University of Oklahoma

Gallogly College of Engineering
School of Computer Science

CS3323: Principles of Programming Languages

Fall 2022

Instructor: Dr. Richard Veras

Course Format: Hybrid

Time: 11:30 AM – 12:20AM Monday, Wednesday and Friday

Location: Carson Engineering Center, Room 0117

Exam: 12/12/2022 Monday 1:30PM-3:30PM

Office Hours: 10:30AM-11:30AM Tuesday and Thursday

Office Hours Location: Devon Energy Hall, Room 210-C (Tentative)

Teaching Assistant: Egawati "Ega" Panjei

Learning Management System/website: canvas.ou.edu

Course Prerequisite: CS 2413, and CS 2813/MATH 2513, and ENGL 3153/BC 2813/ENGR 2002.

Course Description:

An introduction to theoretical foundations and paradigms of programming languages. Topics include basic concepts such as lexical analysis, syntax analysis, type systems and semantics, some practical issues such as memory management and exception handling, and programming paradigms such as imperative programming, object-oriented programming, functional programming and scripting.

Lectures will be a mix of traditional lectures, in-class lab time, class discussions, videos and other activities. Participation is required to get the most out of the class. Class projects/labs/assignments will require the design and implementation of complex software systems. A UNIX family operating system will be used along with the GNU Toolchain for most assignments.

Course Goals:

This course is meant to provide an experience for the students to view programming as a goal-oriented process. A major component of this course will be learning from one another through challenging open-ended team assignments. Here students will be challenged to think creatively to synthesize potential solutions, devise testing strategies and integrate these solution into their implementations.

Learning Management System:

We will use the Canvas learning system. This course website can be reached through canvas.ou.edu. Please check this system regularly to keep informed on all announcements, updates, and changes.

ABET Student Outcomes: By the end of the semester, the students will have:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Learning Outcomes: By the end of the semester, the students will be able to apply computer science theory and software development fundamentals to produce computing-based solutions. For more information, see http://www.abet.org.

Texts and Materials:
The required text is "Crafting Interpreters." Robert Nystrom. 978-0990582939. This is a free text and can be obtained here: https://craftinginterpreters.com/contents.html

There are quite a few recommended books that go into further detail for those who are interested. Use https://www.bookfinder.com/ to find reasonable secondhand prices for these texts.

- "Engineering a Compiler." Keith D. Cooper and Linda Torczon. Morgan Kaufmann. 978-0120884780.
- "Compilers: Principles, Techniques, and Tools." Alfred Aho, Ravi Sethi, Jeffrey Ullman, Monica S. Lam. Pearson Publisher. 978-0321486813.
- "Essentials of Programming Languages." Daniel Friedman, Mitchell Wand. 978-0262062794.

Computer Accounts and Software

All students enrolled in class should also have a CS account and access to a Linux-based systems in the CS department. For most computer science students, an account will be automatically created. All code written for this course MUST run using the compilers or interpreters that will be specified for the assignments. It is your responsibility to ensure that your code runs on these systems. For compatibility reasons, we recommend developing and testing on a Linux-based machine.

Teaching Philosophy & Inclusion Statement:

This course revolves heavily around group assignments to encourage peer learning. Your peers will continue to be your peers beyond graduation. It is my goal to create an inclusive classroom that encourages the strengthening of the bonds between you and your peers.

Learning Activities, Assignments, and Assessment:
The work in this course will be divided into several components including: programming assignments, reading assignments, group programming assignments, exams, and participation activities.

Programming assignments will be individual coding challenges covering – or preparing for -- the material in class. Similarly, reading assignments will be written assignments or in-class quizzes covering material in the book. Homeworks and readings will be in support of the labs and exams.

Group Lab/Projects will be opportunities to combine the knowledge gained from the readings and homework assignments to synthesize a deliverable. Team members will be randomized for each programming assignment and will be graded on mastery of material, team effort and individual participation.

A midterm and a final exam will cover the material in the lectures and assignments to assess your understanding of the content.

Participation points will be awarded to activities that are in support of your peers' education in the course. A running list of activities and opportunities will be made available. This will include (but not be limited to) activities such as being a peer grader for an assignment, creating written/video/in-person tutorials on tools/topics/problems/readings, or similar activities negotiated beforehand.

Assigning Grades:

- Reading Assignments: 10%
- Programming Assignments: 20%
- Participation: 10%
- Projects/Labs: 40%
- Midterm: 10%
- Final: 10%

Grading Scale:

The letter grade thresholds will be no higher than the following; they may be lower at the discretion of the instructors. For example, an 89.99 is a B.

Grade	Points
A	>90
B	80-89
C	70-79
D	60-69
F	<60

Tentative Schedule (Subject to change)

This is a tentative schedule and will be adjusted throughout the semester to best fit the class.

Week	Chapter #	Chapter title
1		Preliminaries
1		Preliminaries
1	1	Introduction
2	2	Map of the Territory
2		
2	3	The Lox Language
3	4	Scanning
3		
3	5	Representing Code
4	6	Parsing Expressions
4		
4	7	Evaluating Expressions
5	8	Statements and State
5		
5	9	Control Flow
6	10	Functions
6		
6	11	Resolving and Binding
7	12	Classes
7		
7	13	Inheritance
8	14	Chunks of Bytecode
8		**Midterms**
8	15	A Virtual Machine
9	16	Scanning on Demand
9		
9	17	Compiling Expressions
10	18	Types of Values
10		
10	19	Strings
11	20	Hash Tables
11		
11	21	Global Variables
12	22	Local Variables
12		
12	23	Jumping Back and Forth
13	24	Calls and Functions
13		

13	25	Closures
14	26	Garbage Collection
14		**Thanksgiving**
14		**Thanksgiving**
15	27	Classes and Instances
15		
15	28	Methods and Initializers
16	29	Superclasess
16		
16	30	Optimization
17		**Exam Day**

Course Policies

Absences

You are expected to attend class and actively participate in the exercises and discussions. In cases of sickness, and quarantine alert you instructor before the class period (email) and we will discuss alternative arrangements.

Late Assignments

Except in the cases of sickness or provost approved activities, late work will not be accepted.

University Masking Guidelines: The university encourages masking indoors. The university strongly encourages masking for all individuals in high-density settings, such as classrooms and at special events.

Land Acknowledgement Statement Provided by OU's Tribal Liaison office:
Long before the University of Oklahoma was established, the land on which the University now resides was the traditional home of the "Hasinais" Caddo Nation and "Kirikirʔi:s" Wichita & Affiliated Tribes.

We acknowledge this territory once also served as a hunting ground, trade exchange point, and migration route for the Apache, Comanche, Kiowa and Osage nations. Today, 39 tribal nations dwell in the state of Oklahoma as a result of settler and colonial policies that were designed to assimilate Native people. The University of Oklahoma recognizes the historical connection our university has with its indigenous community. We acknowledge, honor and respect the diverse Indigenous peoples connected to this land. We fully recognize, support and advocate for the sovereign rights of all of Oklahoma's 39 tribal nations. This acknowledgement is aligned with our university's core value of creating a diverse and inclusive community. It is an institutional responsibility to recognize and acknowledge the people, culture and history that make up our entire OU Community.

Expectations for Academic Integrity:

Cheating is prohibited at the University of Oklahoma, because it devalues the degree you are working hard to get. As a member of the OU community, it is your responsibility to protect your educational

investment by knowing and following the rules. For specific definitions on what constitutes cheating, review the Student's Guide to Academic Integrity at: http://integrity.ou.edu/students_guide.html

To be successful in this class, all work on exams, quizzes and homework must be yours and yours alone. You may not receive outside help. Be aware that it is my professional obligation to report academic misconduct, which I will not hesitate to do. Sanctions for academic misconduct can include expulsion from the University and an F in this course, so do not cheat. It is simply not worth it.

University Policies

Copyright Syllabus Statement:

Sessions of this course may be recorded or live-streamed. These recordings are the intellectual property of the individual faculty member and may not be shared or reproduced without the explicit, written consent of the faculty member. In addition, privacy rights of others such as students, guest lecturers, and providers of copyrighted material displayed in the recording may be of concern. Students may not share any course recordings with individuals not enrolled in the class or upload them to any other online environment.

Religious Observance

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.

Reasonable Accommodation Policy

Students requiring academic accommodation should contact the Accessibility and Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information please visit http://www.ou.edu/drc/home.html. Any student in this course who has a disability that may prevent them from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

Title IX Resources and Reporting Requirement

For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, the University offers a variety of resources. To learn more or to report an incident, please contact the Sexual Misconduct Office at 405/325-2215 (8 to 5, M-F) or smo@ou.edu. Incidents can also be reported confidentially to OU Advocates at 405/615-0013 (phones are answered 24 hours a day, 7 days a week). Also, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. Inquiries regarding non-discrimination policies can be directed to University Equal Opportunity Officer and Title IX Coordinator at 405/325-3546 or smo@ou.edu . For more information, visit http://www.ou.edu/eoo.html.

Adjustments for Pregnancy/Childbirth Related Issues
Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact your professor or the Disability Resource Center at 405/325-3852 as soon as possible. Also, see http://www.ou.edu/eoo/faqs/pregnancy-faqs.html for answers to commonly asked questions.

Emergency Protocol
During an emergency, there are official university procedures that will maximize your safety.

Severe Weather: If you receive an OU Alert to seek refuge or hear a tornado siren that signals severe weather *1. LOOK* for severe weather refuge location maps located inside most OU buildings near the entrances *2. SEEK* refuge inside a building. Do not leave one building to seek shelter in another building that you deem safer. If outside, get into the nearest building. *3. GO* to the building's severe weather refuge location. If you do not know where that is, go to the lowest level possible and seek refuge in an innermost room. Avoid outside doors and windows. *4.* GET IN, GET DOWN, COVER UP. 5. *WAIT* for official notice to resume normal activities.

Link to Severe Weather Refuge Areas , Severe Weather Preparedness - Video

Armed Subject/Campus Intruder:

If you receive an OU Alert to shelter-in-place due to an active shooter or armed intruder situation or you hear what you perceive to be gunshots:

1. GET OUT: If you believe you can get out of the area WITHOUT encountering the armed individual, move quickly towards the nearest building exit, move away from the building, and call 911. *2. HIDE OUT*: If you cannot flee, move to an area that can be locked or barricaded, turn off lights, silence devices, spread out, and formulate a plan of attack if the shooter enters the room. *3. TAKE OUT*: As a last resort fight to defend yourself.

For more information, visit http://www.ou.edu/emergencypreparedness.html

Shots Fired on Campus Procedure - Video

Fire Alarm/General Emergency:

If you receive an OU Alert that there is danger inside or near the building, or the fire alarm inside the building activates: *1. LEAVE* the building. Do not use the elevators. *2. KNOW* at least two building exits *3. ASSIST* those that may need help *4. PROCEED* to the emergency assembly area *5 ONCE safely outside, NOTIFY first responders of anyone that may still be inside building due to mobility issues. 6. WAIT* for official notice before attempting to re-enter the building.

OU Fire Safety on Campus

Mental Health Support Services:

If you are experiencing any mental health issues that are impacting your academic performance, counseling is available at the University Counseling Center (UCC). The Center is located on the second floor of the Goddard Health Center, at 620 Elm Rm. 201, Norman, OK 73019. To schedule an appointment call (405) 325-2911. For more information please visit http://www.ou.edu/ucc.