

# Day 1 Stuff

First lecture - MATH 371

Prof. Chris Cornwell

Towson University, Dept. of Mathematics

Jan 19, 2025

## About me

- ▶ *Prefer to be called:* Chris, Dr. Cornwell, or Prof
- ▶ *Preferred pronouns:* He/him/his
- ▶ *Email:* `ccornwell@towson.edu`
- ▶ *Office:* YR 227
- ▶ *Likes:* Enthusiastic about math; like hiking, soccer, and gaming.

If I don't respond quickly to an email or message, it does not mean that I am declining to answer. During the week, I make an effort to return messages within 24 hours.

## Office hours

Please visit office hours. I am happy to discuss questions you have and class topics.

Regular office hours: Tuesday 1:00 – 2:00 pm, Wednesday 10:30 am – noon. Otherwise, please email to make an appointment at another time.

# Outline

Course structure

Course resources

Getting started with Python

# What is this course about?

## Topics:

Fundamentals of machine learning.

Basics of Python, implementing machine learning (on data) in Python.

## More specifically, we will cover:

- ▶ A working knowledge of Python.
- ▶ Basic (linear) models for *regression* and *classification*.
- ▶ Training and testing models.
- ▶ Feature selection.
- ▶ Some learning theory, avoiding overfitting, and model evaluation.
- ▶ Potentially: support vector machines, clustering, or tree-based methods.

## Assignments and Grades

- ▶ Classwork: short, group work (~ 30 – 40 minutes in class). Grading is not detailed; more about completion and effort.
  - ▶ Homework: ~ 3 of these per month. Spend time on these, have discussions about them with each other, with me. Often involve some coding.
  - ▶ Two midterm exams and a final. (See syllabus.)
- 
- ▶ Grades: 10% classwork, 30% homework, 30% two midterms (15% *each*), and 30% final.

## In class

Some of class will be lecture and we will often have time for group work (for submission) and coding.

- ▶ Bring a laptop to class if able; the classroom also has computers available.
- ▶ I will be available to give direction with group assignments and assigned notebooks.
- ▶ *Occasionally, instead of group work questions the questions might be individually completed. This will be announced beforehand.*

## Exams

The course has two midterms and a final. The midterms will be written by hand and are closed book. Exam questions will be related to what has been emphasized in class and has been asked on assignments. As an exam date nears, we will discuss what to expect on the exam questions.

I plan for the final to be project-based. (Details to follow.)

- ▶ Midterm 1: planned for Thursday, March 6.
- ▶ Midterm 2: planned for Thursday, April 17.
- ▶ Final exam: Thursday, May 15, 12:30am-2:30pm.



# Outline

Course structure

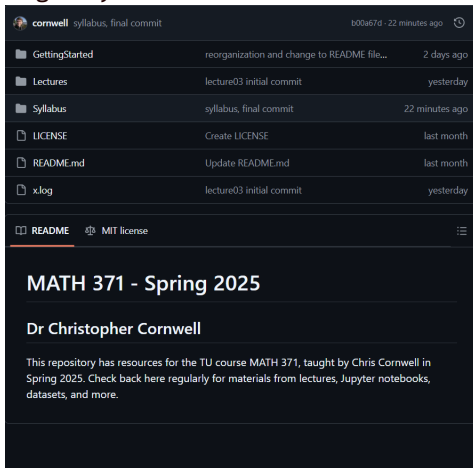
**Course resources**

Getting started with Python

# Course on Github

Many class resources will be on the Github repository [here](#).

I will place links on Blackboard to some of the folders at that site, including class slides, Jupyter notebooks, and data sets. Check back, they will be updated regularly.



