MET CS 767 2025 Fall 2 Online Course Syllabus
Advanced Machine Learning and Neural Networks

Instructor

Eric Braude, Ph.D. ebraude@bu.edu

Course Duration

Start: October 28, 2025
End: December 15, 2025

Course credits

4 credits

Course Description

The course explores theories and methods for automating the application of knowledge, with an emphasis on learning from input/output data. It covers a wide variety of approaches, including Supervised Learning, Neural Nets and Deep Learning, Unsupervised Learning, Competitive Learning, Bayesian Learning, and Genetic Algorithms.

Prerequisites: MET CS 521 and at least one of MET CS 622, MET CS 673, MET CS 682, or MET CS 677 or instructor consent.

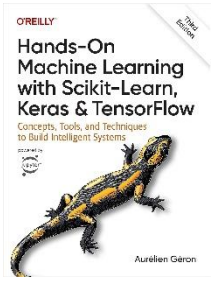
Course Learning Objectives

By successfully completing this course, you will be able to do the following:

- Distinguish between main machine learning techniques: Classification, neural nets, and rules.
- Compare how the main machine-learning techniques can be applied.
- Implement more than one of these techniques in a significant manner.

Course Materials

Required Book



Géron, Aurélien. (2022). *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems* (3rd ed.).

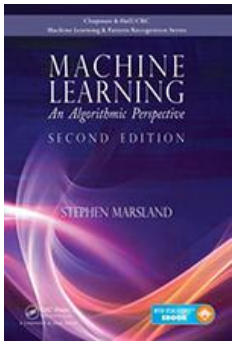
Publisher: O'Reilly Media
ISBN-13: 978-1098125974

This book can be purchased from Barnes and Noble at Boston University.

This textbook will be referred to in syllabus as "Géron Book".

Additional Recommended Books

The following books are very nice to have but not required.



Marsland, Stephen. (2014). *Machine Learning: An Algorithmic Perspective* (2nd ed.).

Publisher: Taylor & Francis
ISBN-13: 978-1466583283; ISBN-10: 1466583282

This book can be purchased from Barnes and Noble at Boston University.

This textbook will be referred to in syllabus as " Marsland Book".

Machine Learning and Artificial Intelligence: Concepts, Algorithms and Models

by Reza Rawassizadeh | Mar 15, 2025

Tools and Technology Requirements

Students will use Python and TensorFlow, both freely available.

Microsoft Azure Dev Tools for Teaching

Microsoft Azure Dev Tools for Teaching is a Microsoft program that supports technical education by providing access to Microsoft software for learning, teaching, and research purposes. Our membership allows faculty and students currently enrolled in MET courses to obtain certain Microsoft products free of charge. All MET students are granted access to download the software for the duration of their study at MET College.

FAQ and basic information are at Microsoft Azure Dev Tools for Teaching, (You may have to enter your personal BU login credentials to access this page.)

Study Guide and Timeline of Deliverables

Module 1 Study Guide and Deliverables

(October 28 – November 3, 2025)

Module Theme and Topics:

Machine Learning Introduction:

- Introduction to Classification, Regression, and Neural Nets
- Introduction to Genetic Algorithms and Bayesian Learning

Required Readings:

- Module 1 online content
- Géron Book:
  - Chapter 1
  - pp. 175-178 (Chapter 5, "Linear SVM…")
  - pp. 195-198 (Chapter 6, "Training…")
  - pp. 299-303 (Chapter 10, "Introduction…")
  - Secondary reading: the rest of chapter 6
- Part I: Marsland Book Chapter 3, pp. 39-43, and Chapter 8, p. 169 (suggested but not required)
- Part II: Marsland Book Chapter 1 and Chapter 10, pp. 211-214 (suggested but not required)

Assignments:

- Self-Introduction due Thursday, October 30, at 11:59 PM ET (not graded)
- Draft Assignment 1 due **Sunday, November 2, at 6:00 AM ET**
- Assignment 1 due **Wednesday, November 5, at 6:00 AM ET**

