

Python for Machine Learning and Artificial Intelligence

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Office Hours: 2 - 3 PM Every day

MEETING TIME:

12 - 2 PM (Tentative)*

LOCATION:

BG 105L Classroom (Tentative)*

* Meeting times and locations may be updated upon notice prior to compressed course week.

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces students to the Python programming language with an emphasis on preparing students for working with machine learning and AI applications. This course should be taken as preparation for the Innovation and Entrepreneurship Clinic by students who are new to programming or who could benefit from a refresher course in Python. No prior coding or computer science experience is required. The course covers basic Python syntax, data structures, program flow controls, functional programming, object-oriented programming, and use of the Numpy, Pandas, Scikit-Learn, and Matplotlib libraries, as well as APIs for Large Language Models, for data preprocessing for machine learning and AI.

OBJECTIVES:

This class is designed to enable you to:

- understand basic computational methods, python syntax, computer operations, expressions, algorithms, python variables and data types, objects, and functions;
- use python programming structures like functions, classes, and objects;
- work with native python data structures like lists, tuples, and dictionaries;
- employ python libraries commonly used for machine learning and training AI models, including Numpy, Scikit-Learn, Matplotlib, and Pandas;
- understand basic data cleaning and preprocessing methods for AI training;

- use standard application programming interfaces (APIs) for popular Large Language Models (LLMs).

STUDENT LEARNING OUTCOMES:

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

- read and understand basic python code,
- write python programs using both functional and object-oriented programming methods,
- use popular python machine learning libraries to visualize and process data for machine learning and AI training,
- prepare data for training with machine learning and AI models,
- work with popular AI models via their APIs.

Contact Information

Professor Nguyen can be reached by e-mail (nguyenthinh@ufl.edu) or by Teams chat or by calling his office number. E-mail is my preferred mode of contact.

Logistics:

As required by the Board of Governors regulation 8.003, instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor. The instructor is only responsible for these instructional materials.

Course Meeting Times – The class will meet every day during the week of compressed courses at the time designated at the start of this syllabus. If you would like me to record a class via Zoom and make it available on Canvas, please send me an e-mail, preferably at least 24 hours in advance of the class.

Communication - I will communicate with the class via the course Canvas site. Please monitor the course Canvas site regularly for readings, assignments, and updates.

Coding Exercises - There will be in-class coding exercises, which will be supplemented by homework. Expect to spend 1 - 2 hours outside of class per day working on coding homework assignments, which should be turned in on Canvas before class on the following day. We will review coding homework exercises in class after they are assigned, so be prepared to show and explain your code in class.

Workload -Students should expect to spend at least two hours outside of class reading and preparing for every hour of class. This includes homework assignments and coding exercises.

As this course is for a compressed week, this will require a significant time commitment each day to complete readings, assignments, and coding exercises.

Please bring your laptop to class. You do not need to install any special software on your computer. You can use Mac, Windows, or Chromebook. Some students have been able to use an iPad, but you will have a better experience with a keyboard and mouse. All coding will be done in Google Colab, which works through a browser. Classroom coding exercises will be demonstrated using Jupyter notebooks, which are run inside of Colab. I encourage you to spend some time after each class going through the notebook and studying the examples discussed in class. You are encouraged to make your own copy of the class notebook and tinker with the code in the notebook or use the code to implement your own examples.

Readings / Textbooks - There will not be an assigned textbook for this class. In general, the readings for this class will consist of online tutorials and online readings that will be assigned via Canvas each day. A list of readings due throughout the week will be provided at the start of class to help you plan ahead.

Assignments - You will be given daily homework assignments, which may include coding exercises and quizzes, to reinforce what you learn in class each day. Please complete these assignments on time and be prepared to bring any questions to class. Learning coding is best done by taking something you're interested in and applying the methods we learn in class. It's as much about muscle memory as an intellectual exercise. Therefore, you should be prepared to take an active role in learning.

Law School Policies

Class Attendance Policy:

Attendance in class is required by both the ABA and the Law School. Attendance will be taken at each class meeting. Students are allowed 3 absences during the course of the semester. Students are responsible for ensuring that they are not recorded as absent if they come in late. A student who fails to meet the attendance requirement will be dropped from the course.

Observance Of Religious Holidays:

UF Law respects students' observance of religious holidays. Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence. Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

Professionalism - Treat other students, faculty, and clients courteously, be prepared for class, ensure that you do not distract other students, and engage the material as best you are able.

You're welcome to use your laptops in class to follow along with code demonstrations, but please avoid outside distractions and silence your cellphones.

