Frequently Asked Questions

Fraida Fund

Will we have live meetings? Is this course synchronous or asynchronous?

This course includes both synchronous and asynchronous content. We will have a weekly live meeting on Zoom for a "chalk talk", and you will also have to watch a weekly pre-recorded video of a programming/demo session. Some weeks may also have asynchronous pre-lecture content that you should watch or read *before* the live meeting.

Am I required to attend the live meetings, or can I watch a recording later?

The live meetings will be recorded. However, you will be required to attend the final exam session at the live meeting time.

How can I get help or ask questions about the course material?

There are two ways to get help:

- Post a question on the Q&A forum for this course.
- Attend a Zoom office hours session with the instructor.

Note that you can ask questions **anonymously** on the Q&A forum, if you feel more comfortable that way.

How will my work in this course be evaluated?

Your mastery of the course material will be evaluated by your performance on:

- **Homework problem sets**: Almost all questions on the problem sets are computer-graded, and you'll have instant feedback as you work, so you'll know whether your answers are correct or not. If you manage your time well, you'll be able to get help or ask clarifying questions so that you can improve your understanding on questions you did not answer correctly, and re-submit a corrected answer for credit.
- **"Lab" assignments**: Some modules include a "lab" assignment that expands on the technique you learned that week. You'll be given a Python notebook with some cells missing; you'll have to fill in code or answer questions in the missing cells. These assignments are partly computer-graded with instant feedback, and partly manually graded.
- **Exams**: The fall and spring sections will include a midterm exam and a final exam. The summer section has a final exam.

The relative weight of each of these components will be shared via the course syllabus in the first week of the semester.

What should I expect from the course exams?

Each exam will have the following four sections:

- **Basics of ML models**: these questions will typically ask you to do some computations involving a machine learning model. This section will also include one question where you will be given some data, and you will have to use it to fit a specific model, and then make predictions.

- **Real world usage**: this section is for evaluating your understanding of practical concerns we have discussed, that apply when using ML models with real data to solve real problems. Typical questions in this section might ask you to select the most appropriate approach for a particular machine learning problem, or might ask you about case studies that we discussed during the course.
- **Short questions/no computation**: these questions are about the intuition and the fundamental concepts underlying the machine learning models we have discussed. Be prepared to answer questions about any derivations we worked through in class, and about the visualizations and examples from the Colab lessons.
- **Coding question**: each exam will include one "substantial" coding problem, in the last section. This question is likely to require a much deeper understanding of ML and ML programming than the "basic" question asked in the first section.

During the exam, you will be permitted to use a (limited-size) reference sheet that you have prepared, and the *official* API reference pages for: scikit-learn, numpy, pandas, keras, tensorflow.

How much time should I expect to spend on this course?

This is a 3-credit course. During a fall or spring semester, the median student should spend at least 3 hours/week/credit → 9 hours/week for a 3 credit course. During the summer semester, which is a couple of weeks shorter, you might spend a little more than 9 hours/week.

A typical week will include the following:

- pre-lecture reading (some weeks) or study time (30-60 minutes)
- a "chalkboard lecture" about 120 minutes long
- a "Python notebook" video about 90-120 minutes long
- a homework problem set (estimated time: 1-2 hours)
- a lab assignment (estimated time: 2-3 hours)

A student who is not very comfortable with the prerequisites may have to spend more time than the estimated 9 hours/week in order to do well.

What are the prerequisites for this course?

This course is mathematically oriented, and undergraduate-level knowledge of probability and linear algebra is required.

If you want to brush up, you can review:

- Review of probability theory (http://cs229.stanford.edu/section/cs229-prob.pdf)
- In Boyd & Vandenberghe "Introduction to Applied Linear Algebra" (http://vmls-book.stanford.edu/vmls.pdf), these sections:
  - Section I, Chapter 1 (Vectors): vectors, vector addition,scalar-vector multiplication, inner product (dot product)
  - Section I, Chapter 3 (Norm and distance): Norm of a vector, euclidean distance
  - Section II, Chapter 5 (Matrices): matrix notation, zero and identity matrices, sparse matrices, matrix transposition, matrix addition, scalar-matrix multiplication, matrix norm, matrix-vector multiplication
  - Section II, Chapter 8 (Linear equations): systems of linear equations
  - Section II, Chapter 10 (Matrix multiplication): matrix-matrix multiplication
  - Section II, Chapter 11 (Matrix inverses): Inverse, solving a system of linear equations
  - Also a quick optimization review: Appendix C (Derivatives and optimization)

There will be a significant programming component to this course, and class and homework exercises will be in Python. You do not need to know Python a priori, but you should know basic programming concepts and have experience programming in some programming language, and you should be comfort-

able picking up Python on your own. We will review some important Python basics in the first week of the course.

Do I need previous experience with machine learning for this course?

This is an introductory graduate level course and no prior machine learning knowledge will be assumed.

Do I need a computer with a GPU? Will I have to install some software on my computer?

In this course, we will use the Google Colab environment for practical programming demos and exercises. Colab is a free browser-based environment for Python programming. You don't need to install anything to use Colab - you'll just need a browser.

Do I need a textbook for this course?

You won't need to buy a textbook - all of the materials you'll need will be posted on the course site.

What topics will be included?

Here is a rough outline of the course content (subject to change):

1. Intro to ML, Python + numpy, exploratory data analysis
2. Linear regression
3. Gradient descent, bias-variance tradeoff
4. Model selection and regularization
5. Logistic regression for classification
6. K nearest neighbor
7. Decision trees, ensembles
8. Support vector machines, kernels
9. Neural networks
10. Deep learning, convolutional networks, transfer learning
11. Deploying machine learning systems
12. Unsupervised learning
13. Reinforcement learning (optional, not on exam)

What should I do if I need extra time on an assignment because of illness, religious practice, or a death in the immediate family?

If you need extra time on an assignment because of illness (including COVID-19), religious practice, or a death in the immediate family, please contact the student advocate.

The student advocate will reach out to your professors directly to recommend excused absences or extended deadlines, so you do not need to share any details of your personal circumstance with me.

What should I do if I need extra time on an assignment or exam because of a disability?

If you need extra time on an assignment or exam because of a disability (for example: you need to take frequent breaks from a computer screen because of a vision problem, or you have an executive function disorder), you will need to work with the Moses Center to request accommodations beyond the "48 free late hours". Please refer to the "Moses Center Statement of Disability" section.

(Note that disability accommodations are not retroactive, so you should begin this process at the beginning of the semester if you think you may need it, rather than waiting until you are already struggling.)

The Moses Center will reach out to your professors directly if your accommodations are approved, so you do not need to share any details of your disability with me.