Live Classrooms:

Please note live sessions might take more than an hour depending on the topic and discussions**.**

- **Wednesday, October 29, 8:00 – 9:00 PM ET** (main content)
- **Thursday, October 30, 8:00 – 9:00 PM ET** (coding and other details)
- Live Office: Wednesday and Thursday after Live Classroom, for as long as there are questions

Module 2 Study Guide and Deliverables

(November 4 – November 10, 2025)

Module Theme and Topics:

Learning from Data and Neural Nets, Part I

Required Readings:

- Module 2 online content
- Géron Book:
    - pp. 259-273 (Chapter 9, "Unsupervised…")
    - Secondary: rest of Chapter 96
- k-Means: Marsland Book pp. 282-287 (suggested but not required)
- Learning with Neural Nets, Part I: Géron Book pp. 299-317 ("Introduction to Artificial…"); Marsland Book pp. 15-20, 43-49 (suggested but not required)

Assignments:

- Draft Assignment 2 due **Sunday, November 9, at 6:00 AM ET**
- Assignment 2 due **Wednesday, November 12, at 6:00 AM ET**

Live Classrooms:

Please note live sessions might take more than an hour depending on the topic and discussions**.**

- **Wednesday, November 5, 8:00 – 9:00 PM ET** (main content)
- **Thursday, November 6, 8:00 – 9:00 PM ET** (coding and other details)
- Live Office: Wednesday and Thursday after Live Classroom, for as long as there are questions

Module 3 Study Guide and Deliverables

(November 11 – November 17, 2025)

Module Theme and Topics:

Neural Nets, Part II: Backpropagation and Deep Learning

Required Readings:

- Module 3 online content
- Géron Book:
    - pp. 300-338 ("From biological…")
    - pp. 357-394 ("Training Deep…")
    - Secondary: Chapter 11
- Neural Nets: Marsland Book pp. 73-85 (suggested but not required)

Assignments:

- Draft Assignment 3 due **Sunday, November 16, at 6:00 AM ET**
- Assignment 3 due **Wednesday, November 19, at 6:00 AM ET**

Live Classrooms:

- **Wednesday, November 12, 8:00 – 9:00 PM ET** (main content)
- **Thursday, November 13, 8:00 – 9:00 PM ET** (coding and other details)
- Live Office: Wednesday and Thursday after Live Classroom, for as long as there are questions

Module 4 Study Guide and Deliverables

(November 18 – November 24, 2025)

Module Theme and Topics:

Neural Nets, Part III: Large Language Models (LMMs) and Generative Adversarial Networks (GANs)

Required Readings:

- Module 4 online content
- Géron Book: pp. 659-662, (Chapter 17, "Generative…")

Assignments:

- Draft Assignment 4 due **Sunday, November 23, at 6:00 AM ET**
- Assignment 4 due **Wednesday, November 26, at 6:00 AM ET**

Live Classrooms:

- **Wednesday, November 19, 8:00 – 9:00 PM ET** (main content)
- **Thursday, November 20, 8:00 – 9:00 PM ET** (coding and other details)
- Live Office: Wednesday and Thursday after Live Classroom, for as long as there are questions

Module 5 Study Guide and Deliverables

(November 25 – December 1, 2025)

Module Theme and Topics:

Genetic Algorithms

Required Readings:

- Module 5 online content
- Marsland Book Chapters 10.1 and 10.2 (suggested but not required)
- As time permits: Marsland Book Chapter 10.3 (suggested but not required)

Assignments:

- Draft Assignment 5 due **Sunday, November 30, at 6:00 AM ET**
- Assignment 5 due **Wednesday, December 3, at 6:00 AM ET**

Live Classrooms:

- **Wednesday, November 26, 8:00 – 9:00 PM ET (covers genetic algorithms as well as Assignment 5—for around one and a half hours)**
- **No Thursday live session**
- Live Office: Wednesday and Thursday after Live Classroom, for as long as there are questions

