



College of Engineering & Applied Sciences

CSPB 3022

Introduction To Data Science With Probability And Statistics

Class Notes

UNIVERSITY OF COLORADO

2024

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Week 1: (1/15 - 1/21)

Data Science Lifecycle, Python And Pandas

1.0.1 Piazza

Must post / respond to two Piazza posts. (1/23/24)

1.0.2 Lectures

The lecture videos for this week are:

- Course Overview \approx 54 min.
- Pandas Part 1 \approx 54 min.
- Pandas Part 2 \approx 54 min.
- Python Walkthrough \approx 47 min.
- Learning to Use Jupyter Notebooks \approx 9 min.
- Using Markdown In Jupyter Notebooks \approx 11 min.
- Writing Mathematics In Jupyter Notebooks \approx 16 min.
- Beginning Python \approx 44 min.
- Python - Basic NumPy \approx 18 min.

- [Quick Calculus Refresher](#) ≈ 21 min.

The lecture notes for this week are:

- [Course Overview Data Science Lifecycle](#)
- [Pandas Part 1](#)
- [Pandas Part 2](#)
- [L^AT_EX](#)

1.0.3 Assignments

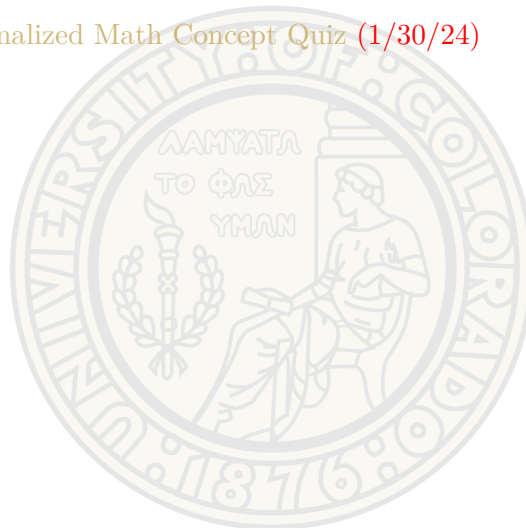
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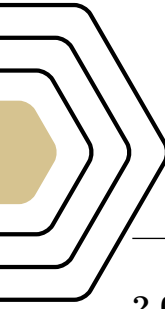
- The assignment for this week is **Data Science Lifecycle, Python And Pandas**. [\(1/23/24\)](#)

1.0.4 Quiz

The quizzes for this week are:

- [Math Concept Quiz](#) • [Finalized Math Concept Quiz](#) [\(1/30/24\)](#)





Pandas, Exploring And Cleaning Tabular Data

2.0.1 Piazza

Must post / respond to two Piazza posts. (1/30/24)

2.0.2 Lectures

The lecture videos for this week are:

- Pandas Part 3 \approx 54 min.
- Pandas Part 4 \approx 54 min.
- Discussion 2 Video Walkthrough: Basics with Pandas and In-Depth with NumPy \approx 73 min.

The lecture notes for this week are:

- Pandas Part 3
- Pandas Part 4
- Permutations And Combinations
- Section 7.1 Intro To Discrete Probability
- Section 7.2 Probability Theory And Applications

2.0.3 Assignments

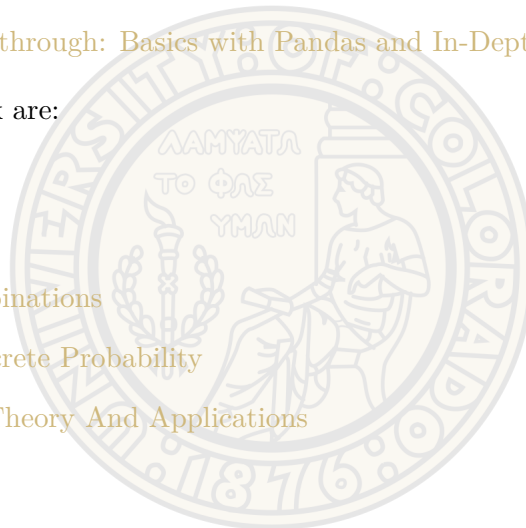
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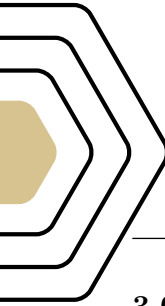
- The assignment for this week is **Pandas, Exploring And Cleaning Tabular Data**. (1/30/24)

2.0.4 Quiz

The quizzes for this week are:

- Python And Pandas Quiz • Finalized Python And Pandas Quiz (1/30/24)





Exploratory Data Analysis And Visualization

3.0.1 Piazza

Must post / respond to two Piazza posts. (2/6/24)

3.0.2 Lectures

The lecture videos for this week are:

- Lecture 6: Data Wrangling And EDA \approx 54 min.
- Lecture 7: EDA And Visualization \approx 54 min.
- Lecture 8: Quiz Walkthrough And Visualization \approx 54 min.
- Discussion 3: More With Pandas \approx 50 min.

