MARYLAND APPLIED
GRADUATE ENGINEERING

ENPM606 Data Science (0101, DE01)

Term: Fall 2024
Professor: Dr. Patrice Seyed   **Grading Assistant:** Amitejash Rout
Pronouns: he/him   **Pronouns:** she/her
Office Phone: n/a   **Email:** amitejashrout@umd.edu
Email: apseyed@umd.edu   **Office Hours:** TBD
Office Hours: Wednesday 9:40PM – 10:40PM

Credits: 3
Course Dates: From August 27th – December 19th
Course Times: Tuesdays 7:00 - 9:40pm and Online
Classroom: Online

Canvas ELMS Link: https://umd.instructure.com/courses/1368608

Course Description

Computers have made it possible, even easy, to collect vast amounts of data from a wide variety of sources. It is not always clear, however, how to use those data and how to extract useful information from data. This problem is faced in a tremendous range of scholarly, government, business, medical, and scientific applications. The purpose of this course is to teach some of the best and most general approaches to get the most out of data through clustering, classification, and regression techniques. Students will gain experience analyzing several kinds of data, including document collections, financial data, scientific data, and natural images.

Finally, it is required that you have regular access to a computer and an Internet connection throughout this course. A laptop is preferable. If you have a laptop, it would be useful to bring the laptop to class, especially for working through hands-on examples.

Prerequisites

Comfortable with basic math concepts (sums, variables), discrete math, and some programming experience.

Learning Outcomes

After successfully completing this course you will be able to:

- Complete a data science project, from inception to presentation.
- Apply data analysis techniques to data using Python.
- Structure and execute hypothesis testing experiments.
- Train and evaluate supervised models.
- For more information, review the Creating Meaningful Learning Objectives module.

Course Materials

Required Resources

- Book: (N/A, course materials provided.)

- Application/Software: Each assignment will require a small amount of digging into data using the software language Python. This software is free and open source software and is available for all major operating systems. The assignments will take the form of applying already-implemented algorithms to data to

understand the processes involved and answering questions to test understanding. Use of Python is included within the course and homeworks must be submitted in the Python language.

- Total Estimated costs of required course materials: $0.00

Supplemental Resources (no purchase required)
- Readings: None.
- Hardware/Software: A laptop that you will bring to class.

Course Structure
Lectures will be primarily comprised of two components: 1) traditional lecture, where I teach the topics accordingly to the syllabus and schedule, 2) a period of time for interactive "lab" exercises, as well as time for working on projects, discussion, and working on homework.

Halfway through the semester, students will complete an in-class midterm that will test high-level understanding of concepts. In addition, students will work on a project that emphasizes the concepts covered in the class. The project will be in a group of three to four students focusing on a shared problem. This project will have three stages:
1. An initial proposal, explaining what they want to do.
2. A first-step deliverable (due three quarters into the semester) to make sure students are grappling with the problem, e.g. a transformation of the data, performing a preprocessing step, or creating a baseline for comparison.
3. A final project report.

This course includes both on-campus and online sections. To attend synchronously online, log into ELMS-Canvas at the time of the Section 0101 class Tuesdays at 7:00-9:40 PM and select "Video Conference" from the left side menu. This will open a Zoom link to the live classroom.

For asynchronous online students, all lectures will be recorded and made available on ELMS-Canvas under "Panopto Recordings/Video Lectures" within 24 hours of the class time. Be sure to review the recorded lecture in a timely manner.

On-campus students come to class prepared to engage with the lecture and materials. Online students, be sure to log into Canvas regularly and participate in discussions and activities. Regardless of the section you are enrolled in, participation is expected.

Please note that F1 students enrolled in the on campus section are required to attend in person. If you have a conflict on a particular day, please reach out to me in advance to discuss.

Communication Guidelines

Communicating with the Instructor
My goal is to be readily available to you throughout the semester. I can be reached by email at apseyed@umd.edu. Please DO NOT email me with questions that are easily found in the syllabus or on ELMS-Canvas (e.g., When is this

assignment due? How much is it worth? etc.), but please DO reach out about personal, academic, and intellectual concerns/questions.

