and used for a homework submission, the post will be deleted.
- **Email:** Email should be used to reach me if you have any questions or concerns that are personal and do not belong on the discussion board. When you send an email, please include your full name, section, and UW NetID.

Lab Hours:

There will be designated times each week in which you can ask the TAs and/or the instructor questions about the programming assignments or other aspects of the course. These will be held via Zoom. The lab hours will begin during the second week of class (when the first assignment is due). The times for the lab hours will be posted during the first week of class. A few things to note:

- To start the quarter, there are over 550 students enrolled in this course. Therefore, it is likely that you will have to wait to get help in the lab hours. You are strongly encouraged to start your homework early and attend lab hours early in the week. The lab hours will be less busy early in the week so you will get more personalized attention.
- There will be a system in place for reserving a place in line to get help from the TA. A video tutorial for how to attend the Zoom lab hours will be posted during the first week of class.

Exams: This course will have a midterm and final exam. Exams will be completed online, likely through Canvas. They will be timed and open note. You will be given a 24 hour time window in which they must be completed. The tentative date for the midterm is Friday, May 8. The University schedule for final exams is as follows:

- **AMATH 301A:** Tuesday, June 9
- **AMATH 301B:** Wednesday, June 10
- **AMATH 301C:** Thursday, June 11

I am currently investigating different options for the timing of the final exam and will update you (and the syllabus) when that is finalized.

Homework: Homework assignments will be assigned weekly and due on Fridays. The assignments will be posted to Canvas. The lowest homework score will be dropped.

Homework Grading:

- Homework assignments will typically consist of two types of problems - MATLAB Grader problems and Writeup problems. MATLAB Grader problems will be submitted and graded online using MATLAB Grader. Writeup problems will be submitted through a website called Gradescope. These problems may sometimes be graded statistically or for completion.
- Late homework will not be accepted. It is strongly encouraged that you do **not** wait until the last minute to submit your assignment in case you have technical difficulties.
- During the first week of the course you will be added to the course MATLAB grader page as well as the course Gradescope page. You should look for emails from both in your UW email account.
- A video will be posted during the first week of class that demonstrates how to submit both parts of your homework. A practice assignment will be posted to let you practice using MATLAB grader.

Grading Policy:

Homework	40%
Activities/Quizzes	10%
Midterm Exam	20%
Final Exam	30%

Computing Policy: MATLAB will be used heavily in this course so you need access to it. MATLAB licenses for students can be obtained for free from UWare. If you do not have a computer that can run MATLAB, you can rent a computer from the Student Technology Loan Program.

Academic Integrity: Students shall abide by the University of Washington Academic Responsibility policies, which are outlined at `https://depts.washington.edu/grading/pdf/AcademicResponsibility.pdf`. Violations and suspected violations will be reported to the appropriate Dean's Representative and through the webpage for Community Standards and Student Conduct. This can lead to a mark on your permanent academic record. Any form of dishonesty in an assignment will lead to a zero on the assignment. Other consequences, including a failing grade in the course, will be determined based on the seriousness of the offense or multiple offenses at the instructor's discretion.

Collaboration on homework is encouraged but copying will not be tolerated. Every student must submit their own assignment consisting of their own work. Copying or submitting work that is identical to a classmate's work or online solution, in part or in whole, is academic misconduct. You may discuss ideas about how to approach a problem or how to overcome certain roadblocks, but you should not share code nor provide specific detailed instructions to another student. Behaviors that are considered cheating include, but are not limited to:

- Showing another student your solution to an assignment or looking at another student's solution
- Having another person walk you through an assignment, describe in detail how to solve it, or sit with you as you code. This includes current or former students, tutors, friends, paid consultants, or anyone else.
- Copying any amount of code from anywhere other than resources posted by the instructor. It is permissible to copy code from lecture notes or homework solutions from previous assignments if they have been posted by the instructor.
- Posting your homework solution code, in part or in whole, online to ask others for help. This includes public message boards, code repositories, forums, file sharing sites and services, or any other online system.

As a general rule, you should not look at another student's code before submitting your assignment. Under our policy, a student who gives inappropriate help is equally guilty as one who receives it. Please contact the instructor if you are unsure whether a particular behavior is a violation of the policy.

Late Work and Make Up Policy: Late work will not be accepted and make up exams will not be given unless class is missed by an unavoidable cause (http://www.washington.edu/admin/rules/policies/SGP/ScholRegCH112.html#1). Proper documentation must be provided. If possible, advance notice should be given to the instructor if class will be missed. If advance notice cannot be given, you must notify the instructor as soon as possible.

Access and Accommodations: Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Religious Accommodations: Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/). Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/).