Special Circumstances - If you face special circumstances that could affect your participation in class or your ability to prepare adequately (such as a life event, a disability or illness, or other emergency), please contact me.

There are resources at the College of Law and beyond that we can enlist to assist you. There are a lot of resources here to assist you. In particular, I would like you to be aware of:

Wellness at UF Law

U Matter, We Care – contact at <umatter@ufl.edu> or 352.392.1575 (24 hours)

Counseling and Wellness Center – <UFLawCares@law.ufl.edu> or 352.392.1575

Student Health Care Center – 352.392.1161 (24 hours)

University of Florida Shands Emergency Room / Trauma Center – 352.733.0111; the ER is at 1515 SW Archer Road, Gainesville, FL 32608.

Statement Related To Accommodations For Students With Disabilities

Students requesting accommodations for disabilities must first register with the Disability Resource Center (<https://disability.ufl.edu/>). Once registered, students will receive an accommodation letter, which must be presented to the Assistant Dean for Student Affairs (Assistant Dean Brian Mitchell). Students with disabilities should follow this procedure as early as possible in the semester. It is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester. Students may access information about various resources on the UF Law Student Resources Canvas page, available at <https://ufl.instructure.com/courses/427635>.

Feedback: At several points during the course, I will ask you for feedback in writing / electronically about how the course is progressing and how it can be improved. This feedback is anonymous, and it is extremely important to me to gauge how well the class as a whole is following along.

Compliance With Uf Honor Code:

Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Law Honor Code located here.

Use of Artificial Intelligence Resources

Using AI chatbots like ChatGPT, Claude, or Gemini is a great way to learn programming and is encouraged in this course. For example, asking a chatbot to explain how a piece of Python code works is a great way to learn to code. Nevertheless, when working on homework or coding exercises, it is helpful to think through a problem on your own and try to apply what you learn before using AI. When first working on a problem, turn off the AI-assisted code completion features on Colab. Only after spending significant time on a problem should you ask AI for suggestions. Make sure that you read the explanation of the solution provided by AI, if applicable. Please be aware that sometimes AI will provide solutions that use advanced methods or alternative techniques that we have not covered, so don't assume there is only one way to do something or that the AI's solution is the "right" one. If you don't understand the solution, please ask questions in class or in office hours.

College of Law Policies - Information about other College of Law policies, including on Attendance, Computer Requirement, Add / Drop Policies, and ADA Accommodations, can be found at this link: [this link](#).

Grading

This course is graded satisfactory (S) / unsatisfactory (U) based on attendance, completion of homework assignments, quizzes, and participation in classroom exercises. This grading policy is to encourage you to take academic risks by exploring areas that may be new or technically challenging for you without undue anxiety. Nevertheless, you should strive to do your best in the class in order to prepare yourself for success in the Innovation Clinic, where your familiarity with Python will be important to your success in learning about AI and in your ability to interact meaningfully with our clients.

Recordings Of Class

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or guest lecturer during a class session. Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a

recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor and Student Conduct Code.

Content

I intend to cover the topics below during the compressed week, but I may adjust the pace as needed to provide a positive and effective learning experience for everyone, based on the results of quizzes and homework for the class overall. If we are not able to cover all the material, the advanced topics will be covered in the Innovation Clinic.

Day	Topic
1	<p>Introduction: Why learn Python? Why Python is the #1 programming language for AI.</p> <p>Logistics: Setting up your programming environment: Colab and Jupyter notebooks</p> <p>Python Syntax: Understanding indentation, variable naming conventions, and elements of Python syntax (e.g., line breaks, punctuation, comments)</p> <p>Introduction to basic python data types: integers, floats, strings, Boolean, special value types</p> <p>Understand what it means to “bind” a variable.</p>
2	<p>Expressions: Basic operators Evaluating expressions Imperative programming</p> <p>Program flow controls: Boolean expressions Branching (if / then / else) Looping (while, for)</p>
3	<p>Structured data types: Lists, tuples, sets, and dictionaries List comprehensions, tuple unpacking</p> <p>Functional Programming:</p>

	Functions and parameters Recursion Lambda functions Understand local vs. global variables and code execution frames
4	Object-Oriented Programming: Classes, objects, and instances Attributes and methods Understanding inheritance, abstraction, encapsulation, and polymorphism
5	Using libraries for machine learning: Using Numpy, Matplotlib, Pandas, and Scikit-Learn Data Preprocessing for AI training: Data cleaning and processing techniques One-hot encoding and scaling Developing custom AI preprocessing pipelines Using APIs: OpenAI, Gemini, and Langchain