Course Logistics for CS-GY 6923 INET Spring 2024

Semester: Spring 2024
Course Instructor: Mina Ghashami
Email: mina.ghashami@nyu.edu

Course Logistics:

Weekly Assignments:

- Begin on the Available Date specified.
- Must be submitted by 11:59 PM on the Submission Date.
- No late submissions will be accepted without prior approval.

Assignment Schedule

Assignment	Available Date	Submission Date
Week 2	Jan 29th	Feb 05th
Week 3	Feb 05th	Feb 12th
Week 4	Feb 12th	Feb 26th
Week 5	Feb 26th	Mar 04th
Week 6 (Project Proposal)	Mar 04th	Mar 11th
Week 7	Mar 11th	Mar 25th
Week 8	Mar 25th	Apr 01st
Project Report Draft	Apr 15th	Apr 22nd
Project Presentation Recording	Apr 22nd	Apr 29th
Project Final Report	Apr 22nd	May 06th

Course Grading Schema

Grade Item	Association	Weight (%)
Homework Assignments (Weeks 2-8)	Assignments	40
Final Project	Peerceptiv	50
Class Participation	-	10
Total		**100**

Final Project Grading Schema

Component	Description	Weight (%)
Final Project Video Presentation	Uploaded by students to Peerceptiv for peer review.	50
Final Project Professor Grade	Evaluated by the instructor for content, accuracy, and presentation.	30
Review Feedback by Student	Each student provides feedback on the reviews they receive.	20

Note on Final Project Grading:

In this course, the final project consists of a video presentation that each student will upload to Peerceptiv, an online platform for peer evaluation. The grading for the final project is distributed as follows:

- **50% Peer Grade:** Each student's video presentation will be reviewed and graded by their classmates through Peerceptiv. This peer evaluation will account for half of the final project grade.
- **30% Instructor Grade:** The remaining 30% of the project grade will be determined by the professor. This assessment will focus on the depth of content, clarity of explanation, and the overall quality of the video presentation.
- **20% Feedback on Reviews:** Students are expected to provide feedback on each peer review they receive. This means that for every review a student's presentation gets, the student must offer a thoughtful response to their reviewer. This task of providing feedback is crucial and constitutes the remaining 20% of the final project grade. It ensures that reviewers receive valuable responses to their evaluations, fostering a constructive learning environment. Please note that active participation in both reviewing peer presentations and providing feedback on received reviews is essential for the comprehensive assessment of your final project.

Course Communication

Announcements -

Announcements will be posted on NYU Brightspace on a regular basis. You can locate all class announcements under the *Announcements* tab of our class. Be sure to check the class announcements regularly as they will contain important information about class assignments and other class matters.

Email –

You are encouraged to post your questions about the course in the Forums discussions on NYU Brightspace. This is an open forum in which you and your classmates are encouraged to answer each other's questions. But, if you need to contact me directly, please email me at mina.ghashami@nyu.edu. You can expect a response within 48 hours.

Weekly Discussion Forums –

Discussion forums are an excellent way for you to engage with the course material and with your peers. Each module will have an accompanying discussion board question posted in the *Forums* tab. You are expected to read the discussion boards and engage in thoughtful discussions. I will read all discussion posts and provide content clarification and feedback when necessary.

Weekly Virtual Meetings –

Once a week, we will hold a virtual class meeting through the *Meetings* tool on NYU Brightspace. This weekly meeting is an opportunity for you to ask questions and gain clarification about the course content from myself and your peers. You are highly encouraged to attend these meetings. I understand that not all students will be available to attend these virtual meetings. Due to this fact, the meetings will be recorded so you can watch them when you are available.

Netiquette –

When participating in an online class it is important to interact with your peers in an appropriate manner. Always use professional language (no netspeak) in your discussion board posts and emails. Please be respectful of your classmates at all times even if you disagree with their ideas.

Interaction Policy

You are required to be an active online learner in this course and expected to participate in the Active Learning Modules, weekly discussion boards, weekly virtual meetings

Readings

The required texts for the course are

1. *Introduction to Machine Learning, Third Edition*, Ethem Alpaydin, MIT Press, 2014
2. *Python Machine Learning: Machine Learning and Deep Learning with Python, scikit- learn, and TensorFlow 2, Third Edition*, Sebastian Raschka and Vahid Mirjalili, Packt Publishing, 2020.

You can access NYU's central library here: http://library.nyu.edu/
You can access NYU Tandon's Bern Dibner Library here: http://library.poly.edu/

Course requirements

Participation is paramount to your success in this course. Be sure to log into NYU Brightspace multiple times a week, read all announcements, complete all Active Learning Modules and assignments on time, and participate in Discussion Forums and Virtual Meetings.

Topics

Topic 1: Introduction to the course and to machine learning

- Objective: Be able to describe, at a very high level, what machine learning is and why it is becoming increasingly prevalent.
- Readings: Alpaydin, Chapters 1 and 2. Read for the big picture. Don't get stuck on the details.
- Discussion Forum: Introductory post about yourself.
- Webinar Session
- Programming Assignment: Set up your Jupyter notebook environment.

