

DATA 301

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Outline

- Where is Course Content?
- Syllabus
- Evaluation
- Who is this course for?
- Topics (a tentative list)

Course Content

<https://cnuclasses.github.io/DATA301/>

Bookmark it, almost all content will be here

Syllabus

<https://cnuclasses.github.io/DATA301/>

Go to Syllabus tab

Required textbook: None

Suggested Texts:

- *Python for Data Analysis*, Wes McKinney
- *Machine Learning with Python Cookbook*, Chris Albon – common task recipes
- *Python Machine Learning*, Sebastian Raschka - Excellent machine learning introduction

Evaluation

- As per syllabus:
 - 2 exams
 - 1 final exam
- Multiple projects
 - (up to 5)

Who is this course for?

- Anyone who works with data (social sciences, biology, psychology, law, medical etc.)
- This course will go over techniques for:
 - Exploring Data
 - Identifying data clusters
 - Using Data to train predictive models
 - Finding anomalies (maybe)
 - Determining what part of the data has the greatest influence on a models prediction
- **This course is an introduction. There is a LOT more to the field.**

Topics?

- Let's see what others suggest
 - search 'data science syllabus'

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 - search 'data science syllabus'
 - See what a llm thinks -prompt("please generate a 14 week undergraduate data science syllabus suitable for students who have basic probability and statistics, linear algebra, and python programming")
- We will cover a lot of this.
- How about if we just do an introduction?

Topics

- Week 1
 - Course outline, pre-reqs
 - general project workflow
 - review
- Week 2-3
 - Data preprocessing, cleaning, EDA
- Week 4-5
 - Unsupervised algorithms
 - Clustering
- Week 6
 - Supervised algorithms
 - Splitting a dataset
 - Dataset imbalance
 - Leakage
- Week 7-9
 - Decision Trees
 - Random Forest
 - Algorithm evaluation

Topics

- Week 10
 - Gradient Boosted Trees
 - What tree based algorithms cannot do that regressions and Neural Networks can do
- Week 11
 - Explainability
- Week 12
 - Hyperparameters
 - Cross validation
- Week 13-14
 - Recommender systems or time series analysis
 - Ensembling
 - Topics

Where to go after this course?

- SQL – there is a lot of data in databases
 - Do you need a Database class?
 - Not for this course.
 - Professionally, it's a little trickier. You can learn what you need in a week or so and get pretty good after a month.
- Do you need to scale your compute?
 - Not for this class
 - Professionally, yes. You don't use a laptop. At a minimum use a local desktop with a GPU (or GPUs)
 - Realistically, something cloud based (Lambda, AWS, etc..)
 - What if your data is huge and will not fit in memory? Cloud based (pyspark, Dask..etc this area is changing fast)
- Time series data (store sales by day, NLP etc.)
- You have to learn to use Linux
- Start creating your own projects
- Participate in Data Science competitions (Kaggle etc.)