CS108L Computer Science for All

Instructors:

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Course Website: https://cs4all.cs.unm.edu/cs108
Coursework Turn-in: learn.unm.edu

Course Description:

CS108L — Computer Science for All is an introduction to Computational Science and Modeling. As a hybrid course, a significant part of the course content is on-line. This hybrid course uses a style of pedagogy called a "flipped classroom". That is, most content (i.e. the lectures) is delivered during out-of-class times via videos and reading materials which are expected to be reviewed by the deadlines given on the class website. While in-class time is used for hands-on activities, project work, questions and other interactive learning. Students are also encouraged to visit instructors during their office hours.

Goals: Students will gain experience not only in computer science and programming but also in designing, building, testing, debugging, and running experiments with computer models. Students will develop computational thinking skills and learn about complex adaptive systems.

Credit: The course is offered to both College and High School students. UNM students who successfully complete the class receive 3 UNM credits. High school students who successfully complete the class receive 1 high school credit and 3 UNM college credits. This course is listed as a Natural and Physical Science Core Course (Area 3). Therefore all high school and college students who earn a C or better in CS108 will have the 3 course credits apply toward the UNM Science Core.

Recommended Supplies:

1. Internet access
2. USB Flash Drive
3. Home or campus computer access

* In this course, students will create original computer programs using an agent-based modeling environment and programming language called NetLogo. NetLogo runs on Windows, Mac, and Linux operating systems. NetLogo is open source and free to use. *

Grading:

The CS108L class consists of a total of 17 weeks. There are 8 modules, each of which includes a programming assignment and a set of materials to read or watch online. The final 8th module is a longer programming assignment that is more self-directed. A student's grade is determined by the percent of available points achieved. The following is an approximate list of points; any changes in points or assignments will be based on class needs and communicated clearly.

Item	Description	Pts (ea.)	No.	Total
1-Week Assignments	Programming assignment due in 1 week	20	3	60
2-Week Assignments	Programming assignment due in 2 weeks	40	4	160
Final Project	Programming assignment	80	1	80
Quizzes	Multiple choice in class quiz, closed book	10	5	50
Review Quizzes	Multiple choice, retake able quiz, UNM Learn	5	5	25
Midterm Exam	Given in class, multiple choice and program	100	1	100
Final Exam	During finals week, multiple choice and program	100	1	100
Participation	Engagement during activities in class	100	V	100
Total points earnable--				675

Letter Grade Score Ranges	
Numerical Score	**Letter Grade**
>= 100%	A+
93% – <100%	A
90% – <93%	A-
87% – <90%	B+
83% – <87%	B
80% – <83%	B-
77% – <80%	C+

Letter Grade Score Ranges	
Numerical Score	**Letter Grade**
73% – <77%	C
70% – <73%	C-
67% – <70%	D+
63% – <67%	D
60% - <63%	D-
<60%	F

Late Assignments:

There are times when unexpected circumstances occur, to account for this you have 3 free late days in the semester that you may use without penalty on any assignments but the final project. We recommend you only use these for the unexpected emergencies. After they are used, you will be penalized 10% for each subsequent late day up to 2 days late. After 2 days late, assignments will only be accepted with instructor permission for genuine emergencies. If you are struggling with an assignment, use the available office hours and email questions early. Do not wait to the last minute to resolve issues.

Course Schedule (tentative):

Module 1 (Weeks 1&2): Introduction to NetLogo

Learning Outcomes: Define the 3 A's of computational thinking, decomposition in programming, statements and expressions in Netlogo, and colors (RGB and Netlogo Index). Know the key words for writing procedures. Write code in Netlogo using basic statements and expressions to make turtles move, draw lines and change colors.

Module 2 (Week 3): Introduction to Abstraction

Learning Outcomes: Define abstraction, local variables, loop and iteration, complex systems and pair programming. Write code in Netlogo that can create basic geometric shapes.

Module 3 (Week 4): Introduction to Modeling

Learning Outcomes: Define computer model, global variables, diffusion, agents, random and 'wiggle' walks and Netlogo sliders. Create basic graphs of data. Write code in Netlogo that creates a basic diffusion model utilizing global variables and adjustable walks with the slider control.

Module 4 (Week 5): Boolean Logic

Learning Outcomes: Define Boolean logic, Netlogo patches, conditional statements. Write code that enables an agent to interact with its environment using Boolean logic and conditional statements.

Module 5 (Weeks 6&7): Variables, Scope and Running Experiments with Computer Models

Learning Outcomes: Define scope and its relationship with variables in Netlogo, breeds and shape in Netlogo. Add charts, input and output interfaces to a Netlogo GUI and associate variables to them. Write code that creates breeds, changes turtle shapes and creates new turtles as the program runs. Analyze multiple variable settings and find appropriate values to establish an equilibrium state in an environmental model.

Midterm Week (Week 8): Review (Monday)
Midterm Exam (Wednesday)
Break!

