Class Syllabus: 1015 CoSci Fall 2020 - Python with Machine Learning.

Instructor

- Prof Philip Schlump
- Office: Office hours will be online using Zoom. M,W,F from 8:00am to 9:00am and by appointment. The Zoom link to join will be emailed out to the class.
- Contact via email (pschlump@uwyo.edu) or (for emergencies only): 720-209-7888 (my cell) and pschlump@gmail.com (personal email).
- Class Time: Lectures are online and pre-recorded. We will have a mix of discussion and one-on-one time during class. If your schedule will not permit getting together during a discussion time, then we will schedule individual one-on-one time. I will be asking all of you when it is possible to have a 1 hour discussion - we will schedule it.

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 1015 class.

Overview of the class

Lectures: Really good research on the *best* way to teach says that the optimal format is to pre-record lectures and edit them. Then to have one-on-one time with the students and discussion with the students during class. This is what we are going to do. I have split the lectures into 2 parts - there is a podcast - stuff that you need to know as a computer science major - but stuff that is not “white board” diagram type stuff. The podcast will be more entertaining and not necessarily “note taking” type of material. It is designed to be something that you can listen to while doing the dishes. (Ok … It is not all that entertaining - but I will add stories and anecdotes to the podcast - and it is on topics like history of computing - As a person in the computer science field - this will help you. If nothing else, knowing things that just don’t work in this field is a good way to not repeat past mistakes. Also the podcast section is shorter than a full 1 hour lecture.)

Lectures - Find someplace where you can focus and take notes. The first $\frac{1}{2}$ of the class is on learning Python. This follows with the book (about the first 200 pages). The second $\frac{1}{2}$ of the class is on Machine Learning - we will be using a package from Google called TensorFlow. In both cases this is

the “take” notes part of the class. I do have handouts for every lecture. Listen to the lectures *before* class discussions.

One-on-one time. I will schedule time to work with each and every one of you. There will be group discussions. It will be a week or so before we get together as a group. Group discussions will normally be on a Tuesday morning at 10:00am.

Throughout the class we will be using a tool called Visual Studio Code. Python 3.8 will be the version of Python that we are working with. The exact version of Python is the Anaconda 64 bit release of Python. We will use TensorFlow 2.x. These tools are available in EN 4059 and EN 4072 labs. It is possible to remotely access these labs. Realistically you should install them 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.

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

Python 3.8 - 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

Required texts

We will be covering the first $\frac{1}{2}$ of the book in learning Python (pages 1 … 318). The book can be purchased from Amazon if you need a paper copy. *Python Crash Course* by Eric Mathers, 2nd edition. At this point in time Amazon lists it for $17.00 and notes that it is the best selling Python book of all time. The Amazon link is: https://www.amazon.com/Python-Crash-Course-2nd-Edition/dp/1593279280/ref=pd_sim_14_7

Project 1 from the book is used in the machine learning section. We will implement project 1, then we will use machine learning to drive the game and win. This means that you have to get project 1 to work (homework 14) and you should consider starting on it immediately after homework 10 is done. Project 1 and (homework 14 and 15) have as many points as both the midterm and the final!

I did not order this via the UW bookstore - so if you want a print copy - you will need to order it.

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

Required Projects

Most of the class grade comes from the homework. Specifically 20% of the semester grade is from the midterm and the final.

Final Examination

The final will be online and will need to be completed by the end of finals week, Midnight Dec 18th.

The midterm will also be online.

Extra credit

No extra credit is planned at this time.

Office Hours

Online: Office hours are online - you can make an appointment but I will be online in Zoom Monday, Wednesday, Friday from 8:00am till 9:00am. Additional office hours will be announced.

Grading

Your grade is from the Projects, 2 Tests (Midterm and Final).

Title	Points	Book Chapter	Date
Hw 01 - Be a programmer and hello world.	100 Pts	Chapter 1	Aug 31
Hw 02 - Variables, simple calculation.	200 Pts	Chapter 2	Sep 7
Hw 03 - List Operations. Quick-Sort.	200 Pts	Chapter 3 & 8	Sep 14
Hw 04 - Arrays and other Lists Operations.	200 Pts	Chapter 4	Sep 21
Hw 05 - Logic Flow, If, While.	200 Pts	Chapter 5	Sep 28
Hw 06 - Data Structures (Dictionaries)	200 Pts	Chapter 6	Oct 5
Hw 07 - User Input.	200 Pts	Chapter 7	Oct 12
Midterm	400 Pts		Oct. 13
Hw 08 - Objects and Methods.	200 Pts	Chapter 8 & 9	Oct 19
Hw 09 - Files. Persistence.	200 Pts	Chapter 10	Oct 26
Hw 10 - Hashing and User Passwords.	200 Pts	Chapter 11	Nov 2
Hw 11 - TensorFlow Hello World.	100 Pts		Nov 9
Hw 12 - Linear Regression.	200 Pts		Nov 16
Hw 13 - Image Classification.	200 Pts		Nov 23
Hw 14 - The Game &&Game.	400 Pts	Ch 12,13,14	Dec 2
Hw 15 - TF Game Control. Win the Game.	400 Pts		Dec 12
Final	400 Pts		Dec 14..18

Total: 4000

Letter Grades

Points	Letter Grade
From 3400 to 4000	A
From 3000 to 3399	B
From 2600 to 2599	C
From 2200 to 2599	D
From 0 to 2199	F

Yes there may be a little wiggle room in the grading. Yes - if I write a bad test question that has no answer - or multiple answers - then it won't be counted in your grade. Yes I make mistakes in grading (not too often - but mistakes happen - and I won't hold my mistakes against your grades). If something goes wrong then let's fix it.