The lecture notes for this week are:

- Pandas Part 4
- Exploratory Data Analysis
- Visualization

3.0.3 Assignments

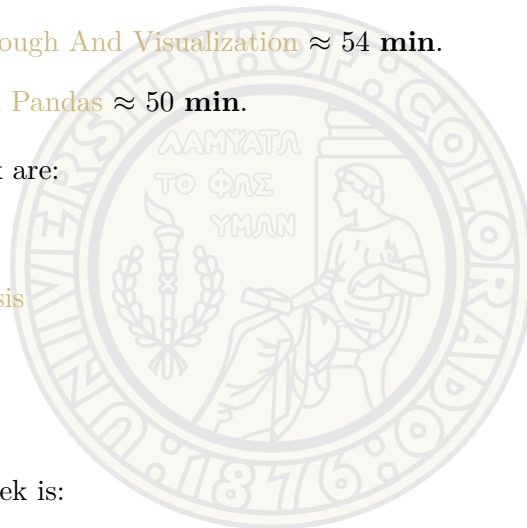
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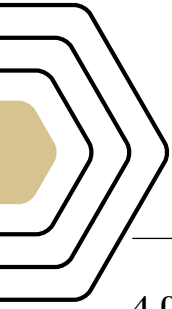
- The assignment for this week is **Exploratory Data Analysis And Visualization**. (2/6/24)

3.0.4 Quiz

The quizzes for this week are:

- Math And Pandas Quiz • Finalized Math And Pandas Quiz (2/6/24)





Visualization And Introduction To Probability

4.0.1 Piazza

Must post / respond to two Piazza posts. (2/13/24)

4.0.2 Lectures

The lecture videos for this week are:

- Visualization and Introduction to Probability \approx 54 min.
- Probability Part 1 \approx 54 min.
- Quiz Walkthrough; Probability \approx 54 min.
- Bike Sharing EDA and Visualization \approx 49 min.

The lecture notes for this week are:

- Intro To Probability Lecture Notes
- Probability II - Total Probability, Bayes Rule And Independence Lecture Notes

4.0.3 Assignments

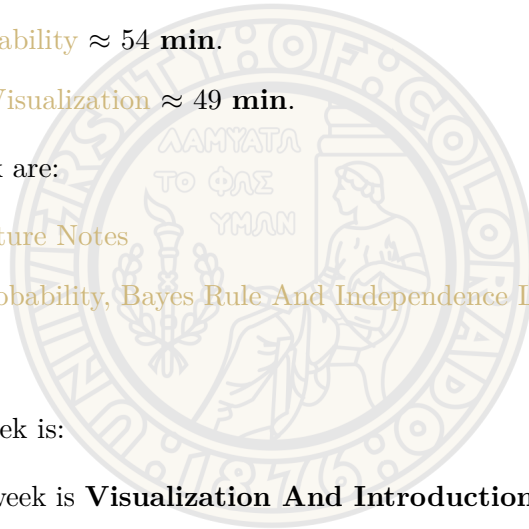
The assignment for this week is:


- The assignment for this week is **Visualization And Introduction To Probability**. (2/13/24)

4.0.4 Quiz

The quizzes for this week are:

- Quiz 4 • Finalized Quiz 4 (2/13/24)





Probability: Independence, Simulation, Random Variables

5.0.1 Piazza

Must post / respond to two Piazza posts. (2/20/24)

5.0.2 Lectures

The lecture videos for this week are:

- Probability Cont. Independence And Simulation ≈ 54 min.
- Probability Cont. Independence And Simulation Jupyter Notebook Examples ≈ 27 min.
- Random Simulation Example ≈ 45 min.
- Independence Cont. Discrete Random Variables ≈ 54 min.
- Quiz Walkthrough, Common Discrete RVs, Expectation ≈ 54 min.

The lecture notes for this week are:

- Independence Lecture Notes
- Discrete Random Variables Lecture Notes
- Expected Value And Variance Lecture Notes

5.0.3 Assignments

The assignment for this week is:

- The assignment for this week is **Probability: Independence, Simulation, Random Variables.** (2/20/24)

5.0.4 Quiz

The quizzes for this week are:

Quiz 5 • Finalized Quiz 5 (2/20/24)

Week 6: (2/19 - 2/25)



Exam 1

6.0.1 Piazza

Must post / respond to two Piazza posts. (2/27/24)

6.0.2 Lectures

The lecture videos for this week are:

- Expected Value, Variance, Discrete And Continuous RV ≈ 54 min.

