EECS 553 W23: Course Information and Policies

Instructor: Clayton Scott
Time: TTh 12:00 - 1:30
Location: IOE 1610

GSIs: Alex Ritchie <aritch@umich.edu> and Jianxin Zhang <jianxinz@umich.edu>

Office Hours: To be posted on Canvas

Required textbook: None. Slides and lecture notes will be provided. Lecture notes are available under "Files."

Prerequisites: Graduate level coursework in probability and linear algebra

General machine learning textbooks:

- Murphy, *Machine Learning: A Probabilistic Perspective*, MIT Press, 2012, available online through the UM library.
- Hastie, Tibshirani, and Friedman, *The Elements of Statistical Learning: Data Mining, Inference, and Prediction*, Springer, Second Edition, 2009. Free online.
- Bishop, *Pattern Recognition and Machine Learning*, Springer, 2006. Free online.
- Duda, Hart, and Stork, *Pattern Classification*, Wiley, 2001, available online through the UM library.
- Barber, *Bayesian Reasoning and Machine Learning*, free online.

More specialized references:

- Goodfellow, Bengio, and Courville, *Deep Learning*, MIT Press, 2016. Free online.
- Scholkopf and Smola, *Learning with Kernels*, MIT Press, 2002, available online through the UM library.
- Mardia, Kent, and Bibby, *Multivariate Analysis*, Academic Press, 1979 (good for PCA, MDS, and factor analysis).
- Boyd and Vandenberghe, *Convex Optimization*, Cambridge University Press, 2004. Free online.
- Sutton and Barto, *Reinforcement Learning: An Introduction*, MIT Press, 2018, Second Edition. Free online.
- Schapire and Freund, *Boosting*, MIT Press, 2012. Available through the UM Library.
- Mohri, Rostamizadeh, and Talwalkar, *Foundations of Machine Learning*, MIT Press, 2012, available online through the UM library.
- Shalev-Shwartz and Ben-David, *Understanding machine learning: from theory to algorithms*, Cambridge University Press, 2014. Available through the UM Library.
- Efron and Friedman, Computer Age Statistical Inference, Cambridge, 2016. Available online through the UM Library.

Grading:

Homework: 35%, submission via gradescope
Two in-class exams: 30% (20% max score, 10% min score)
Project: 30%
iClicker: 5%

Homeworks:

Homeworks will be assigned bi-weekly and will involve both pen/paper exercises and programming in Python. Solutions in other languages are not acceptable. Prior experience with Python is not assumed, although experience with a related language (e.g., Matlab, R) will be helpful. A Python tutorial will be offered, and code fragments and hints will be provided on the homework assignments. Submission shall be via gradescope.

Each assigned homework problem will be graded out of 3 points, with 3 = fully or essentially correct, 2 = mostly correct but with one or more notable errors, 1 = some effort was made but mostly incorrect, and 0 = not submitted or very little effort evident. If a problem has multiple parts, each part will be worth three points. Fractional scores may be given.

Given that this is a large class, and depending on grader and GSI availability, not all problems (or parts of problems) may be graded. In this case, we will select a few (parts of) problems to grade, and your grade will be based on these. Your performance on ungraded problems will not be considered in determining your homework grade.

Your five lowest scores on individual problems (or parts of problems, for those with multiple parts) will be dropped.

Late homework policy: TBA

Exams:

There will be two in-class exams. A practice exam with solutions will be provided in advance of each exam. The exams will contain multiple choice and written portions, but no programming. Cheat sheets will be allowed.

Final Project:

There will be a final project. You will be asked to form groups of 2-4 people. Each project should conform to one of the following three types: (i) select a published paper on a novel ML methodology, and re-implement the method; (ii) apply ML methods to a novel data set; (iii) devise a new ML methodology. Students will grade each others' projects according to a specific rubric and using a conference-style peer review system, overseen by the instructors. Detailed guidelines will be given in advance. A project proposal will be due several weeks before the project due date.

iClicker:

Each lecture will involve one or more multiple choice questions administered through iClicker cloud. Each question will be worth 5 points. 4 points will be awarded for attempting to answer, 5 for a correct answer, and 0 for not attempting. When there is more than one question in a given lecture, the scores will be averaged for that day. The lowest 3 iClicker scores on or before 3/23 will be dropped. From 3/28 onward iClicker participation is required.

