Class: 1010 Intro Computer Science

Class Time

Lecture: Tu/Th 11:10 AM - 12:25 - Room 310 Class Room Building (CR)

Attendance is required.

Lab Times

Lab 10: Tu 3:20pm - 5:10pm - Enzi STEM Room 315

Lab 11: Tu 6:20pm - 8:10pm - Enzi STEM Room 315

Lab 12: Th 3:20pm - 5:10pm - Enzi STEM Room 315

Lab 13: Th 6:20pm - 8:10pm - Enzi STEM Room 315

Lab 14: Fr 2:30pm - 4:20pm - Enzi STEM Room 315

Attendance is required.

Final Time

Thursday the final will be December 16 10:15 a.m. – 12:15 p.m. In this room.

Instructor

- Prof Philip Schlump
- Office: 4081B in the Engineering Building. My office is right across the hall from the Computer Science Department Office.
- Office hours will be Tuesday from 9:00am to 10:45am, Thursday from 8:00am to 9:00am and by appointment. Appointments can include using zoom.com for remote office hours.
- Contact via email (pschlump@uwyo.edu) or (for emergencies only): 720-209-7888 (my personal cell) and pschlump@gmail.com (personal email). For using GIT and inviting me to have access to your files/projects use pschlump@uwyo.edu as the email address.
- Class Time: Turn off phones and other internet connected devices during class and lab.

If you call me to set up an appointment, you will need to send me a SMS message first so that I enter your name into my contact list. I get 10+ robo-calls a day and I will not answer a random number. Text me with your name and that you are a student in 1010 class.

Overview of the class

Python is becoming a more important language. In some analysis is is the most important language. Job sites show that Python is the most in-demand job. Python was designed to be easy to learn.

In this class we will cover the basics of programming, automated testing, source code control (git), and how to convert requirements into programs. Some time will be spent using a variety of tools that are common to most modern software development.

In the second half of the class we will focus on using TensorFlow 2.x. and Kereas a library on top of TensorFlow that makes the creation of data pipelines and machine learning relatively easy. A significant emphasis will also be on using Pandas and NumPy to engineer data so that it is suitable for use in a machine learning context. The experience with advanced data manipulation libraries like Pandas and NumPy is useful outside the area of Machine Learning.

Throughout the class we will be using a number of tools. Visual Studio Code will be used for editing text and other files. Python 3.8 will be the version of Python that we are working with. This is the Anaconda install version of Python. The exact version of Python is the Anaconda 64 bit release of Python. We will use TensorFlow 2.x. Realistically you should install these tools on on your own computer. They work on Mac, Windows, and Linux. I do 80% of my development on a Linux system, 15% on Mac and 5% on Windows. We will also use a tool called Jupyter Notebooks. This is a layer on top of Python.

Visual Studio Code: https://code.visualstudio.com/download

Python 3.8 - Anaconda: https://www.anaconda.com/products/individual

Iron Python and Jupyter Notebooks: https://jupyter.org/install

(You won't need this installed for a while, but...) TensorFlow 2.x: https://tensorflow-object-detection-api-tutorial.readthedocs.io/en/latest/install.html

Required texts

We will be covering the first $^1/_2$ of the book in learning Python (pages 1 ... 318).
Python Crash Course by Eric Mathers, 2nd edition. At this point in time Amazon notes that it is the best selling Python book of all time.

There will be outside reading also. I will provide links or .pdfs.

Required Activity

You are expected/required to visit office hours at least once during the semester. Come with a question - any question. It need not be class related.

Homework is Required

Most of the class grade comes from the homework. Specifically 30% of the semester grade is from the midterm and the final. 15% from Midterm, 15% from Final. The final is cumulative.

Extra credit

No extra credit is planned at this time.

Class Dates and Schedule.

Note - This is the current “Plan” - if this is updated it will be announced in class and posted to the Github.com site for the class.

