

CGU
Institute of Mathematical Sciences
Mathematics of Machine Learning (Math 462)
Spring, 2024

Contact Information

Class Instructor:

Marina Chugunova,
Professor of Mathematics

Office: Math. North House (second floor)

Phone: 909-607-9489

E-mail: marina.chugunova@cgu.edu

Teaching Assistant:

Rylie Weaver

E-mail: rylie.weaver@cgu.edu

Instructor Feedback and Communication

- arrange your private Zoom meeting time by sending me an e-mail or drop by my office on Tuesdays before or after the class

Topic: Office Hours with Marina (Zoom Meeting ID: 832 2503 1007)

The best way to get in touch with me is by e-mail. I will do my best to respond to email messages within 2 business days.

Class Schedule

Semester start date: first class is on **January 17**

Tuesday: 3 hour class 4:00 pm - 6:50 pm Math North Computational Lab (for those who cannot attend in person the Zoom option will be provided)	My office hour is 7-8 pm on Tuesdays (for those who cannot attend office hours in person the Zoom option will be provided)
---	---

Course Description

Credit/Units: 4 unit course

Machine learning is a rapidly growing field that is concerned with finding patterns in data. It is responsible for tremendous advances in technology, from personalized product recommendations to speech recognition in cell phones.

Background Preparation (Prerequisites)

Good knowledge of probability, applied linear algebra, optimization and some coding skills are highly recommended.

Student Learning Outcomes

This course material covers theoretical foundations, algorithms, and methodologies for machine learning, emphasizing the role of probability and optimization and exploring a variety of real-world applications. Through lecture examples and programming projects, students will learn how to apply powerful machine learning techniques to new problems.

Texts and Journal References

Required: *“Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems”*; 3d Edition
by Aurelien Geron;

Optional(highly recommended)l: *“Theory of Neural Information Processing Systems”*
by A. C. C. Coolen and all.

Grading Plan

Class Element	Weight
Final project	22%
6 HW projects	30%
12 in class quizzes (on Tuesdays at the beginning of the class)	48%

The instructor will make every effort to return to you each assignment with feedback within 7 days.

Final Grades

Your grade will be calculated using the following scale. Grades with plus or minus designations are at the professor’s discretion.

Letter Grade	Grade Point	Description	Learning Outcome
A	4.0	Complete mastery of course material and additional insight beyond course material	Insightful
B	3.0	Complete mastery of course material	Proficient
C	2.0	Gaps in mastery of course material; not at level expected by the program	Developing
U	0	Unsatisfactory	Ineffective

In exceptional circumstances (e.g., illness) that prevent a student from completing assigned coursework, and provided that the student's work to date is satisfactory, the instructor may assign an I (Incomplete) grade along with a date for successful submission of course assignments and requirements.

Continual matriculation at CGU requires a minimum grade point average (GPA) of 3.0 in all coursework taken at CGU. Students may not have more than two incompletes at one time.

CGU policies on grades, including incomplete grades, registration and enrollment can be found on the Registrar's webpage: <http://www.cgu.edu/registrar>.

Class Policies

The CGU institutional policies apply to each class offered at CGU; a few are detailed below. Students are encouraged to review the student handbook for their program as well as policy documentation in the Bulletin and on the Registrar's webpages: <http://bulletin.cgu.edu/> and <http://www.cgu.edu/registrar>.

Scientific and Professional Ethics

The work you do in this class must be your own. Feel free to build on, react to, criticize, and analyze the ideas of others but, when you do, make it known whose ideas you are working with. You must explicitly acknowledge when your work builds on someone else's ideas, including ideas of classmates, professors, and the authors you read. If you ever have questions about drawing the line between others' work and your own, ask the class professor to give you guidance. Exams must be completed independently and without using cell phones, tablets, or computers to search or retrieve material. Any collaboration on answers to exams, unless expressly permitted by the instructor, may result in an automatic failing grade and possible expulsion from the Program. Additional information on CGU's Policy on Academic Honesty can be found at: <https://cgu.policystat.com/policy/2194316/latest/>. In addition, Honnold Mudd Library has a number of resources on academic honesty and integrity, including the following online tutorial: <http://libraries.claremont.edu/achontutorial/pages/>.

Instructor Feedback and Communication

The best way to get in touch with me is Email. I will to my best to respond to email/voice messages within two business days.

Attendance

This is an in-class course.

Students are expected to attend all classes, whether the class is taken for credit or on an audit basis. Students unable to attend a class must seek permission for an excused absence from the instructor or teaching assistant prior to the class meeting. Unapproved absences or late attendance for three or more classes may result in a lower grade or being involuntarily withdrawn from the class (with enrollment refunds governed by CGU's published Academic Calendar).

Homework

Homework should be done individually and posted on Canvas by 10PM Wednesday, one week after it is given (with one exception, see schedule). The homework should be returned in *.pdf format. Scanned handwritten copies are acceptable.

Only one late homework will be admitted, with a penalty of 50% of the grade on that homework. The grader will make every effort to return to you each assignment with feedback within 7 days.

Midterms

For the first midterm, only a two-sheets cheat-sheet (4 pages) is allowed.

The second midterm is open notes open book.

In both midterms, access to Internet is forbidden. The midterm exams will be proctored by the grader and by me.

Oral Final Exam (FE students only)

The oral final exam is a "mock interview", i.e., it is supposed to prepare you for a real interview in industry. Every FE student will have an individual exam lasting 15 minutes. Students are strongly encouraged to see me during office hours to practice mock interviews.

Written Final

The final will be open book and open notes.

Class recordings

Class recordings will be posted on Canvas for the students who have a valid excuse for not coming to class.

Other Resources

Accommodations for Students with Disabilities

If you would like to request academic accommodations due to temporary or permanent disability, contact the CGU Dean of Students and Coordinator for Student Disability Services at DisabilityServices@cgu.edu or 909-607-9448. Appropriate accommodations are considered after you have conferred with the Office of Disability Services (ODS) and presented the required documentation of your disability to the ODS.

Mental Health Resources

Graduate school is a context where mental health struggles can arise or be exacerbated. If you ever find yourself struggling, please ask for help. If you wish to seek out campus resources, here is some basic information: <https://www.cuc.claremont.edu/mcaps/>

Monsour Counseling and Psychological Services (MCAPS) is committed to promoting psychological wellness for all students at the Claremont Colleges. Professional and well-trained psychologists, psychiatrists, and post-doctoral and intern therapists offer support for a range of psychological issues in a confidential and safe environment.

Phone (909) 621-8202

After hours emergency (909) 607-2000

Tranquada Student Services Center, 1st floor

757 College Way

Claremont, CA 91711

Title IX

If I learn of any potential violation of CGU's gender-based misconduct policy (e.g., rape, sexual assault, dating violence, domestic violence, or stalking) by any means, I am required to notify the CGU Title IX Coordinator at Deanof.Students@cgu.edu or (909) 607-9448. Students can request confidentiality from the institution, which I will communicate to the Title IX Coordinator. If students want to speak with someone confidentially, the following resources are available on and off campus: EmPOWER Center (909) 607-2689, Monsour Counseling and Psychological Services (909) 621-8202, and The Chaplains of the Claremont Colleges (909) 621-8685. Speaking with a confidential resource does not preclude students from making a formal report to the Title IX Coordinator if and when they are ready. Confidential resources can walk students through all of their reporting options. They can also provide students with information and assistance in accessing academic, medical, and other support services they may need.

Campus Security

Campus security can be reached 24 hours/day at (909) 607-2000.