The lecture notes for this week are:

- Expected Value, Variance Discrete And Continuous RV Lecture Notes

6.0.3 Quiz

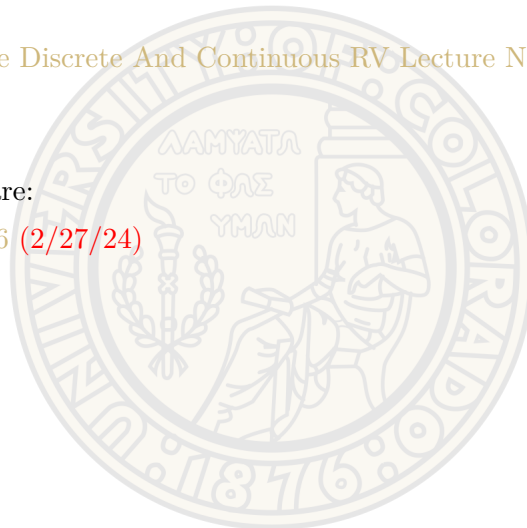
The quizzes for this week are:

- Quiz 6 • Finalized Quiz 6 (2/27/24)

Exam

The exam for this week is:

- Exam 1 (2/23/24)





Expected Value, Variance - Discrete And Continuous RV

7.0.1 Piazza

Must post / respond to two Piazza posts. (3/5/24)

7.0.2 Lectures

The lecture videos for this week are:

- Random Variables And Distributions Notebook Walkthrough ≈ 83 min.
- RV And Distributions, Expectation And Variance ≈ 54 min.
- Joint Distributions, Covariance, Independence ≈ 54 min.
- Covariance And Correlation, Independence ≈ 54 min.

The lecture notes for this week are:

- Expected Value, Variance Discrete And Continuous RV Lecture Notes
- More With RV - Discrete Vs. Continuous - Expected Value And Variance Lecture Notes
- Joint Distributions - Covariance And Correlation Lecture Notes
- Sampling Lecture Notes

7.0.3 Assignments

The assignment for this week is:

- The assignment for this week is **Expected Value, Variance - Discrete And Continuous RV.** (3/5/24)



Covariance And Correlation, Independence - Sampling

8.0.1 Piazza

Must post / respond to two Piazza posts. (3/12/24)

8.0.2 Lectures

The lecture videos for this week are:

- Sampling \approx 54 min.
- Central Limit Theorem \approx 54 min.
- Hypothesis Testing \approx 54 min.

The lecture notes for this week are:

- Sampling Lecture Notes
- Sample Statistics and The Central Limit Theorem Lecture Notes
- Hypothesis Testing Lecture Notes

8.0.3 Assignments

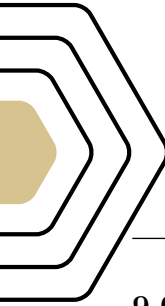
The assignment for this week is:

- The assignment for this week is **Covariance And Correlation, Independence - Sampling**. (3/12/24)

8.0.4 Quiz

The quizzes for this week are:

Quiz 7 • Finalized Quiz 7 (3/12/24)



CLT And Hypothesis Testing

9.0.1 Piazza

Must post / respond to two Piazza posts. (3/19/24)

9.0.2 Lectures

The lecture videos for this week are:

- Hypothesis Testing \approx 54 min.
- Testing Hypothesis And The Central Limit Theorem Walkthrough \approx 63 min.
- A/B Testing \approx 54 min.
- A/B Testing Walkthrough \approx 33 min.
- Errors In Hypothesis Testing \approx 54 min.

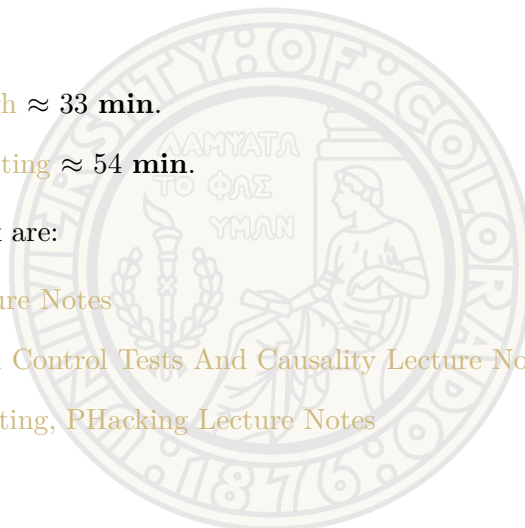
The lecture notes for this week are:

- Hypothesis Testing Lecture Notes
- AB Testing, Randomized Control Tests And Causality Lecture Notes
- Errors in Hypothesis Testing, PHacking Lecture Notes

9.0.3 Assignments

The assignment for this week is:

- The assignment for this week is **CLT And Hypothesis Testing**. (3/19/24)



Week 10: (3/18 - 3/24)



Exam 2

10.0.1 Piazza

Must post / respond to two Piazza posts. (3/26/24)

10.0.2 Lectures

The lecture videos for this week are:

- Confidence Intervals And The Bootstrap ≈ 54 min.
- Quiz 9 Walkthrough ≈ 16 min.

The lecture notes for this week are:

- Confidence Intervals And The Bootstrap Lecture Notes

10.0.3 Quiz

The quizzes for this week are:

- Quiz 8 • Finalized Quiz 8 (4/9/24)

10.0.4 Exam

The exam for this week is:

- Practice Exam 2 (3/22/24)
- Exam 2 (3/22/24)

