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2021 Spring

NS 5116

The applications of computer hardware and programming languages in behavioral experiments and big data analysis

電腦硬體與程式語言在行為科學實驗與大數據分析之應用

Wednesdays 1-4 PM

Location: S5-607-1/計中 I-202

Instructor: Dr. Erik C. Chang

Office: S5-601

Phone: 03-4227151-65209

Email: audachang@gmail.com

Office Hours: Wednesdays 10AM-12PM or by appointment only

Course Aims

This course aims to familiarize the students with the basics and applications of the Python, with a focus on creating experiments in behavioral sciences and analyzing big dataset from open government or institutional database. Through lectures and hands-on practices, the students should be able to independently write Python scripts for the experiments or applications of their research projects.

Course Materials

*Get Programming: Learn to Code with Python	https://www.manning.com/books/get-programming
*Data Science from Scratch: First Principles with Python	https://amzn.to/39w4ERf
*Supplementary materials	https://ncueeclass.ncu.edu.tw/course/7702
Learn Python 3 the Hard Way	https://learncodethehardway.org/python/
Learn More Python 3 the Hard Way	https://learncodethehardway.org/more-python/

*****required readings

Grades

Requirements	Dates	Weighting
Course participation	Throughout the semester	10%
Homework	Throughout the semester	40%
Project 1	28-April	25%
Project 2	23-June	25%

Course Participation (10%)

Students are expected to get ready for the class by 1AM, which means that the laptops, the extension cords, and other course related materials should be ready by then. Each missing from class without proper excuse will lead to a 2% deduction from the final grades.

Homework (40% [4% per homework])

There will be homework assignment for every lecture. The majority of them will be a programming quiz that you need to submit codes and the output file/graphics. The quiz will be announced after each lecture, and the answer is due by 11:59PM on the next Tuesday. Each hour of delay will result in 10% deduction in grades of that homework. You should try first to solve the quiz independently. Looking for online resources or discussion with classmates is encouraged, but asking experts to write the codes for you to solve the quiz directly is NOT. One can only learn how to program or use software through sufficient hands-on practice. Therefore this course places huge weights on homework. The top 10 scores of the weekly homework will be tallied into the final grades.

Projects (50%)

Every student will have to complete three different programming projects throughout the semester, each reflecting what you have learned from the course by each due time. The student can either comes up with their own task to resolve, or consult the lecturer about suitable programming tasks. The due dates are April 28 (25%) and June 30 (25%), all at 11:59PM.

Tentative Schedule

Lecture ID	Date	Topic
1	2/24	Orientation; basic concepts of programming
2	3/3	Python environment; data types; scripting
3	3/10	Conditionals, loops, and Functions
4	3/17	Psychopy I
5	3/24	Psychopy II
6	3/31	Interaction with hardware
7	4/7	Advanced data manipulation (numpy, pandas) I
8	4/14	Advanced data manipulation (numpy, pandas) II
9	4/21	Statistics & Prediction I
10	4/28	Statistics & Prediction II; **project #1 Showcase**
11	5/5	Visualization (matplotlib) I
12	5/12	Visualization (matplotlib) II;
13	5/19	Pattern recognition in brain images (Multivoxel Pattern Analysis, MVPA) I
14	5/26	Pattern recognition in brain images (Multivoxel Pattern Analysis, MVPA) II
15	6/2	Recommender Systems
16	6/9	Natural Language Processing (NLP) and High-dimensional Semantic Space
17	6/16	NLP and sentiment analysis
18	6/23	Final Project Presentation