Date	Lect. No	Description
Week 1		
Tue Aug 24	1	Cover Syllabus - Class Rules
		Why Computer Science.
		Your first program (Excel/Google Sheet)
		Your first program - Python.
		Lab starts next week!
Thr Aug 26	2	Python Mental Model.
		Basic Operators.
		Variables / Types
		Textbook Chapter 1
Week 2		
Tue Aug 31	3	Code Re usability. def`.
		Unit Conversions. Mikes to km.
		Big Numbers. Encryption.
		A Model of Solar System
		How computers represent data.
		Textbook Chapter 2
Thr Sep 2	4	Lists. Data Structures.
		Files, Modules.
		Input / Output in Python.
		Use of Command Line
		Textbook Chapter 3
Week 3		
Tue Sep 7	6	How important testing is.
		Testing Code
		Automated Testing
		Formal Verification

Date	Lect. No	Description
		Textbook Chapter 11 - Testing
Thr Sep 9	7	More on Lists, Dictionaries Maps.
		Very basic use of git.
		Textbook Chapter 4
Week 4		
Tue Sep 14	8	Control Flow / If Statements
		Textbook Chapter 5
Tue Sep 16	9	Dictionaries
		Outside Data - SQLite3
		Outside Data - Pandas
		Textbook Chapter 6
Week 5		
Tue Sep 21	10	Control Flow / Loops
		How DNA encodes proteins.
		Fetch/Execute cycle and loops.
		Textbook Chapter 7 - Loops
Thr Sep 23		NO CLASS - Wyoming Hack-A-Thon.
		Yes you still have lab(s).
		You should go and attend some of the
		Hack-A-Thon.
Week 6		
Tue Sep 28	11	String Processing. Representation.
		Searching Genetic Data.
		Textbook Chapter 7 - User Input
Tue Sep 30	12	Functions / Recursion
		Textbook Chapter 8
Week 7		
Tue Oct 5	13	Midterm Review.

Date	Lect. No	Description
Thr Oct 7	14	Midterm Test
Week 8		
Tue Oct 12	15	Object Oriented Programming.
		Textbook Chapter 9
Thr Oct 14	16	More on Objects.
		Objects and Testing.
		How the web works.
		A bit of HTML, CSS, JS.
		A bit of bottle.
Week 9	17	Understanding data.
Tue Oct 19		Data Engineering.
		What is TensorFLow (TF) what is a
		Tensor.
Thr Oct 21	18	Example of Classification.
		Uses of ML in the real world.
Week 10	19	Overfit and Underfit.
Tue Oct 26		Using Pandas and NumPy.
Thr Oct 28	20	Building a data Pipeline.
		Managing data. Image data.
		Test data. CSV files.
Week 11	21	Limitations of Machine Learning.
Tue Nov 2		"You are a Thing and I Love You"
		Machine learning and social context.
		ML and the law.
Thr Nov 4	22	ML and future of work.
Week 12	23	Regression with TF.

Date	Lect. No	Description
Tue Nov 9		Predicting Housing Prices.
Thr Nov 11	24	Real world example of ML.
Week 13	25	Text Classification with TF Hub.
Tue Nov 16		Reuse of Models.
Thr Nov 18	26	ML and Privacy.
Nov 22-26	27	Thanksgiving Break.
Week 14	28	Sentiment Analysis.
Tue Nov 30		
Thr Dec 3	29	Computer Security / Authentication.
Week 15	30	Blockchain and economic impact.
Tue Dec 7		Future of Computing.
Thr Dec 9	31	Final Review.

Lab Schedule

This is the schedule for the lab. Lab assignments should be turned in during lab but you have until the following Monday at midnight to get them turned in. They are uploaded to the wyoweb (instructure) site.

