

Class: 1010 Intro Computer Science

Class Time

Lecture: Tu/Th 11:00 AM - 12:15 - Room 310 Class Room Building (CR)

Attendance is required.

Lab Times

Lab 10: Tu 2:45pm - 4:35pm - Enzi STEM Room 315

Lab 11: Tu 6:10pm - 8:00pm - Enzi STEM Room 315

Lab 12: Th 2:45pm - 4:35pm - Enzi STEM Room 315

Lab 13: Th 6:10pm - 8:00pm - Enzi STEM Room 315

Attendance is required.

Final Time

Thursday the final will be a take home due May 12, 2022 12:00 midnight.

Instructor

- Prof Philip Schlump
- Office: 4081B in the Engineering Building. My office is right across the hall from the Computer Science Department Office.
- Office: Office hours will be Tu/Th from 9:25am to 10:50am (immediately following this class) and by appointment.
- 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 Mac system, 10% on Linux and 5% on Windows.

Original Class Notes

All of the originals for the class are at <https://github.com/Univ-Wyo-Education/S22-1010>

Tools

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

Python 3.9 - Anaconda: <https://www.anaconda.com/products/individual>

(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> Also if you have difficulty installing this on your own computer the University has provided virtual systems that you can install and run this on and Google has provided a system that we can run tensorflow across the web.

Required texts

We will be covering the first $\frac{1}{2}$ 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.

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
<i>Week 1</i>		
Tue Jan 18	1	Cover Syllabus - Class Rules
		Why Computer Science.
		Your first program (Excel/Google Sheet)
		Your first program - Python.
		Lab starts next week!
Thr Jan 20	2	Python Mental Model.
		Basic Operators.
		Variables / Types
		<i>Textbook Chapter 1</i>
<i>Week 2</i>		
Tue Jan 25	3	Code Re usability. def .
		Unit Conversions. Miles to km.
		Big Numbers. Encryption.
		A Model of Solar System
		How computers represent data.
		<i>Textbook Chapter 2</i>
Thr Jan 27	4	Lists. Data Structures.
		Files, Modules.
		Input / Output in Python.
		Use of Command Line
		<i>Textbook Chapter 3</i>
<i>Week 3</i>		
Tue Feb 01	5	How important testing is.
		Testing Code
		Automated Testing
		Formal Verification
		<i>Textbook Chapter 11 - Testing</i>

Date	Lect. No	Description
Thr Feb 03	6	More on Lists, Dictionaries Maps.
		Very basic use of Git.
		<i>Textbook Chapter 4</i>
Week 4		
Tue Feb 08	7	Control Flow / If Statements
		<i>Textbook Chapter 5</i>
Tue Feb 10	8	Control Flow / Loops
		Outside Data - SQLite3
		Outside Data - Pandas
		<i>Textbook Chapter 6</i>
Week 5		
Tue Feb 15	9	Dictionaries
		How DNA encodes proteins.
		Fetch/Execute cycle and loops.
		<i>Textbook Chapter 7 - Loops</i>
Thr Feb 17		NO CLASS (You may have a pre-recorded video)
		Yes you still have lab(s).
Week 6		
Tue Feb 22	10	String Processing. Representation.
		Searching Genetic Data.
		<i>Textbook Chapter 7 - User Input</i>
Thr Feb 24	11	Functions / Recursion
		<i>Textbook Chapter 8</i>
Week 7		
Tue Mar 01	12	Midterm Review.
Thr Mar 03	13	Midterm Test
Week 8		
Tue Mar 08	14	Object Oriented Programming.
		<i>Textbook Chapter 9</i>