While I will do my best to respond to emails within 24 hours, you will more likely receive email responses from me on Mondays, Wednesdays and Fridays from 8:00am-10:00am EST.

When constructing an email to me please put "ENPM 808W (Section XXXX): Your Topic" in the subject line. This will draw my attention to your email and enable me to respond to you more quickly.

Additionally, please review [These tips for 'How to email a Professor'](). By following these guidelines, you will be ensured to receive a timely and courteous response.

Finally, if you need to discuss issues not appropriate for the classroom and/or an email, we can arrange to talk by phone, over Zoom, or in person. Send me an email asking for a meeting and we can set something up.

Announcements
I will send IMPORTANT messages, announcements, and updates through ELMS-Canvas. To ensure you receive this information in a timely fashion, make sure your email and announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS-Canvas ([How to change notification settings in CANVAS]()).

Log into our ELMs-Canvas course site at least once every 24-hour period to check your inbox and the Announcements page.

Names/Pronouns and Self-Identifications
The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to in this class, both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). Keep in mind that the pronouns someone uses are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, it is your choice whether to disclose how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Communicating with your Peers
With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions. I encourage you to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind, that free speech has its limit and this course is NOT the space for hate speech, harassment, and derogatory language. I will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert me immediately if you feel threatened, dismissed, or silenced at any point during our semester together and/or if your engagement in discussion has been in some way hindered by the learning environment.

Netiquette Policy
Netiquette is the social code of online classes. Students share a responsibility for the course's learning environment. Creating a cohesive online learning community requires learners to support and assist each other. To craft an open and interactive online learning environment, communication has to be conducted in a professional and courteous manner at all times, guided by common sense, collegiality and basic rules of etiquette.

Grading

Grade Breakdown

Assignment	Percentage %
Homework	30%
Mid-Term Exam	25%
Participation/Engagement	5%
Final Project	40%
Total	100%

Course Assignments

Homework Assignments
- There will be a total of three homework assignments due. Together, they are worth 30% of your final grade.
- Assignments are designed to help you learn the material, so please use them for that!
- You are allowed to collaborate with others (as many people as you'd like), but you must turn in your own assignment. For example, you could work together in a group, but each person must write up their solutions individually.
- Homework 1: **Exploratory Data Analysis**: Demonstrate that you can discretize, visualize, and interpret data, as well as find a public data and analyze it. Submit Python notebook to Canvas. Complete assignment information available in Canvas.
- Homework 2: **Regression Models:** Normalize data, perform a regression, interpret the coefficients, and explain data distributions. Submit Python notebook to Canvas and model results to an internal class Kaggle competition. Complete assignment information available in Canvas.
- Homework 3: **Classification Models:** Normalize language data, perform classification with multiple algorithms, feature tuning, and interpret models. Submit Python notebook to Canvas, and model results in an internal class Kaggle competition. Complete assignment information available in Canvas.

Mid-Term Exam
- 10/15/2023
- For in-class section the written exam will be distributed and taken in person. For web-section, instructions will be provided for taking and submitting the exam within the same time period.

- There will be an in-class midterm. The midterm will cover material in the previous lectures and will be open notes.

Participation & Engagement
- Each class is critical to your learning experience, and I expect you to come to class prepared (having read all assigned readings, ready to engage). I also expect active participation, not passive reception of the material.
- Your energy in contributing to class discussions and hands-on exercises will make this class an enjoyable experience for all of us.
- We will also be using ELMS for class communication with instructor and among students. You can get credit for participation by answering and asking useful questions on that platform. Ideally you should be participating both online and in class, however.

Final Project
- Project Proposal, First Project Deliverable, Final project Presentations and submission of materials.
- The goal is to demonstrate what you have learned during the course and exercise that in a group project setting.
- Your final project should demonstrate the primary stages taught as the Data Science Lifecycle, or a deep dive within 1 or 2 stages. Example projects will be shown during the course. Complete assignment information available in Canvas.

Grading Assignments

All assignments will be graded according to a predetermined set of criteria (i.e., rubric) which will be communicated to students before the assignment is submitted.

To progress satisfactorily in this class, students need to receive timely feedback. To that end, it is my intention to grade all assignments within **2 weeks** of their due date. If an assignment is taking longer than expected to grade, students will be informed of when they can expect to see their grade.

