

## Week 1: Course Overview

Econ 590: Special Topics in Economics

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Cal State Fullerton

# Agenda

## Today's topics

- Introductions
- Course information
- Course materials
- Grades and assignments

# Introductions

# My Info

Anuar Assamidanov

- Ph.D student, Applied Microeconomics

Contact info

- Email: [aassamidanov@fullerton.edu](mailto:aassamidanov@fullerton.edu)
- Office hours: Monday 5:30–6:30 pm, Tuesday 10-11 am (via Zoom)

Best way to communicate with me

- “Public” question: Ask in class
- Short “private” question: Email with [Econ 590] in the subject
- Longer “private” question: Sign up for office hours

# About Me

- I study labor economics, economics of crime, applied econometrics, and machine learning
- This is my second time teaching Machine Learning
  - ▶ You can play a role in shaping the design of this course, for yourself and for future classes
- Call me “Anwar” if you would like
- Pronouns: he/him/his

# About You

## Introduce yourself

- Name
- Pronouns
- Department
- Research interests
- Favorite (or most familiar) statistical software?
  - ▶ Any experience with Python?
- Anything else you want us to know?

# Course Information

# Course Website

`github.com/assamidanov/econ_590`

I will use this GitHub repository to post lecture slides, Python code, problem sets, datasets, etc.



# Course Description

You have already learnt

- Classical linear regression model
- “Treatment effect” estimation

(If you have not taken Elementary Statistics & Econometrics, please see me to determine if this course is appropriate for you)

This introductory course gives an overview of different concepts, techniques, and algorithms in machine learning (ML) and their applications in an economic setting. We begin with classification, linear and non-linear regressions, bagging, boosting, and end with more recent neural networks and deep learning models. We will also touch on the recent methods at the intersection of ML and econometrics, designed for causal inference, optimal policy estimation, estimation of counterfactual effects.

# Course Goals

- ➊ Gain an in-depth understanding of some of the most common estimation methods in modern ML & AI
  - ▶ Regularization
  - ▶ Tree-based methods
  - ▶ Neural Networks
  - ▶ Intersection of Causal Inference & ML
- ➋ This course will give students the conceptual knowledge behind these ML methods, emphasizing their practical application
- ➌ Students will learn how to program machine learning algorithms in Python using cutting-edge libraries such as TensorFlow and Scikit-learn.

# Course Structure

## Lectures

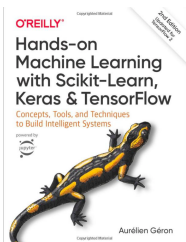
- Classes will be regular lectures on theories and methodologies of ML algorithms.

## Labs

- During lab sessions, students apply the algorithms and practice using Python.
- Students will finish a given example by the end of each lab session
- To support these in-class exercises, students should bring laptops to class.
- Laptops should only be used during class for these exercises and, optionally, for taking notes.

# Course Materials

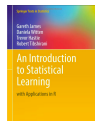
# Textbook and Notes



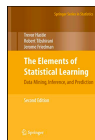
## *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow (Second Edition)* Aurélien Géron

- Paperback copy is usually less than \$30
- I will also post supplemental notes on some topics that we cover

# Other References



*An Introduction to Statistical Learning*  
Friedman, Hastie, and Tibshirani



*The Elements of Statistical Learning*  
James, Witten, Hastie, and Tibshirani

# Software

We will use the Python programming language in this course

Why Python?

- Python is free and open source
- Python is powerful and flexible
  - ▶ Basic statistics, data cleaning, linear regression, matrix algebra, simulation methods, structural estimation, data visualization, etc.
- Well-integrated with app
- Easy to deploy algorithm
- Python is favored by employers

How can I learn Python?

- Python tutorial in Week 1&2
- Many Python resources available for free
- First problem set will be a (relatively) gentle introduction to Python

# Installing Python

Installing Python is *usually* straightforward



Download ([anaconda.com/products/individual](https://anaconda.com/products/individual)) and it will include Python and Jupyter Notebook

What is the difference between Python and Anaconda Jupyter Notebook?



Python is like a car's engine. It is the program that powers your data analysis.



Jupyter Notebook is like a car's dashboard. It is the program you interact with to harness the power of your “engine.”



# Grades and Assignments

# Grades

The grading policy is as follow:

- Assignments: 30% (best 6 out of 7)
- Midterm: 30%
- Final project: 40% (Paper 20%, Presentation 20%)

# Assignments

Students are also expected to submit biweekly assignments in which they apply the practiced methods to a pre-defined problem.

- Apply the ML methods you learn in class
- Consist of programming tasks designed to give you experience working with big and otherwise challenging data in the context of econometric analysis
- Interpret your results

## Rules for Assignments

- All assignments are due by Monday, 11:59 pm on the week listed in the syllabus
- You must submit your code with your write up
- Assignments will be evaluated based on both functionality and the readability/organization of the code that you write

See syllabus for tentative problem set schedule

# Final Project

Final project will be similar to problem sets

- Estimation, interpretation, etc.
- One month to complete
- Work in groups of up to three people

How the final project differs from problem sets

- Closely mimics a real-world research project
- Will require roughly twice the effort of a assignment

More details to come toward the end of the semester

# Participation

Participation is required

- Read the assigned reading
- Do the assignments
- Keep up with in-class discussions and exercises
- Stay at home if you are sick! Please refer to <http://coronavirus.fullerton.edu/mandatory-health-screening/> for recommended steps
- The University requests that any employee or student who tests positive for COVID-19 or becomes aware that they may have been in close contact with someone who either has tested positive for or is suspected to have COVID-19 report the positive result or exposure using the CSUF COVID-19 Self-Reporting Form (<http://coronavirus.fullerton.edu/report-covid-19-case-or-exposure/>). CSUF's Infectious Diseases Response Team reviews and verifies COVID-19 confirmed cases and responds to concerns from the campus community on COVID-19.