Module 6 Study Guide and Deliverables

(December 2 – December 8, 2025)

Module Theme and Topics:

Bayesian Learning

Required Readings:

- Module 6 online content
- Marsland Book Chapters 2.3 and 16.1 (suggested but not required)

Assignments:

- Optional Draft Assignment 6 due **Sunday, December 7, at 6:00 AM ET**
- Assignment 6 due **Wednesday, December 10, at 6:00 AM ET**

Live Classrooms:

- **Wednesday, December 3, from 8:00 PM to 9:00 PM ET (main content)**
- **Thursday, December 4, from 8:00 PM to 9:00 PM ET (coding and other details)**
- Live Office: Wednesday and Thursday after Live Classroom, for as long as there are questions

Course Evaluation:

Please complete the course evaluation once you receive an email or Blackboard notification indicating the evaluation is open. Your feedback is important to MET, as it helps us make improvements to the program and the course for future students.

Final Exam Details

The Final Exam is an online proctored exam available from **Wednesday, December 10, 2025, at 6:00 AM ET to Saturday, December 13, 2025, at 11:59 PM ET**.

The Computer Science department requires that all final exams be administered using an online proctoring service that you will access via your course in Blackboard. In order to take the exam, you are required to have a working webcam and computer that meets the exam proctoring service's system requirements. A detailed list of those requirements can be found on the How to Schedule page. Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment within the defined exam window.

Please note that student activity during the final exam is monitored and recorded by the proctoring vendor. Accessing any unauthorized material during the final exam is a major violation of the course policy and can result in serious academic disciplinary actions.

Final Exam Duration: **three hours (180 minutes)**

The exam features essay questions. Each question is worth equal points.

Evaluation of Students and Grading

To attain excellence ("A" work), you are expected to go beyond satisfying the assignment statement essentials, and to develop your own analyses and comparisons. Additional detailed criteria are listed later in this Syllabus section.

> Note: To help the teaching team clarify points in students' work, grades are subject to students possibly being required to answer questions orally about the work they have submitted. Reasonable notice will be given.

Basis for Grades

There are three components to your grades.

1. **Draft Assignments**
    - Each Draft Assignment typically requests part of the module's assignment and is intended to help you complete the latter. You may only submit your draft assignment once, so that you can get feedback before your assignment for that module is due. We encourage you to start the draft version early in each module.
    - Draft Assignments are graded on a Pass/Fail basis, with Pass=1, Fail (Not yet acceptably on track)=0, and Neither=0.5.
    - Draft Assignment 6 in Module 6 is optional, so you can concentrate on completing your Assignment 6 during Week 6. Your draft assignments grade will be calculated from Draft Assignment 1 to Draft Assignment 5. If you do choose to complete Draft Assignment 6, its grade will replace a prior draft assignment with a 0.5 or 0.0 grade—if one exists. (There is no extra credit for Draft Assignment 6 other than this.)
2. **Assignments**
    - The purpose of weekly assignment is to give you hands-on practice with what you have learned.
    - You are permitted to submit and resubmit your weekly assignment unlimited times to improve your work, provided you do so before the assignment deadline for that module. Only the last on-time version will be graded.
    - The weekly assignments in total are worth 60% of the course grade. The teaching team expects your understanding to improve throughout the course. Accordingly,

the first sets of assignments weigh less than the rest, so you will have opportunities to catch up along the way. The weight of assignments ramps up as follows:

- Assignment 1 (Module 1): 7%
- Assignment 2 (Module 2): 7%
- Assignment 3 (Module 3): 9%
- Assignment 4 (Module 4): 11%
- Assignment 5 (Module 5): 13%
- Assignment 6 (Module 6): 13%

3. **Final Exam**
    - There will be a proctored final exam in this course. Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment.
    - The grading criteria for each question are shown in the Final Exam Essay Questions Rubric below. You must provide explanation of all of your answers, and it will be subject to these criteria. The exam has occasional reminders to explain your answers.
    - Please keep the contents of the final exam confidential. Sharing details about this exam constitutes academic misconduct for both parties.