Date	Lect. No	Description
Thr Mar 10	15	More on Objects.
		Objects and Testing.
		How the web works.
		A bit of HTML, CSS, JS.
		A bit of bottle.
Mar-10		Spring Break - No Class
to Mar-18		
Week 9	16	Understanding data.
Tue Mar 22		Data Engineering.
		What is TensorFlow (TF) what is a
		Tensor.
Thr Mar 24	17	Example of Classification.
		Uses of ML in the real world.
Week 10	18	Overfit and Underfit.
Tue Mar 29		Using Pandas and NumPy.
Thr Mar 31	19	Building a data Pipeline.
		Managing data. Image data.
		Test data. CSV files.
Week 11	20	Limitations of Machine Learning.
Tue Apr 05		"You are a Thing and I Love You"
		Machine learning and social context.
		ML and the law.
Thr Apr 07	21	ML and future of work.
Week 12	22	Regression with TF.
Tue Apr 12		Predicting Housing Prices.
Thr Apr 14	23	Real world example of ML.
Week 13	24	Text Classification with TF Hub.
Tue Apr 19		Reuse of Models.

Date	Lect. No	Description
Thr Apr 21	25	ML and Privacy.
Week 14	27	Sentiment Analysis.
Tue Apr 26		
Thr Apr 28	28	Computer Security / Authentication.
Week 15	29	Blockchain and economic impact.
Tue May 03		Future of Computing.
Thr May 05	30	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
<i>Week 2</i>		
Jan 25, Jan 27	2	Installation of Python, Compeer Setup
		Hello World Program.
		Lab Goal: Be able to edit a file.
		Lab Goal: Be able to write a program.
<i>Week 3</i>		
Feb 1, 3	3	File System.
		Editing Text Files.
		Lab Goal: Be able to write a program.
		1st part of Unit Conversion.
<i>Week 3</i>		
Feb 7, 8	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.
<i>Week 4</i>	4	CSV reading and a Dictionary
Feb 15, 27		Basic use of Git/Github.com
<i>Week 5</i>	5	Data Analysis
Feb 22, 24		
		Pull out data. Draw Graphs.
<i>Week 6</i>	6	Search Genetic Data.
Mar 1, 3		Determine if Steffie Lee has CF.
<i>Week 7</i>	7	Recursive Calculation
Mar 8, 10		Calculate Fibonacci

Date	Week	Description
		Find the largest value in a list.
Week 8	8	A simple form with a web page and form.
Mar 15, 18		Render a page with a form.
Week 9	9	Tensor Flow Install - Hello World
Mar 22, 24		Basic test of TensorFlow
		Read some data, draw a graph.
Week 10	10	Data Analysis
Mar 29, 31		
Week 11	11	Image Classification
Apr 5, 7		
Week 12	12	Hand Writing Analysis
Apr 12, 14		
Week 13	13	Sentiment Analysis.
Apr 19, 21		Compeer Security Worksheet.
Week 14	14	TBD. Makeup lab?
Apr, 26, 28		

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 Jan 31	100	Lab 1: Hello World in Python
			Due as a part of your lab.
2	Mon Feb 7	100	Assignment 2: Distance to Planets (with test code)
		100	Lab 3: Planet/Star Distances questions Due.
			Due as a part of your lab.
3	Mon Feb 14	100	Assignment 3: Count the words in a file.
		100	Lab 3: Use git to get to some files.
4	Mon Feb 21	100	Assignment 3: Read in a list and search it.
		100	Lab 4: Setup and use git and a branch.
5	Mon Feb 28	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 Mar 7	100	Search genetic data.
		100	Lab 6: Convert genetic codes to proteins.
7	Mon Mar 14	100	Recursion Calculating Fibonacci Numbers
		100	Lab 7: Recursive sort - quicksort.
8	Mon Mar 21	100	Web server - Serve simple page with bottle.
		100	Lab 8: Better HTML and CSS.
9	Mon Mar 28	100	OOP - why and how - Battery Management System.
		100	Lab 9: Tensor Flow Install and test.
10	Mon Apr 4	100	Data analysis and graphs. Regression.
		100	Lab 10: Correlation is not causation.
11	Mon Apr 11	100	Image Classification.
		100	Lab 11: xImage Classification.
12	Mon Apr 18	100	Hand writing analysis.

Assignment #	Date Due	Pts	Description
		100	Lab 12: Hand writing analysis.
13	Mon Apr 25	100	Web Scraping.
		100	Lab 13: Using Web Scraping for Sentiment.
14	Mon May 2	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. BeautifulSoup

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

Don't 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 your 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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