Class Schedule

This is an approximate schedule. Any updates will be announced.

Wk.	Date	Description
1	Aug 24	Lecture 1 : Class Intro
		Lecture 2 : Installation and Setup.
		Pod Cast: Why Computer Science.
		Pod Cast: Why This Class.
		Pod Cast: Why This Instructor.
2	Aug 31	Lecture 3: Variables and Data Type. Two dimensions of data.
		Lecture 4: Where is data stored? An overview of computer architecture.
		Pod Cast: Why Test Code.
		Pod Cast: Computer Trends - BlockChain.
3	Sep 7	Lecture 5: Lists and Sorting Data.
		Lecture 6: Pre-Sorted Data - Trees.
		Pod Cast: Computer Trends - Machine Learning.
		Pod Cast: The Human Factor.
4	Sep 14	Lecture 7: Performance How fast is the code. How correct is it.
		Lecture 8: If true then do. Control Logic.
		Pod Cast: History of Computing: Unix and the OS.
		Pod Cast: What can’t be done. Uncomputable things.
5	Sep 21	Lecture 9: Associating Keys with Data. Indexes. Dictionaries.
		Lecture 10: Input / Output and Files.
		Pod Cast: How accounting fraud happens.
		Pod Cast: Legal Responsibility. Machine Learning and the Law.
6	Sep 28	Lecture 11: Associating Functions and Data. Object Oriented Programming.

Wk.	Date	Description
		Lecture 12: More on Objects.
		Pod Cast: Owl / Java / JavaScript and a Single Processor World.
		Pod Cast: Multi Processor World.
7	Oct 5	Lecture 13: Alternatives to objects. Interfaces / Traits / Functional / Prototype
		Lecture 14: Using `git` (https://github.com or https//gitlab.com etc.)
		Pod Cast: Remote Work / Remote Study.
		Pod Cast: Strategy and beating the competition.
8	Oct 12	Lecture 15: Software &&engendering process.
		Lecture 16: Software Testing.
		Pod Cast: Making Money with Computers.
		Pod Cast: Making Money without Computers.
9	Oct 19	Lecture 17: What is hashing. What is a blockchain.
		Lecture 18: Files and running programs at the command line.
		Pod Cast: Who is the “Al” in Algebra and Algorithm.
		Pod Cast: From slow to fast. Algorithms are more important than languages.
10	Oct 26	Lecture 20: Machine Learning and Tensors -What is a Tensor?
		Lecture 20: Fitting of Data. Good Data / Bad Data.
		Pod Cast: Univ. of Wyoming WABL Research.
		Pod Cast: Univ. of Wyoming AI Research.
11	Nov 2	Lecture 21: Encoding of Data - one hot. Image Classification.
		Lecture 22: Feature Engineering
		Pod Cast: Costs of mistakes. What are the costs of software defects.
		Pod Cast: Costs of security. What is security worth.
12	Nov 9	Lecture 23: Building our “game.”
		Lecture 24: Interfacing to our “game.”
		Pod Cast: Rise of the Robots.

Wk.	Date	Description
		Pod Cast: The future is bright.
13	Nov 16	Lecture 25: Failures in training. Problems with Machine Learning.
		Lecture 26: Other kinds of Machine Learning.
14	Nov 23	Lecture 27: Testing with fuzzy data.
		Lecture 28: Impact of Machine Learning. The 2nd Industrial Revolution.
15	Nov 30	Lecture 29: More on our “game” and ML - Automated Survival in a Hostile Environment.
		Lecture 30: Still more on training and auto-programming.
16	Dec 7	Lecture 31: Make up lecture. To be determined.
		Lecture 32: Make up lecture. To be determined.
17	Dec 14	Lecture 33: Where to from this point forward. At UW / In Life.
		Lecture 34: Final Review.

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 12.

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. Help each other. It is legitimate in this class, (it may not be in other classes), for you to help your fellow student. If you do then note it in your code. Code is very unique to each person. If two of you turn in the same code - 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.

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 .

Attendance and Absence policies

You have to watch the lectures and listen to the podcast. This class has prerecorded lecture and audio that you are expected to watch/listen to. This is your "required" attendance.

SARS-Cov-2 / COVID-19 Related Policies

During this pandemic, you must abide by all UW policies and public health rules put forward by the City of Laramie (or by Natrona County if at UW-Casper), the University of Wyoming and the State of Wyoming to promote the health and well-being of fellow students and your own personal self-care. Please review our current policy. As with other disruptive behaviors, we have the right to dismiss you from the classroom (Zoom and physical), or other class activities if you fail to abide by these COVID-19 policies. These behaviors will be referred to the Dean of Students Office using the UWYO Cares Reporting Form for Student Code of Conduct processes.

Syllabus Changes

I will alert you to any possible course format changes in response to UW decisions about community safety during the semester.

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 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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