Grade Computations

The course grade will be computed from the following:

- Draft Assignments: 10%
- Assignments: 60%
- Proctored Final Exam: 30%

Assignments Rubric

The module assignments are graded according to the overall rubric format below; individual assignments may contain variations of this form. These are averaged using the following guidelines: A+ = 97, A = 95, A- = 90, B+ = 87, B = 85, B- = 80 etc. When a paper is considered outstanding, a score of up to 100 can be given.

Criteria	D	C	B	A
Correctness	No justification of correctness	Tests, comments, and explanations mostly correct	Tests, comments, and explanations justify correctness; honored all instructions	Tests, comments, and explanations justify correctness extremely well; complete and thorough; honored all instructions
Clarity	Unclear	Explained; somewhat clear	Every class, class relationship, and method clearly specified; well	Every class, class relationship, and method precisely specified; thoroughly

			commented; clear; little redundant code	commented; entirely clear; negligible redundant code
Understanding	Minor understanding evidenced	Satisfactory understanding evidenced	Evidence of good understanding throughout	Evidence throughout of entirely thorough understanding

Draft Assignment Rubric

The draft assignment grades are: *Acceptably on track* (1), *Not yet acceptably on track* (0), and *Neither* (0.5).

Final Exam Essay Questions Rubric

Please respond to the following question as concretely and as clearly as you can, citing specifics from your term project (i.e., avoid generalities—statements that apply to most projects of your overall type). To demonstrate your understanding, use your own words. Where you have no clear conclusions, describe the relevant trade-offs. Each question will be evaluated using rubrics like the following.

The resulting grade is the average of these, using: A+ = 97, A = 95, A- = 90, B+ = 87, B = 85, B- = 80 etc.

Criteria	D	C	B	A
Technical Correctness	No justification of correctness	Technically mostly correct	Implementation correctness well justified; commented completely; well commented and tested	Implementation correctness thoroughly justified throughout by precise block- and line-comments and tests
Clarity in Presentation	Unclear	Somewhat clear	Clear with a few exceptions	Entirely clear throughout
Depth and Thoroughness of Coverage	Shallow or superficial coverage of most topics	Satisfactory depth and thoroughness	Evidence of depth and thoroughness in covering most topics	Evidence of depth and thoroughness in covering all topics

To get an A grade for the course, your weighted average should be >=93; for A-, >=90; B+, >=87; B, >=83; B-, >=80; etc.

By the time grades are submitted to the registrar, the class average will be approximately an 87 (B+).

Grades typically start lower, allowing room for growth as the term progresses.

Note: An A grade at Boston University is reserved for excellent work. If you are given and A, you are to be congratulated. The university officially designates good work as deserving of a B and we reward good work with a B accordingly. It is our obligation to tell you, as far as we can, what would improve your work. (That can sometimes be hard if you receive an A, of course.) If you don't see such feedback, please remind your facilitator/instructor about it. Grades are an excellent motivator, but they are only means to an end rather than ends in themselves. The average grade in graduate courses is usually expected to be a B+. If the course average turns out to be less than this at the end of the term, and the class performance is not less than average, I am able to elevate some grades that fall on borderlines.

Ungraded Items:

- **Ungraded Discussion Forums:** There are ungraded discussion forums throughout the course. You are encouraged to share your knowledge and learn from your peers. Discussion forums are provided for your benefit. Some discussion forums involve the instructional staff; others are among students.
- **Live Classroom Sessions:** Live Classroom sessions will be offered during this course in Modules 1 through 6. In each module, students have a Live Classroom session with the instructor and another Live Classroom (or problem-solving session) with the facilitator. Days/times will be posted in the Study Guide.

    - Your participation, while not mandatory, will be valuable to you and the class. To participate in the Live Classroom discussion, you will need to go to the "Live Classroom/Offices" area.
    - Live Classroom sessions will be recorded and archived for further viewing. You can go to the "Live Classroom Recordings" area to view the recordings.