Grade Computation

All assessment scores will be posted on ELMS/Canvas page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet and discuss.

It is expected that you will submit work by the deadline listed in the syllabus and/or on ELMS-Canvas. Late work will be penalized according to the late work policy described in the **Course Policies and Procedures** section below.

Grade Disputes: I am happy to discuss any of your grades with you, and if I have made a mistake I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99 ≠ 90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs

+	97.00%	+	87.00%	+	77.00%	+	67.00%	+	
A	94.00%	B	84.00%	C	74.00%	D	64.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%	-	

Course Schedule

Week #	Topic	Deliverable
1	Course Introduction, Introduction to Python	
2	Probability crash course	
3	Properties of data, bikeshare exercise, data munging	
4	Linear regression (titanic dataset)	
5	Logistic regression (Bayes)	
6	Decision trees (Svm)	HW1 Due
7	MidtTerm Prep	Project Proposals Due
8	Midterm	
9	Evaluation, Feature selection	HW2 Due
10	Unsupervised Learning, midterm review	
11	Semi-Supervised learning	HW3 Due
12	Neural Networks	
13	Thanksgiving Recess	
14	Workshop	
15	Project Presentation	All Project Materials Due Friday 5:00PM

Note: This is a tentative schedule, and subject to change as necessary – monitor ELMS-Canvas for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

Course Policies and Procedures

The University of Maryland's conduct policy indicates that course syllabi should refer to a webpage of course-related policies and procedures. For a complete list of graduate course related policies, visit the Graduate School website. Below are course-specific policies and procedures which explain how these Graduate School policies will be implemented in this class.

Satisfactory Performance
The Graduate School expects students to take full responsibility for their academic work and academic progress. The student, to progress satisfactorily, must meet all the academic requirements of this course. Additionally, each student is expected to complete all readings and any preparatory work before each class session, come to class prepared to make substantive contributions to the learning experience, and to proactively communicate with the instructor when challenges or issues arise.

Questions about Assignments
Please ask all questions you may have about an assignment by 5:00 PM the day before the assignment is due. Any questions asked after that time may not be answered in time for you to make changes to your work.

Late Work Policy
Assignments should be completed by the due date and time listed with the assignment, on the syllabus, and/or in the course calendar. If you are unable to complete an assignment by the stated due date, it is your responsibility to contact your instructor to discuss an extension, at least 24 hours BEFORE the assignment is due. Extensions are not guaranteed, but may be granted at the instructor's discretion.

Each person has five free late days to be used, no questions asked, during the course (late days can only be used in increments of one day; if your assignment is three minutes or three hours late, that counts as one late day). When turning in a late assignment, clearly mark at the top that you are using a late day. After you use your late days, late assignments will get half credit. Assignments more than two days late may not be graded.

Religious Observance
It is the student's responsibility to inform the instructor of any intended absences for religious observances in advance. Notice should be provided as soon as possible but no later than the end of the schedule adjustment period.

Academic Integrity
For this course, some of your assignments will be collected via Turnitin on ELMS/Canvas. I have chosen to use this tool because it can help you improve your scholarly writing and help me verify the integrity of student work. For information about Turnitin, how it works, and the feedback reports you may have access to, visit Turnitin Originality Checker for Students

The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the University of Maryland does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time at the University of Maryland.**

It is important to note that course assistance websites, such as CourseHero, or AI generated content are not permitted sources, unless the instructor explicitly gives permission. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. These sites offer information that might be

inaccurate or biased and most importantly, relying on restricted sources will hamper your learning process, particularly the critical thinking steps necessary for college-level assignments.

Additionally, students may naturally choose to use online forums for course-wide discussions (e.g., Group lists or chats) to discuss concepts in the course. However**, collaboration on graded assignments is strictly prohibited unless otherwise stated**. Examples of prohibited collaboration include: asking classmates for answers on quizzes or exams, asking for access codes to clicker polls, etc. Please visit the **Office of Graduate Studies' full list of campus-wide policies** and reach out if you have questions.

Finally, on each exam or assignment you must write out and sign the following pledge: *"I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."*

If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to me straight away. Also, *if you are ever unclear* about acceptable levels of collaboration, *please ask*!

