EE P 502 A:

Analytical Methods for Electrical Engineering

Autumn 2023

Time: Wednesdays from 6:00-9:00pm

- In person, in ECE Building, classroom 125
- Remotely via UW Zoom

Instructor: Tamara Bonaci (tbonaci@)

Office hours: After the class on Wednesday, and by appointment

Teaching Assistants:

- **Rahul Biswas (rbiswas1@uw.edu)**
  - **Office hours: TBD**
- **Ritik Srivastava (ritiksh@uw.edu)**
  - **Office hours: TBD**

Course website: UW Canvas - https://canvas.uw.edu/courses/1663488/pages/home

Couse assignment submission: https://canvas.uw.edu/courses/1663488/assignments

Course Piazza (discussion board): https://piazza.com/washington/fall2023/eep502au2023/info

Course gradebook: https://canvas.uw.edu/courses/1663488/gradebook

Course Goals:

- To make mathematics fun.
- To flex your brain muscles.
- To remind you of things you may have forgotten, but you will need for the rest of the PMP program.
- To point you toward where you can learn more.

Course Overview:

This course is intended as a foundational course for electrical engineers, and it will cover material related to **sets, functions and relations.** We will also talk about **calculus, sequences and convergence.** We will then refresh your memory about **linear algebra, differential equations** and **Fourier transforms.** We will talk about **graphs** and **networks.** Finally, we will cover an **introduction to probability** and **machine learning.**

Lectures will be organized as a combination of theory, programming and simulation tasks, and in-class activities, focusing on real-life examples. Our programming language of choice will be Python.

Course Progression:

The following is the class progression covering the 11 weeks for the course.

Week 1: Course overview. Introduction to Python for analysis.

Week 2: Sets, functions, relations and cardinality.

Week 3: Calculus, sequences, and convergence.

Week 4: Introduction to linear algebra.

Week 5: Linear algebra II. Introduction to differentiation.

Week 6: Differentiation and differential equations.

Week 7: Introduction to Fourier transforms and analysis.

Week 8: Introduction to graphs and networks.

Week 9: No lecture – Thanksgiving.

Week 10: Introduction to probability.

Week 11: Introduction to machine learning. Course review.

Finals week: Final projects due.

About the Course:

The course will consist of ***quizzes, homework assignments and final project.***

Homework assignments: We will have ***nine homework assignments*** in this course.

Homework assignments will be a mix of written questions and coding problems. Our programming language of choice will be Python, and you will be expected to submit your solutions as a Jupyter notebook (*.ipynb file) using Canvas.

Quizzes: We will have ***five short quizzes*** in this course**.** Quizzes will be made available after the class, and you will have several days to take them, at your own convenience. Once you open the quiz, you will have 90 minutes to work on the problems (**a timed quiz**).

We will take your four best quiz scores into account when determining your quiz grade.

Project: The final course component is a project. This is an individual assignment, and it will be assigned in week 7th of the quarter. As a part of your project assignment, you will choose one of the five offered topics, and you continue working on it until the final exam week. You will be expected to submit your project report, and the corresponding code.

Grading:

Your grade in this course will be based on homework assignments, quizzes and final project. The expected grade breakdown is:

- Homework assignments: 65%

- Final project: 25%
- Quizzes: 10%

Course Material:

There is no required textbook for this course, but we will post reading notes, and recommended books every week, related to the topic we are covering.

Some resources you might find helpful include:

- Seymour Lipschuts and Marc Lipson, **Schaum's Outline of Linear Algebra, 5th Edition**
- Hwei Hsu, **Schaum's Outline of Signals and Systems, 3rd Edition,**
- Moson Hayes, **Schaum's Outline of Digital Signal Processing, 2nd Edition,**
- Oppenheim, Willsky and Hamid, **Signals and Systems, 2nd edition,** Prentice Hall.
- Chi-Tsong Chen, **Linear Systems, Theory and Design, 4th Edition,**
- Leon-Garcia, **Probability, Statistics, and Random Processes For Electrical Engineering, 3rd Edition**

Course Policies:

Collaboration: In this course, we want you to learn from each other. Therefore, you are allowed (and encouraged!) to talk to your classmates and other students about all course assignments. You may also consult outside reference materials, and the instructor. However, all material that you decide to turn in should reflect your own understanding of the subject matter at the time of writing. This means that you should answer quiz questions by yourselves, and your homework and final project submissions should represent your own work. If you work with someone else on any assignment, please include their names on the material that you turn in.

Assignment Turn-in: All course assignments (quizzes, homework and final project) should be submitted using Canvas, and following instructions outlined in the assignment. Please, ***do not use*** email for assignment submissions.

Late Assignment Turn-in: Homework assignments are due **by 11:59pm PT on the assigned date,** but we understand that you may have to sometimes turn them in late. The grading penalty is 5% of the grade that you would otherwise receive for each day, or part of the day, that you are late. No submissions will be accepted after two weeks.

Please note that quizzes and final project will not be accepted if submitted late.

Checking grades: Grades will be posted to the course gradebook.