

CSCI 3920: Advanced Programming with Java & Python



Department of Computer Science and Engineering
Course Syllabus – Fall, 2022



Instructor:	Javier Pastorino (website)	Class Days:	Mon & Wed
Email:	javier.pastorino@ucdenver.edu	Class Times:	12:30 – 1:45pm
Office:	LSC 320-E	Classroom:	LSC 844
Office Hours:	Tuesdays. Schedule appointment on Calendly .		

Course Description

Catalog Data

This course introduces the fundamental concepts to develop programs and projects using modern software engineering techniques and two different programming languages (Java and Python). It will cover and apply pattern design approaches, reusable components driven by everyday needs within many software developments, the relationships between object-oriented programming concepts and software design concepts. It will dig deeper into techniques to program single threaded applications as well as advanced techniques to construct concurrent and distributed applications.

Course Objectives

Designing and developing software has many aspects. Many of these aspects are best approached without a specific language in mind. The concepts behind most Software Engineering, Program Design, and Program Construction techniques are language independent.

The goal of this course is to introduce two new languages, one fully Object-Oriented and another one that follows either Procedural or Object-Oriented paradigms. This is done while engaging the students in advanced programming techniques like multithreading and concurrent programming as well as introducing Software Design practices.

Course Format

This course will be conducted in an in-person setting with two 75-minute sessions each week.

Prerequisites

This course requires **CSCI2421 – Data Structures & Program Design**.

Each student must sign the [Prerequisites Agreement Form](#) and [take the non-graded prerequisite assessment](#) to receive credit for any assessment. If this is not completed by Friday 5pm on the first week, the student will be administratively dropped from the course.

Prerequisites Agreement form and assessment will be available on Canvas

Learning Outcomes

Expected Knowledge at the Start of the Course:

Students are expected to understand the basic concepts of Object-Oriented Programming and the basic concepts behind Data Structures and Algorithms. Students are expected to understand the basic concepts of Program Construction.

Expected Knowledge Gained at the end of the Course:

Students are expected to understand

- Java Programming Concepts and Constructs,
- Python Programming Concepts and Constructs,
- multithreading and concurrency issues on parallel programs and
- the design of distributed multi-platform applications.

Student Outcomes

This course will address the following criteria:

- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

ABET Assessment Criteria:

- (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.
- (j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.
- (k) An ability to apply design and development principles in the construction of software systems of varying complexity.

Textbooks & Tools

We will use two textbooks for this course are:

- **How to program Java.** Early Objects. By P. Deitel and H. Deitel. Pearson. *ISBN 13: 978-0-13-474335-6.* (**Required**)
- **Intro to Python for Computer Science and Data Science.** 1st Edition. By P. Deitel and H. Deitel. Pearson. *ISBN 13: 978-0-13-540467-6.* (**Required**)

Additional readings, for deepening knowledge, may be announced during the course.

Required Tools

- A computer with a minimum of 8GB of RAM (16G recommended).
- You can use Windows, MacOS or Linux operating systems.
- Computer Labs can also be used.

Topics

- Introduction Java, Classes and Objects, Inheritance and Polymorphism.
- Introduction to Python, Classes, Libraries.
- Exception Handling.
- Data Structures and Algorithms: Collections, Lists and Dictionaries.
- **Multi-threading, Concurrency and Networking.**

Course Schedule:

CSCI 3920 - Fall 2022					
Week	Date	Topic	Readings	Assessment	
#1	Mon, Aug 22	Course Introduction	Additional Material		
	Wed, Aug 24	OO and DS Review			
#2	Mon, Aug 29	Introduction To Java	Java Chp. 1-5		
	Wed, Aug 31				
#3	Mon, Sep 05	Labor Day - No classes			
	Wed, Sep 07	Arrays and Exceptions	Java Chp. 7	Hwk 1 due. Java Basis	
#4	Mon, Sep 12	Classes a Deeper Look	Java Chp. 6 & 8		
	Wed, Sep 14	Lab #1: Arrays and Exceptions (Java)			
#5	Mon, Sep 19	Inheritance and Polymorphism	Java Chp. 9, 10 & 16	Quiz 1	
	Wed, Sep 21	Abstract Classes, Interfaces and Collections		Hwk 2 due. Polymorphism	
#6	Mon, Sep 26	Java FX	Java Chp. 12 & 13		
	Wed, Sep 28				
#7	Mon, Oct 03	Networking	Java Chp. 28		
	Wed, Oct 05	Lab #2: JavaFX & Collections (Java)		Hwk 3 due. Collections	
#8	Mon, Oct 10	Multi-Threading	Java Chp. 23		
	Wed, Oct 12				
#9	Mon, Oct 17	Introduction to Python & Functions	Python Chp. 1-4	Quiz 2	
	Wed, Oct 19	Lab #3: Networking and Multi-threading (Java)			
#10	Mon, Oct 24	List & Tuples	Python Chp. 5 7 6		
	Wed, Oct 26	Dictionaries and Sets		Hwk 4 due. Network & Multithreading.	
#11	Mon, Oct 31	Strings.	Python Chp. 8 & 9		
	Wed, Nov 02	Files and Exceptions		Hwk 5 due. Python Basis	
#12	Mon, Nov 07	Object Oriented in Python	Python Chp. 10		
	Wed, Nov 09	Lab #4: Data Structures (Python)		PA1 due. Java	
#13	Mon, Nov 14	Networking	Additional Material	Quiz 3	
	Wed, Nov 16	Multiprocessing		Hwk 6 due. Data Structures	
#14	Mon, Nov 21	Fall Break			
	Wed, Nov 23				
#15	Mon, Nov 28	Array-Oriented Programming - Numpy and Matplotlib	Python Chp. 7		
	Wed, Nov 30	Lab #5: Networking and Multi-Threading (Python)			
#16	Mon, Dec 05	Database-oriented Programming	Java Chp. 24	Quiz 4	
	Wed, Dec 07	Lab #6: Numpy and Databases (Python)		Hwk 7 due. Databases and Arrays. PA2 due. Python	
Finals	Mon, Dec 12	Finals Week			
	Wed, Dec 14				

The previous schedule is tentative, and it may change. Please, check the current one on Canvas.

Assessments

There will be four types of assessments in this course. Two will be completed individually, and two will require working on a team.

- **Homework:** are short to mid-size programming tasks that will assess the student's application of the materials presented in the previous weeks.
 - o **Homework will be automatically graded.** The student will have access to a platform to submit his/her homework. The system will test the submission and report back errors, if any, and the number of tests passed. The homework final grade will be computed as the ratio between passed tests and total number of tests.
 - o Each homework may be submitted to the testing tool as many times as needed to improve it.
 - o *It is recommended to start homework early, so issues can be discussed with TA/Instructors.*

- **Homework is to be completed individually.**
- No resubmission for homework is accepted after the deadline. *The lowest graded homework (one) will be dropped from the final grade.*
- **Quizzes:** are usually a set of multi-choice questions that will assess the student’s understanding of the materials presented in the previous weeks. **Quizzes are to be completed individually.**
- **Laboratories:** there will be six labs that will develop further the understanding of the materials.
 - Labs are designed to be completed in teams of two students, though students may opt to complete the lab individually. However, assigned tasks will be the same whether completed alone or in teams.
 - Attendance is compulsory to receive credits for the lab.
- **Programming Assignments:** there will be two programming assignments to be completed in teams of two or three students. These assignments will comprise a more complex programming task focusing on distributed and parallel processing.
- **There are no exams in this course.**

Grading Policy

- Assignments will be **submitted through Canvas** (unless noted) on the dates and times posted.
- Lab attendance is mandatory to receive grade for the lab. No exceptions.
- In general, there will be no make-up homework or quizzes, or extensions, though extraordinary circumstances should be discussed in advance with the instructor.
- The Final Grade will be distributed among the assessments following the table below.

Assessment Group	Grade
Homework	30%
Laboratories	30%
Programming Assignments	30%
Quizzes	10%

- Final Letter Grade will be converted using the following scale:

0	F	60	61	D-	63	64	D	66	67	D+	69	70	C-	73	74	C	76	77	C+	79	80	B-	83	84	B	86	87	B+	89	90	A-	93	94	A	100
---	---	----	----	----	----	----	---	----	----	----	----	----	----	----	----	---	----	----	----	----	----	----	----	----	---	----	----	----	----	----	----	----	----	---	-----

Communications

Class wide announcements will be posted on Canvas announcements. Make sure you have configured the notifications not to miss those. You can set email notifications or use the Canvas app in your mobile device with push notifications.

If you need to contact me, please **use email**, do not use Canvas messages. I usually reply to emails within 24-48 hours. My email is listed at the beginning of this document. Include **CSCI3920** in your subject for a quick response. However, to discuss exercises/problems, please schedule an

appointment during my office hours, as I will usually not be able to answer those questions over email.

Code of Conduct

Student expectations

- **Civility:** Our commitment is to create a climate for learning characterized by respect for each other and the contributions each person makes to class. Student should follow the same commitment.
- **Professionalism:** Since mobile devices can be a distraction during class, I ask that all devices be put into “silent” mode and not utilized during class; this include any notifications that you have in your devices while on a remote session.

Collaboration and Cheating

I encourage you to review material and discuss ideas together for projects and other assignments, and to work on problems you encounter. It is a characteristic of computing that discussions often help to clarify problems and resolve difficulties — feel free to take advantage of this to improve your understanding of the material, and to complete projects, but **make sure you then create your own work**. It’s important that you go through the program design, coding, and debugging processes yourself, or you will not be developing your own programming skills and understanding. “Working together” does not mean that one student does most of the work and other students put their names on it!

If you have any questions about what this means, please see me.

We reserve the right to use automated similarity metrics to detect plagiarism in this course.

All students must create their work on their own!

Any instances of cheating will result in a zero for the assignment, a grade of zero (an “F”) in the course, or sanctions determined by the college (including suspension and expulsion).

Please, do not share solutions (whole or partial) on public channels like Slack/Discord.

All students must follow the [College of Engineering, Design and Computing - Student Honor Code](#).

Mental Health Resources:

CU Denver faculty and staff understand the stress and pressure of college life. Students experiencing symptoms of anxiety, depression, substance use, loneliness or other issues affecting their mental well-being, have access to campus support services such as the [Student and Community Counseling Center](#), the [Wellness Center](#), and the [Office of Case Management](#). Students also have access to the [You@CUDenver](#) on-line well-being platform available 24/7. More information about mental health education and resources can be found at [Lynx Central](#) and CU Denver’s [Health & Wellness](#) page. Students in imminent crisis can contact [Colorado Crisis Services for immediate assistance](#) 24/7 or walk-in to the counseling center during regular business hours.

Last updated on Jul 31, 2022.