The screenshot shows a GitHub repository interface. At the top, the repository name 'cornwell syllabus, final commit' is displayed with a commit hash 'b00a67d' and a timestamp '22 minutes ago'. Below this is a list of files and folders:

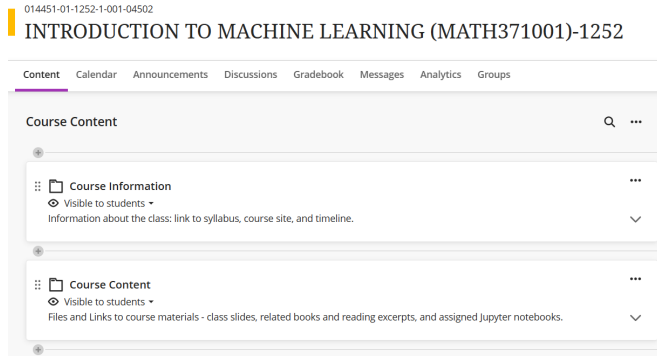
File/Folder	Commit Message	Time
GettingStarted	reorganization and change to README file...	2 days ago
Lectures	lecture03 initial commit	yesterday
Syllabus	syllabus, final commit	22 minutes ago
LICENSE	Create LICENSE	last month
README.md	Update README.md	last month
x.log	lecture03 initial commit	yesterday

Below the file list, there are tabs for 'README' (selected) and 'MIT license'. The main content area displays the repository title 'MATH 371 - Spring 2025' and the author 'Dr Christopher Cornwell'. A description follows: 'This repository has resources for the TU course MATH 371, taught by Chris Cornwell in Spring 2025. Check back here regularly for materials from lectures, Jupyter notebooks, datasets, and more.'

# Course on Blackboard

Below is screenshot of the course on Blackboard.

Assignments will be submitted on Blackboard. I will also update it with links to course materials from the Github repo.



## Textbook

Not just one textbook that we will follow.

However, I will suggest readings from a few textbooks, all available online. Sometimes I will provide excerpts from sources that are not publicly available.

Some of the sources that readings will come from:

1. *An Introduction to Statistical Learning: With Applications in Python*, by James, Witten, Hastie, Tibshirani, and Taylor. ([Link](#))
2. *Mathematics for Machine Learning*, by Deisenroth, Faisal, and Ong. ([Link](#))
3. *Deep Learning Book (Part I)*, by Goodfellow, Bengio, and Courville. ([Link](#))

Other textbook sources: *Understanding Machine Learning* by Shalev-Shwartz and Ben-David; *Foundations of Machine Learning* by Mohri, Rostamizadeh, and Talwalkar.

Also: notes written by Andrew Ng and some lectures by Elizabeth Munch.

# Outline

Course structure

Course resources

Getting started with Python

# Running Python and Jupyter

Working in **Python** throughout the semester.

Often interact with Python through Jupyter notebooks (.ipynb files  
– *IPython notebook*).

# Running Python and Jupyter

Working in **Python** throughout the semester.

Often interact with Python through Jupyter notebooks (.ipynb files – *IPython notebook*).

Two approaches to run and work with Jupyter notebooks.

1. Google's Colaboratory – *easiest startup*, done in the cloud, extra effort to interact with other files.
2. Install and run Python and Jupyter on your computer – *installation steps to get started*, can work offline, easy to interact with other files.

**Instructions** for the two approaches.

# Running Python and Jupyter

Jupyter notebooks in a nutshell: Markdown cells and Code cells.

- ▶ Markdown cells, for text: can use HTML code; syntax shortcuts for formatting & styling. A [guide for writing in Markdown](#).



# Running Python and Jupyter

Jupyter notebooks in a nutshell: Markdown cells and Code cells.

- ▶ Markdown cells, for text: can use HTML code; syntax shortcuts for formatting & styling. A [guide for writing in Markdown](#).
- ▶ Code cells: write lines of Python code. The notebook has a Python kernel (session) running; when you “Run” or execute a Code cell, the notebook works in that Python session and displays the output (if any).

```
for loops
```

Like with `if ... else` statements, in a `for` loop the block of code that repeatedly runs should be indented from where the `for` statement is. For example, you could add up the first 5 positive integers as follows.

```
In [65]: the_sum = 0
         for i in [1,2,3,4,5]:
           the_sum += i
         print(the_sum)
```

15

**Figure:** A Markdown cell followed by a Code cell in a Jupyter notebook