Date	Week	Description
Week 2		
Aug 31, Sep 2,	2	Installation of Python, Compeer Setup
Sep 3		Hello World Program.
		Lab Goal: Be able to edit a file.
		Lab Goal: Be able to write a program.
Week 3		
Sep 7, 9, 10	3	File System.
		Editing Text Files.
		Lab Goal: Be able to write a program.
		1st part of Unit Conversion.
Week 3		
Sep 14, 16, 17	3	Solar System Distances Lab.
		Lab Write and Test 2 Program(s).
		Get output of Test.
		Run Programs to answer Lab Questions.
		Creating text file (Markdown) for
		homework.
Week 4	4	CSV reading and a Dictionary
Sep 21, 23, 24		Basic use of Git/Github.com
Week 5	5	SQLite3 Data Analysis
Sep 28, 30,		
Oct 1		Pull out data. Draw Graphs.
Week 6	6	Search Genetic Data.
Oct 5, 7, 8		Determine if Steffie Lee has CF.
Week 7	7	Recursive Calculation

Date	Week	Description
Oct 12, 14, 15		Calculate Fibonacci
		Find the largest value in a list.
Week 8	8	A simple form with a web page and form.
Oct 19, 21, 22		Render a page with a form.
		POST - save data to SQLite3.
Week 9	9	Tensor Flow Install - Hello World
Oct 26, 28, 29		Basic test of TensorFlow
		Read some data, draw a graph.
Week 10	10	Data Analysis
Nov 2, 4, 5		
Week 11	11	Image Classification
Nov 9, 11, 12		
Week 12	12	Hand Writing Analysis
Nov 16, 18, 19		
Week 13	13	Sentiment Analysis.
Nov 30,		Compeer Security Worksheet.
Dec 2,3		
Week 14	14	TBD. Makeup lab?
Dec 7, 9, 10		

Homework/Assignments Due Dates

Note that the lab would be the week prior to this due date. It is preferred if you get your lab work done and turned in during the lab.

Assignment #	Date Due	Pts	Description
1	Mon Sep 6	100	Lab 1: Hello World in Python
			Due as a part of your lab.
2	Mon Sep 13	100	Assignment 1: Basic Unit Conversion
		100	Lab 2: Testing of Unit Conversion.
3	Mon Sep 20	100	Assignment 2: Distance to Planets (with test code)
		100	Lab 3: Planet/Star Distances questions Due.
			Due as a part of your lab.
4	Mon Sep 27	100	Read in a matrix and add up values.
			Other List programs.
		100	Lab 4: Setup and use git and a branch.
5	Mon Oct 4	100	Sort and Search data. Read csv, sort, output.
		100	Lab 5: Read/Edit CSV file. File formats.
			Using a text editor (vim)
6	Mon Oct 11	100	Search genetic data.
		100	Lab 6: Convert genetic codes to proteins.
7	Mon Oct 18	100	Recursion Calculating Fibinachi Numbers
		100	Lab 7: Recursive sort - quicksort.
8	Mon Oct 26	100	Web server - Serve simple page with bottle.
		100	Lab 8: Better HTML and CSS.
9	Mon Nov 1	100	OOP - why and how - Battery Management System.
		100	Lab 9: Tensor Flow Install and test.
10	Mon Nov 8	100	Data analysis and graphs. Regression.
		100	Lab 10: Correlation is not causation.
11	Mon Nov 15	100	Image Clasification.
		100	Lab 11: xImage Clasification.

Assignment #	Date Due	Pts	Description
12	Mon Nov 22	100	Hand writing analysis.
		100	Lab 12: Hand writing analysis.
13	Mon Nov 29	100	Web Scraping.
		100	Lab 13: Using Web Sceraping for Sentiment.
14	Mon Dec 6	200	Sentiment Analysis.
		100	Lab 14: Sentiment Analysis.
Total		2800	

Grading

Points	Percentage of Semester Grade	Description
1400	35%	Homework / Assignments
1400	35%	Labs
600	15%	Midterm
600	15%	Final

4000 points total for the semester.

Letter Grade	Point Range
A	4000 to 3600
B	3599 to 3200
C	3199 to 2800
D	2799 to 2400
F	2399 and below

Install

Tools

1. Anaconda Python
2. Iron Python (Jupyter Notebooks)
3. Visual Studio Code
4. GIT
5. VIM

Python Packages to Install

This is not a complete list but we will use all of the following Python Libraries. You should import all of these in your “Hello World” so that you verify that you have them installed.