Module 6 (Week 9&10): Algorithms

Learning Outcomes: Define an algorithm, repeat loop, while loop, Netlogo agentset and list. List and differentiate between different types of sorting algorithms. Write code that enables an agent(s) to repeat actions until a specific condition or iteration is met.

Module 7 (Weeks 11&12): Epidemic Modeling
Learning Outcomes: Define epidemiology, artificial life and agent-agent interaction. Write a computer model that simulates the spread of a disease in a population. Follow the scientific method including posing a question, forming a hypothesis and collect data to test that hypothesis.

Module 8 (Weeks 13-16): Final Project
Learning Outcomes: Follow a multilevel project plan, observing project design goals by reaching milestones on time and returning a finished project that demonstrates the specified functionality of the given model.

Final Exam Review (Wednesday, last week): In-class review
Final Exam: Per the UNM final exam schedule in our regular classroom

Course Policies:
Assignments:
1. All assignments specify what format (file type) is to be submitted. Work in any other format will not be graded.
2. All programs require the name of **ALL** authors at the top of the code tab in comments. If an author's name is missing, they will not receive credit.
3. You must use comments to initialize each procedure you authored. When working in pairs it is expected both students have substantial contributions.
4. Instructors have the right to drop students who fail to turn in at least 2 assignments or do not show up to class at any time throughout the semester.

UNM Policies:
Attendance Policy: Regular and punctual attendance is required. UNM *Pathfinder* (the UNM Student Handbook http://pathfinder.unm.edu/) policies apply, which in part means the instructor may drop students based on non-attendance. This policy applies regardless of the grading option you have chosen.

Accommodation Statement: Accessibility Resources Center (Mesa Vista Hall 2021, 277-3506) provides academic support to students who have disabilities. If you think you need alternative accessible formats for undertaking and completing coursework, you should contact this service right away to assure your needs are met in a timely manner. If you need local assistance in contacting the Accessibility Resources Center, see the see the Bachelor and Graduate Programs office.

Academic Integrity: The University of New Mexico believes that academic honesty is a foundational principle for personal and academic development. All University policies regarding academic honesty apply to this course. Academic dishonesty includes, but is not limited to, cheating or copying, plagiarism (claiming credit for the words or works of another from any type of source such as print, Internet or electronic database, or failing to cite the source), fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Note that plagiarism may be either deliberate or unwitting, it is the student's responsibility to know what

constitutes plagiarism (link to UNM plagiarism rules: https://grad.unm.edu/aire/aire-docs/plagiarism-guidelines.pdf). The University's full statement on academic honesty and the consequences for failure to comply is available in the college catalog and in the *Pathfinder*.

Specifically, in this course, you may discuss assignments with your classmates, but we will scan assignments for plagiarized code. Assignments completed in collaboration should always identify who contributed to the assignment. You may never type in another student's program without being cited as a collaborator. If you are unsure about whether something violates the Academic Integrity policy, it is your responsibility to ask an instructor. We will pursue the strongest penalties available for students violating the principles of academic integrity.

Cell Phones and Technology: As a matter of courtesy, please turn off cell phones, pagers, and other communication and entertainment devices prior to the beginning of class. Notify the instructor in advance if you are monitoring an emergency. Computers should be used during class to work on class material, and nothing else.

Chemical sensitivity: The University of New Mexico supports sustaining healthy indoor air quality. In the interest of promoting the health and safety of the University, we are requesting this class to be a perfume-free environment. Some individuals at UNM have been identified as having Multiple Chemical Sensitivity, listed under the American Disabilities Act as a physical disability. Individuals with this diagnosis are sensitive to many products that we wear each day. Please refrain from using perfume-scented personal care, laundry, and cleaning products. Thank you for your consideration of others in providing an environment in which every person on campus can feel safe and comfortable.

A Note About Sexual Violence and Sexual Misconduct: As UNM faculty members and instructors, we are required to inform the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu) of any report we receive of gender discrimination which includes sexual harassment, sexual misconduct, and/or sexual violence. To talk with someone anonymously, contact LoboRESPECT (link below). You can read the full campus policy regarding sexual misconduct at https://policy.unm.edu/university-policies/2000/2740.html. If you have experienced sexual violence or sexual misconduct, please ask a faculty or staff member for help or contact the LoboRESPECT Advocacy Center online: loborespect.unm.edu, by phone: (505) 277-2911, or by email: loborespect@unm.edu.

Work Hard. Be Nice*: UNM has established policies to encourage a respectful and supportive learning environment for all students. There are specific policies in the *Pathfinder* regarding, for example, student grievances, code of conduct, sexual harassment, and discrimination. All UNM policies apply in this class. Additionally, we expect all students and instructors to be respectful of one another, an attitude captured by the *motto of the KIPP charter schools: Work Hard. Be Nice. Within that context we also encourage you to Be Creative. Have Fun.