

Course Syllabus

Course Title:	Python and Mathematics for Machine Learning
Instructor Name:	Anthony Mauro
Course Number:	CSE-90162
Textbook	"Python and Math Essentials for Machine Learning - A Beginner's Guide" https://store.bookbaby.com/book/python-and-math-essentials-for-machine-learning

Welcome to *Python and Mathematics for Machine Learning*!

It is my pleasure to be your instructor for this course! I encourage you to reach out to me via the inbox feature in Canvas or through email if there is anything I can help you with to ensure your success in this course. Also, feel free to ask questions if something in the lectures or the course material is not clear to you. Please do not hold back, we will review a topic until it is clear. At the same time, feel free to help your classmates' with questions they may have.

Communication Policy

I want to hear from you! It is not unusual to encounter difficulties with course content or assignments. If that happens to you, please reach out to me as soon as possible so that we can solve the problem. The earlier you communicate with me about a potential issue, the more likely we are to find a good solution. I do my best to answer questions Monday-Friday, within 24 hours.

I encourage you to visit the [Canvas Student Orientation Course](#) (in your Canvas Dashboard) to see some guidelines for appropriate communication etiquette between students and instructors in the digital space.

Course Description

Please note that a large volume of material is covered in this course, and thus it is critical that you keep up with the pacing. The mathematics and Python language topics covered have been selected to provide the most applicable base of knowledge needed to be successful in the subsequent courses in this series. In particular, topics in Statistics, Calculus, and Linear Algebra will be covered as well as Python language development environments, data structures, recursion, advanced functions, and the machine learning libraries: Numpy, Pandas, and Matplotlib.

Course Prerequisites

N/A. No advanced mathematics is required, however a strong mastery of high school algebra is recommended. Some experience in a programming language (e.g. Java, C/C++, Javascript) is also recommended, but not required.

Student Learning Outcomes

Student Learning Outcomes are specific and measurable goals for student learning. Students demonstrate their mastery of these outcomes through course assessments.

By the end of this course, students will be able to:

- Create Python programming language scripts in the Google Colaboratory or Jupyter Notebooks development environment to implement and provide organized representations of simulations in probability and statistical inference

- Implement, analyze, and debug Python program flow constructs, data structures, and functions including recursive algorithms as well as organize programs into Object-oriented-programming (OOP) frameworks
- Describe a data set including both categorical and quantitative variables to support or refute a statement
- Apply laws of probability to concrete problems in Machine Learning and Data Science
- Apply mathematical tools including calculus, linear algebra, and statistics in the description and development of Machine Learning models
- Write and test working Python programs from a generic problem statement through algorithm development, design and implementation, unit test, integration, and final test

If you are unclear about the outcomes for this course or their application, or if you would like more information about them, please reach out to me.

Course Materials

Required Materials. Lecture materials/videos will be posted in each module of course in Canvas. You will be expected to review the materials prior to attempting the assignments.

Course Schedule

Below, please find the schedule for course topics and assignments. These dates are an estimate to help you with your planning. Please note that this schedule is subject to change during the course.

Module	Topic	Assignment/project
1	<ul style="list-style-type: none"> ● Development Environment, ● Primitive data types 	Applications of Conditional Statements, Loops, Functions and Doctest
	<ul style="list-style-type: none"> ● Variables, Expressions ● Conditionals ● Functions (fruitful and void) 	
	<ul style="list-style-type: none"> ● Loops ● Doctest 	
2	<ul style="list-style-type: none"> ● Data structures <ul style="list-style-type: none"> ○ Lists ○ Dictionaries ○ Sets ○ Tuples ○ Stacks ○ Queues 	Applications of Lists, Dictionaries, Stacks, Queues Application of 2-D arrays - crossword puzzle creator
3	<ul style="list-style-type: none"> ● Recursion ● Advanced Python Functions ● 	Application of Recursion: Maze solver
4	<ul style="list-style-type: none"> ● Object Oriented Programming (OOP) 	Application of OOP - Card Deck implementation and Blackjack
5	<ul style="list-style-type: none"> ● Introduction to Python Data Analytics Libraries: Numpy, Pandas, Matplotlib 	Application of Machine Learning Libraries to pre-processing and data analytics

6	<ul style="list-style-type: none"> Statistics Introduction <ul style="list-style-type: none"> Displaying and Interpreting Data - 1 Displaying and Interpreting Data - 2 	Application of Data Interpretation
7	<ul style="list-style-type: none"> Linear Algebra <ul style="list-style-type: none"> Scalars, Vectors, Matrices, Tensors Introduction Special Vectors and Matrices Eigenvalue decomposition 	Application of Eigenanalysis - Eigenvalue decomposition
8	<ul style="list-style-type: none"> Calculus for Machine Learning <ul style="list-style-type: none"> Derivative Introduction Partial Derivatives Gradient Descent 	Application to Gradient Descent - Cost minimization techniques
9	<ul style="list-style-type: none"> Enrichment Projects <ul style="list-style-type: none"> Algorithm Development Web scraping Exploratory Data Analysis (EDA) 	Application of Web Scraping Application of EDA

There will be a final assessment at the end of the course. Please complete all the modules before attempting the assessment. There are no retakes.

Grading Policies

Letter grades are based on the [UC San Diego Extension Grading Scale](#). Your final course grade is based on the percentage of points you have earned.

Passing Grades		Non-Passing Grades	
A+	100%	D	60-69%
A	93-99%	F	59% and below
A-	90-92%		
B+	87-89%		
B	83-86%		
B-	80-82%		
C+	77-79%		
C	73-76%		
C-	70-72%		

All UC San Diego Extension students must follow the [UC San Diego Extension Academic Integrity Policy](#), which oversees all instances of academic misconduct, including but not limited to: plagiarizing, cheating on exams, allowing someone access to your online course, and improper or missing citations in coursework.

Weighted Grading Criteria

Your grade in this course will be weighted according to the following criteria.

Assignments/Projects	70%
Final Assessment	30%
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TOTAL	100%

You can check your grade in Canvas at any time by clicking 'Grades' in the course navigation menu.

Late Work Policy:

Please contact me as soon as possible to discuss any concerns regarding due dates.

UC San Diego Extension Policies and Resources

MyExtension

Your MyExtension account is your student records portal. Log into [MyExtension](#) to enroll in a course, drop a course, request verification of enrollment, request official transcripts and more.

Academic Policies and Procedures

Please refer to the [UC San Diego Extension Website](#) ([Student Resources](#) tab) for specific details about academic policies and procedures. Navigate to the [Grades](#) section for grade information.

Conduct Code

All UC San Diego Extension students are part of the UC San Diego community and are expected to follow University and UC-wide policies, including the [Student Conduct Code](#) and the [UC San Diego Principles of Community](#). Reports of alleged violations involving sex offenses, including sexual assault and sexual misconduct, will be handled under the policies and procedures set forth in the [University of California's Sexual Violence and Sexual Harassment Policy](#).

Emergencies on Campus

In the event of an emergency, information will be posted on the [UC San Diego Extension Website](#). Extension students must access the website to find out the status of the emergency situation. Email and or phone lines may not be accessible. Information will be updated online as the situation progresses and an ALL CLEAR will be posted on the website once the situation is resolved.

Services for Students with Disabilities

UC San Diego Extension is committed to providing equal access and an exceptional learning environment for all students. If you have any problems accessing course material, or if you anticipate or experience physical or academic barriers based on disability, we encourage you to contact our [Services for Students with Disabilities Office](#) to apply for reasonable accommodations. You can reach this office by email at unex-ssd@ucsd.edu or by calling (858) 822-1366.