1. pandas
2. numpy
3. bottle
4. SQLite3
5. tensorflow
6. keras
7. matplotlib
8. BeautifluSoup

Late work.

Generally it is a good idea to get the homework done on time. Normally I take 10% off for each week day that a homework is late until it is worth only 40% of the original points. The last day for turning in homework is Dec 10 at Midnight. No homework will be accepted after this point.

Original work policy (in this class).

Homework is turned in online via file upload. The homework is really, really important. Do your own work. That is how you learn. If you use google or other web sources, then note where you got the code or answer from. If you copy from the web, then expect that on a one-on-one basis I will be asking you how the code works. You can help each other on homework and in the Lab. Tests (Midterm and Final) you are not allowed to help each other. It is legitimate in this class to use the web for homework and lab work, (it may not be in other classes). If you do then note it in comments your code. Code is very unique to each person. If two of you turn in the same code and do not clearly note that you helped each other - that is very bad. If you note that you worked on it together - and then I ask each of you to explain how it works - that's alright. If you have questions about this email me. If you use code from the web then expect that I will be asking about what the copyright and license terms are for the code. Not all code that is published can be reused. Also be aware that I put hidden data flaws into assignments. For example the accurate size of a tennis ball is 2.575 inches. In previous years I have used 2.5, 2.6 and this year 2.75 inches. If you ask a previous year student for the answers and turn that in you will have wrong result. If you just copy from the web you will have a wrong result.

Title IX – Duty to Report

The University of Wyoming faculty are committed to helping create a safe learning environment for all students and for the university as a whole. If you have experienced any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, know that help and support are available. The University has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The University strongly encourages all students to report any such incidents to the University. Please be aware that all University of Wyoming employees, including student staff, are required to report all Title IX related concerns to the Title IX Coordinator or their supervisor. This means that if you tell a faculty member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty member must share that information with the University's Title IX Coordinator. UW's Title IX Coordinator is Jim Osborn (Manager of Investigations, Equal Opportunity Report and Response). He is located in Room 320 of the Bureau of Mines Building, and can be reached via email at report-it@uwyo.edu or via phone at 766-5200 or 766-5228. For more information, go to: http://www.uwyo.edu/reportit/learn-more/faqs.html .

Classroom Behavior Policy

(This section is not really applicable to this class - we will have class discussions that this applies to)

At all times, treat your presence in the classroom and your enrollment in this course as you would a job. Act professionally, arrive on time, pay attention, complete your work in a timely and professional manner. You will be respectful towards your classmates and instructor. Spirited debate and disagreement are to be expected in any classroom and all views will be heard fully, but at all times we will behave civilly and with respect towards one another. Personal attacks, offensive language, name-calling, and dismissive gestures are not warranted in a learning atmosphere. As the instructor, I have the right to dismiss you from the classroom.

Classroom Statement on Diversity

The University of Wyoming values an educational environment that is diverse, equitable, and inclusive. The diversity that students and faculty bring to class, including age, country of origin, culture, disability, economic class, ethnicity, gender identity, immigration status, linguistic, political affiliation, race, religion, sexual orientation, veteran status, worldview, and other social and cultural diversity is valued, respected, and considered a resource for learning.

Disability Support

If you have a physical, learning, sensory or psychological disability and require accommodations, please register as soon as possible and provide documentation of your disability to Disability Support Services (DSS), Room 109 Knight Hall. You may also contact DSS at (307) 766-3073 or udss@uwyo.edu. Visit their website for more information: www.uwyo.edu/udss

Academic Dishonesty Policies

Dont cheat on the exams. I expect you to take full advantage of all the online resources you can get your hands on. That includes Stack Overflow, Github etc. If you do use someone else's code, put in a link to where you found it. Don't cheat on the projects - do you own work. Most of the learning in the class is from *doing* the projects.

Substantive changes to syllabus

All deadlines, requirements, and course structure are subject to change if deemed necessary by the instructor. Students will be notified verbally in class, on our WyoCourses page announcement, and via email of these changes. I do travel during the semester. Class could be canceled or assignments due dates changed.

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