To help you avoid unintentional violations, *the following table* lists levels of collaboration that are acceptable for each graded exercise. Each assignment will contain more specific information regarding acceptable levels of collaboration.

	OPEN NOTES	USE BOOK	LEARN ONLINE	GATHER CONTENT With AI	ASK FRIENDS	WORK IN GROUPS
Homework Assignments	✔	✔	✔	---	---	✔
Team Project	✔	✔	✔	✔	---	✔
Midterm Exam	✔	---	---	---	---	---

Course Evaluation
Please submit a course evaluation through Student Feedback on Course Experiences in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to Course Experiences is confidential. Campus will notify you when Student Feedback on Course Experiences is open for you to complete your evaluations at the end of the semester. Please go directly to the **Student Feedback on Course Experiences** to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

Copyright Notice
Course materials are copyrighted and may not be reproduced for anything other than personal use without written permission.

Tips for Succeeding in this Course

1. **Participate.** I invite you to engage deeply, ask questions, and talk about the course content with your classmates. You can learn a great deal from discussing ideas and perspectives with your peers and professor. Participation can also help you articulate your thoughts and develop critical thinking skills.
2. **Manage your time.** Students are often very busy, and I understand that you have obligations outside of this class. However, students do best when they plan adequate time that is devoted to course work. Block your schedule and set aside plenty of time to complete assignments including extra time to handle any technology related problems.
3. **Login regularly.** I recommend that you log in to ELMS-Canvas several times a week to view announcements, discussion posts and replies to your posts. You may need to log in multiple times a day when group submissions are due.
4. **Do not fall behind.** This class moves at a quick pace and each week builds on the previous content. If you feel you are starting to fall behind, check in with the instructor as soon as possible so we can troubleshoot together. It will be hard to keep up with the course content if you fall behind in the pre-work or post-work.
5. **Use ELMS-Canvas notification settings.** Pro tip! Canvas ELMS-Canvas can ensure you receive timely notifications in your email or via text. Be sure to enable announcements to be sent instantly or daily.
6. **Ask for help if needed.** If you need help with ELMS-Canvas or other technology, IT Support. If you are struggling with a course concept, reach out to me and your classmates for support.

Student Resources and Services

Taking personal responsibility for your learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit the Counseling Center's Academic Resources to learn more about the wide range of resources available to you. Below are some additional resources and services commonly used by graduate students. For a more comprehensive list, please visit the Graduate School's Campus Resources Page.

Accessibility and Disability Services
The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The Accessibility & Disability Service (ADS) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu. Information about sharing your accommodations with instructors, note taking assistance and more is available from the Counseling Center.

Writing Center
Everyone can use some help sharpening their communication skills (and improving their grade) by visiting The Graduate School's Writing Center and schedule an appointment with them. Additionally, international graduate students may want to take advantage of the Graduate School's free English Editing for International Graduate Students (EEIGS) program.

Health Services
The University offers a variety of physical and mental health services to students. If you are feeling ill or need non-emergency medical attention, please visit the University Health Center.

If you feel it would be helpful to have someone to talk to, visit UMD's Counseling Center or one of the many other mental health resources on campus.

Notice of Mandatory Reporting
Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking: As a faculty member, I am designated as a "Responsible University Employee," and I must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to UMD's Title IX Coordinator per University Policy on Sexual Harassment and Other Sexual Misconduct.

If you wish to speak with someone confidentially, please contact one of UMD's confidential resources, such as CARE to Stop Violence (located on the Ground Floor of the Health Center) at 301-741-3442 or the Counseling Center (located at the Shoemaker Building) at 301-314-7651.

You may also seek assistance or supportive measures from UMD's Title IX Coordinator, Angela Nastase, by calling 301-405-1142, or emailing titleIXcoordinator@umd.edu.
To view further information on the above, please visit the Office of Civil Rights and Sexual Misconduct's website at ocrsm.umd.edu.

Basic Needs Security
If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit UMD's Division of Student Affairs website for information about resources the campus offers you and let me know if I can help in any way.

Veteran Resources
UMD provides some additional supports to our student veterans. You can access those resources at the office of Veteran Student life and the Counseling Center. Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor.