Master Course Description

No: EE 241

Title: PYTHON FOR SIGNAL AND INFORMATION PROCESSING

Credits: 2

UW Course Catalog Description

Introduction to Python programming for signal and information processing. Basic Python syntax and data types. Packages for data manipulation and visualization. Handling a variety of data formats. Prerequisite: either CSE 142, CSE 143 or CSE 160.

Coordinator: Mari Ostendorf

Goals: To learn computational tools for working with a variety of signals and other information sources to support data analysis and implementation of algorithms for electrical engineering applications.

Learning Objectives:

At the end of this course, students will be able to:

- *Implement* simple programs in Python using Jupyter notebook;
- *Read and write* data in different file formats addressing multiple applications;
- *Understand* how to efficiently work with a variety of data types;
- *Use* standard packages for data processing, such as SciPy, NumPy, pandas, etc.;
- *Use* functions to plot, play or visually render different signals or information sources.

Textbook/Resources:

- *Think Python*. Freely available online in HTML and PDF
- The Python Tutorial, available from the Python website
- Course handouts

Prerequisites by Topic: Computer programming

Topics:

1. Getting started with Python and Jupyter notebook, installing packages, working with variables, lists, tuples, and arrays (1 week)
2. Audio file I/O and plotting, functions, conditional control, exception handling (2 weeks)
3. Image file I/O and rendering, matrix operations (2 weeks)
4. Application using csv files, pandas, data frames (2 weeks)

5. Testing and debugging (1 week)
6. Application using text or graphs (2 weeks)

Python concepts, syntax and packages are introduced in the context of lab assignments built on four different data sources.

Course Structure: The class meets once a week for a 2-hour computer lab section. Outside of the two-hour lab section, students spend an additional hour per week to view assigned online tutorials and videos and 3 hours on average to meet with the instructor or TAs and complete the weekly lab assignments.

Computer Resources: The course uses Python for the laboratory exercises and also for checking homework problems. Students are expected to use their personal computers.

Laboratory Resources: The course is scheduled in a classroom that supports collaborative student computer work.

Outcome Coverage:

H = high relevance, M = medium relevance, L = low relevance to course.

(5) **Teams:** *An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.* (L) Some computer lab work is conducted in teams.

(6) **Experiment:** *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.* (M) All labs involve data analysis and visualization.

(7) **Learning:** *An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.* (M) Students are expected to use online documentation to learn the Python programming language for use in lab exercises, building on their knowledge of programming in other languages.

Prepared By: Mari Ostendorf