Expectations

We recognize that emergencies occur in professional and personal lives. If one occurs that prevents your completion of homework by a deadline, please make this plan to your facilitator. This must be done in advance of the deadline (unless the emergency makes this impossible, of course), and should be accompanied by particulars that back it up. Additional documentation may be requested. **No regular credit will otherwise be granted for late homework, but we will note it and it may influence your course grade at the end of the term.**

Policy for the Use of Generative AI

Students should learn how to use AI text generators and other AI-based assistive resources (collectively, AI tools) to enhance rather than damage their developing abilities as writers, coders, communicators, and thinkers.

When using Generative AI in coursework, students shall:

1. Give credit to AI tools whenever used, even if only to generate ideas rather than usable text or illustrations.
2. When using AI tools on assignments, add an appendix showing (a) the entire exchange, highlighting the most relevant sections; (b) a description of precisely which AI tools were used (e.g. ChatGPT private subscription version or DALL-E free version), (c) an explanation of how the AI tools were used (e.g. to generate ideas, turns of phrase, elements of text, long stretches of text, lines of argument, pieces of evidence, maps of conceptual territory, illustrations of key concepts, etc.); (d) an account of why AI tools were used (e.g. to save time, to surmount writer's block, to stimulate thinking, to handle mounting stress, to clarify prose, to translate text, to experiment for fun, etc.).
3. Not use AI tools during in-class examinations, or assignments, unless explicitly permitted and instructed.
4. Employ AI detection tools and originality checks prior to submission, ensuring that their submitted work is not mistakenly flagged.
5. Use AI tools wisely and intelligently, aiming to deepen understanding of subject matter and to support learning.

Specific deliverables are included in each of the assignment instructions. For more details, please see the Generative AI Assistance (GAIA) policy.

Important Message on Final Exams

Dear Boston University Computer Science Online Student,

As part of our ongoing efforts to maintain the high academic standard of all Boston University programs, including our online MSCIS degree program, the Computer Science Department at Boston University's Metropolitan College requires that each of the online courses includes a proctored final examination.

By requiring proctored finals, we are ensuring the excellence and fairness of our program. The final exam is administered online.

Specific information regarding final-exam scheduling will be provided approximately two weeks into the course. This early notification is being given so that you will have enough time to plan for where you will take the final exam.

I know that you recognize the value of your Boston University degree and that you will support the efforts of the University to maintain the highest standards in our online degree program.

Thank you very much for your support with this important issue.

Regards,

Professor Lou Chitkushev, Ph.D.
Associate Dean for Academic Affairs
Boston University Metropolitan College

Course Policies and Academic Conduct

Academic Integrity: Plagiarism is the passing off of another's words or ideas as your own, and it is a serious academic offense. Plagiarism and cheating also defeat the purpose of getting an education. Plagiarism and cheating cases will be handled in accordance with the disciplinary procedures described in the College of Arts and Sciences Academic Conduct Code. You are expected to know and abide by the code, which can be read online: Academic Conduct Code. Penalties range from failing an assignment or course (first offense) to suspension or expulsion from BU. If in doubt, cite your source. If you have any questions about academic integrity, please ask your instructor.

Incidents of academic misconduct will be reported to the Academic Conduct Committee (ACC). The ACC may suspend/expel students found guilty of misconduct.

Disability and Access Services

In accordance with university policy, every effort will be made to accommodate students with respect to speech, hearing, vision, or other disabilities. Any student who may need an accommodation for a documented disability should contact Disability and Access Services at 617-353-3658 or at access@bu.edu for review and approval of accommodation requests.

Once a student receives their accommodation letter, they must send it to their instructor and/or facilitator each semester. They must also send a copy to their Faculty & Student Support Administrator, who may need to update the course settings to ensure accommodation is in place. Accommodation cannot be implemented if the students do not send their letters.