If you do not have an iclicker.com account already, please follow these instructions.

Piazza:

Almost all questions you have about the course, both logistical and technical, should be posted to Piazza. Questions about how to solve homework problems are encouraged, but responses should provide hints as opposed to detailed answers. You may also indicate that your question is for instructors only if your question is of a sensitive nature or may disclose solutions to the class.

Students who are active contributors on Piazza will be more likely to receive the benefit of the doubt in the case of a borderline final grade. Active participation on Piazza is necessary to earn an A+.

Recordings:

Course lectures will be audio/video recorded using the classroom's lecture capture system and made available to all students in this course several hours after the lecture is given. See the "Lecture Recordings" tab.

Students may not record the lecture or distribute any class recordings without written permission from the instructor, except as necessary as part of approved accommodations for students with disabilities. Any approved recordings may only be used for the student's own private use.

Late homework submission policy:

Homework submissions that are received late, but within 24 hours of the deadline, will be docked 20% of the total points available on that assignment. When deciding the lowest five problems/parts of problems to drop per the homework policy, the score of each problem/part *after* the 20% deduction will be considered.

Collaboration on homeworks:

Each student will prepare the final write-up/coding of his or her homework solutions without reference to any other person or source, aside from the student's own notes or scrap work. After making a serious attempt to solve all homework problems on their own, students may consult

with other students to compare approaches, but the final details of all solutions must be generated by each student working individually. Under no circumstances may you copy solutions or code from a classmate or other source.

Auditing:

To audit the course, students should enroll as a visitor. There are no required assignments for auditors/visitors. Your program coordinator can help you enroll as a visitor. You may print this page to pdf and provide to your program coordinator as proof of our approval to enroll as a visitor. See also the Rackham policy for Visiting: https://rackham.umich.edu/academic-policies/section3/. If you are unable to unroll as a visitor for some reason (e.g., you are a PhD candidate and are taking another course), then please email the instructor to be added to Canvas.

Computing resources:

Students may remotely connect to CAEN lab computers. These computers are intended for interactive use, as opposed to long-running, resource intensive jobs.

In addition, for the final project, each student will be granted a certain budget of computing time on the Great Lakes computing cluster, which includes both CPUs and GPUs. Use of the cluster is entirely optional. Students are advised that scheduling jobs, especially GPU jobs, requires careful setup and the 553 instructors cannot guarantee support for all students' questions. In other words, the service is offered "as is." That said, students may ask questions of the class through Piazza as well as the ARC-TS staff. Because of the time needed to set up jobs (again, especially GPU jobs), and delays in responses to getting technical questions answered, students should weigh the pros and cons of using the cluster. Starting early is definitely recommended. Difficulties using the cluster will not be a valid excuse for incomplete project experiments.

Some links with orientation:

Great Lakes Tutorial Notes

Intro to Linux Tutorial (Recording link, UM log-in required), Nov. 8, 5-6:30

Intro to Great Lakes Tutorial(Recording link. UM log-in required), Nov. 11, 5-6:30

How to setup kernels in Jupyter on Great Lakes (Additional video link, UM log-in required)

As an alternative to Great Lakes, students may also consider Google Colaboratory, which gives each student access to a free albeit slow GPU.

Academic Integrity

All undergraduate and graduate students are expected to abide by the College of Engineering Honor Code as stated in the Student Handbook and the Honor Code Pamphlet.

Students with Disabilities

Any student with a documented disability needing academic adjustments or accommodations is requested to send the instructors a private note through Piazza during the first two weeks of class. All discussions will remain confidential.

Student Mental Health and Wellbeing

The University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) at (734) 764-8312 and https://caps.umich.edu/. during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult University Health Service (UHS) at (734) 764-8320 and https://www.uhs.umich.edu/mentalhealthsvcs, or for alcohol or drug concerns, see https://www.uhs.umich.edu/aodresources. For a listing of other mental health resources available on and off campus, visit: http://umich.edu/~mhealth.

Equal opportunity

The Faculty of the COE are committed to a policy of equal opportunity for all persons and do not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation, gender identity, gender expression, disability, religion, height, weight, or veteran status. Please feel free to contact your instructor with any problem, concern, or suggestion. We ask that all students treat each other with respect.