Topic 2: The Perceptron and Adaline machine learning models

- Objectives: Be able to describe and implement the Perceptron and Adaline machine learning models. Be able to compare the assumptions of these two models and discuss their strengths and weaknesses.
- Reading: Alpaydin, Ch. 11.1 - Ch. 11.4
- Reading: Raschka, Ch 2., pp 1-50; Ch 3., pp 51-58.
- Discussion Forum
- Webinar Session
- Programming Assignment 2.

Topic 3: Logistic regression model, regularization. Multiclass classification

- Objectives: Be able to describe and implement the logistic regression machine learning model. Be able to describe regularization, determine to which machine learning situations it is applicable, and apply it. Be able to apply binary classification models to multiclass problems.
- Reading: Alpaydin, Ch. 10
- Reading: Raschka, Ch 3. pp 51-58.
- Discussion Forum

- Webinar Session
- Programming Assignment 3

Topic 4: Support Vector Machines and Kernel Machines

- Objectives: be able to
  - Describe the support vector machines and kernel machines.
  - Implement SVM and kernel machine learning models.
- Reading: Alpaydin, Ch. 10
- Reading: Raschka, Ch 3, pp. 76-87.
- Discussion Forum
- Webinar Session
- Programming Assignment 4

Topic 5: Decision Trees and Decision Tree Pruning

- Objectives: Be able to describe and implement the decision tree machine learning model and to determine when pruning is appropriate and, when it is appropriate, implement it.
- Reading: Aplaydin Ch. 6 and Ch. 9.
- Reading: Raschka, Ch 3, pp. 88-97.
- Discussion Forum
- Webinar Session
- Programming Assignment 5

Topic 6: Bayesian Learning

- Objective: Be able to describe and implement Bayesian machine learning models.
- Reading: Alpaydin, Ch. 3.
- Discussion Forum
- Webinar Session
- Project description

Topic 7: Ensemble Methods

- Objectives: Be able to describe the difference between strong and weak learnings. Be able to describe the techniques of bootstrapping, gradient boosting, and Adaboosting. Be able to describe and implement the random forest machine learning model.
- Reading: Alpaydin, Ch 17.
- Reading: Raschka, Ch. 7.
- Discussion Forum
- Webinar Session
- Programming Assignment 7

Topic 8: Regression

Objectives: Be able to describe how to use multiple machine learning models to solve regression problems and to implement these techniques.

- Reading: Alpaydin, Chs. 7, 8.
- Reading: Raschka, Ch. 10, Ch. 11.
- Discussion Forum
- Webinar Session
- Programming Assignment 8.

Topic 9: Clustering and Nonparametric Models including PCA. Dimensionality Reduction

Objectives: Be able to describe and implement clustering and nonparametric models.

- Reading: Alpaydin, Chs. 7, 8.
- Reading: Raschka, Ch. 10, Ch. 11.
- Discussion Forum
- Webinar Session
- Submit Project Topic

Topic 10: Neural Networks and Backpropagation

- Objective: Be able to describe the technique of backpropagation. Be able to describe and implement machine learning models based on neural networks
- Reading: Alpaydin, Ch 11.5 - Ch. 11.13.
- Reading: Raschka, Ch. 12.
- Discussion Forum
- Webinar Session

Topic 11: Other topics in Neural Networks

- Objective: Be able to describe and implement techniques utilizing convolutional neural networks, recurrent and recursive neural networks, and hidden Markov models.
- Reading: Alpaydin Ch 15
- Discussion Forum
- Webinar Session

Topic 12: Reinforcement Learning

- Objective: Be able to describe and implement reinforcement learning machine learning techniques.
- Reading: Alpaydin, Ch 18.
- Discussion Forum
- Webinar Session
- Submit Project Report Draft

Topic 13: Generative Adversarial Networks, Ethics and Fairness in Machine Learning, and Concluding Comments

- Be able to describe Generative Adversarial Networks. Be able to describe ethical and fairness issues in machine learning.
- Reading: Arvind Narayanan, T*wenty one definitions of fairness and their policies*, ACM FAT* 2018, https://www.youtube.com/watch?v=jIXIuYdnyyk
- Reading: Moritz Hardt, Eric Price, and Nathan Srebro, *Equality of opportunity in supervised learning*, 2016.
- Discussion Forum
- Webinar Session

Topic 14: Presentation of Final Projects

Moses Center Statement of Disability

If you are student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities (CSD) at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.

NYU School of Engineering Policies and Procedures on Academic Misconduct *(from the School of Engineering Student Code of Conduct)*

1. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the Schooland will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.

B. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:

    1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
    2. Fabrication: including but not limited to, falsifying experimental data

and/or citations.

3. Plagiarism: intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
4. Unauthorized collaboration: working together on work that was meant to be done individually.
5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

Access the entire School of Engineering Student Code of Conduct here: engineering.nyu.edu/academics/code-of-conduct