

Course Name: Discrete Structures in Computer Science

Course Number: CS 225

Credits: 4

Prereqs: MTH 112

Instructor name: Samina Ehsan

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Course Description

The subjects covered in this course include formal approach to the logic of Computer Science, including set theory, methods of proof, sequences, recurrence relations, combinatorics and graph theory.

Topics covered in the course include:

- Logic Expressions
- Sets, Sequences and Summations
- Non-Inductive Proof Techniques
- Inductive Proofs
- Recursive Definitions
- Combinatorics
- Graphs

Course Credits

This course combines approximately 120 hours of instruction, online activities, and assignments for 4 credits.

Course Tools

This course will be conducted via Canvas, Piazza and Slack.

- Within the course Canvas site you will access the learning materials, and syllabus; submit assignments, take quizzes/exams, get announcements from the instructor and receive your grades. To preview how an online course works, visit the Ecampus Course Demo. For technical assistance, Canvas and otherwise, see http://ecampus.oregonstate.edu/services/technical-help.htm.
- Piazza site will be used as your online collaboration medium. You will be able to communicate with the instructor, TA/ULAs and your peers via Piazza.
- Slack will be the primary mode of conducting office hours by the Instructor and TA/ULAs unless specified. At the beginning and end of each office hour session (whether or not it is held using Slack), the TA/ULA would put up a message on the Slack channel informing so.

Measurable Student Learning Outcomes

At the completion of the course, students will be able to …

1. Construct and interpret propositions expressed using logic expressions.
2. Demonstrate an understanding of predicate calculus
3. Determine the correctness of and construct non-inductive proofs.
4. Determine the correctness of and construct inductive proofs.
5. Define properties of and operations on sets and sequences.
6. Construct recursive definitions of functions, sets, and strings.
7. Apply basic counting arguments on combinatorial objects.
8. Define and prove properties of graphs.
9. Use at least one algorithm for finding the shortest distance between any two points on the graph.

Course Content

Week	Topic	Reading Assignments	Learning Activities
1	Propositional Logic (CLO #1)	Chapter 2: Section – 2.1 Logical Form and Logical Equivalence Chapter 2: Section – 2.2 Conditional Statements	Practice Activities Syllabus Quiz Homework
2	Predicate Logic & Sequences & Summations (CLO #2 & #5)	Chapter 3: Section -(3.1 to 3.2) Predicates and Quantified Statements Chapter 5: Section - (5.1 to 5.2) Sequences and Summations	Practice Activities Quiz Canvas Discussion Homework
3	Direct & Indirect Proof Methods (CLO #3)	Chapter 4: Section – (4.1 to 4.5) Direct Proof and Counterexample Chapter 4: Section – 4.7 Indirect Argument: Contraposition Chapter 4: Section – (4.7 to 4.8) Indirect Argument: Contradiction	Practice Activities Quiz Homework
4	Set Theory (CLO #5)	Chapter 6: Section - 6.1 Set Theory: Definitions and Element Method of Proof Chapter 6: Section – (6.2 to 6.3) Properties of Sets and Disproofs, Algebraic Proofs	Practice Activities Quiz Canvas Discussion Homework
5	Proof By Induction (CLO #4)	Chapter 5: Section - (5.2 to 5.3) Mathematical Induction: Weak Induction Chapter 5: Section - 5.4 Strong Mathematical Induction	Practice Activities Quiz Homework
6	Recursion (CLO #6)	Chapter 5: (Section - 5.6, 5.7, and 5.9) Recursive Definitions	Practice Activities Canvas Quiz Homework
7	Counting (CLO #7)	Chapter 9: Section-(9.2 to 9.3) Basic Counting Rules: Multiplication and Addition Rule Chapter 9: Section-9.4 The Pigeonhole	Practice Activities Homework
8	Counting (CLO #7)	Chapter 9: Section- (9.2 and 9.5) Permutations and Combinations Chapter 9: Section - 9.6 Combinations with Repetition Allowed	Practice Activities Quiz Canvas Discussion Homework

Week	Topic	Reading Assignments	Learning Activities
9	Graphs (CLO #8)	Chapter 1: Section-1.4 The Language of Graphs Chapter 4: Section 4.9 Application: The Handshake Theorem Chapter 10: Section-10.1 Connectedness: Trails, Paths and Circuits	Practice Activities Quiz Homework
10	Graphs (CLO #9)	Chapter 10: Section -10.6 Spanning Trees and a Shortest Path Algorithm	Practice Activities Canvas Discussion Homework
Final Week	(CLO #3-9)		Final Quiz

Learning Resources

Text books:

- Discrete Mathematics with Applications (5th Edition), Susanna S. Epp, ISBN: Hard-Cover Textbook- 978-1337694193 or Loose-Leaf Textbook- 978-0357097724(Required)
- Discrete Mathematics and Its Applications (7th Edition), Kenneth Rosen, ISBN: 978-0073383095 (Optional)

Note to prospective students: Please check with the OSU Beaver Store for up-to-date information for the term you enroll (OSU Beaver Store website or 800-595-0357). If you purchase course materials from other sources, be very careful to obtain the correct ISBN.

Evaluation of Student Performance

Scores for quizzes, assignments, and discussion grade will be posted on Canvas. If you want to know your grade, use the following weights:

- Homework assignments 30%
- Weekly Quizzes 30%
- Final Quiz 20%
- Canvas Discussions 20%

Homework Assignments (30%)

There are homework assignments each week to be completed over the course of this class.

- Assignments include writing written answers to questions. There will be homework assignments due by the end of each week. Include a comment at the top of all of your assignments that contains your name, the homework number and the list of questions.
- Assignments should be submitted in .pdf format. You can submit scanned handwritten answers saved in .pdf format.
- Assignments are to be turned in before 23:59 on the date they are due. The late assignment must be submitted no more than 48 hours after the original deadline. This means that if an assignment is due on Oct 1 at 23:59, you may turn it in as late as Oct 3 at 23:59 (with 15% penalty for each 24 hours).
- You will turn in your assignments through the Canvas website.

Quizzes (30%)

There will be (1 syllabus + 7 weekly) quizzes to be completed over the course of this class. The best 6 quizzes out of 7 weekly quizzes will be counted.

- The quizzes are timed, closed-book, closed-notes, non-proctored exams. Please be informed that multiple attempts of the quizzes are not allowed. So, take the quiz right away even if you open the quiz accidentally.
- The quizzes will be conducted via Canvas. Each quiz will be 110 - 130 minutes long.
- No late submission will be graded. Please plan to take and submit the quiz before the deadline. And most importantly please don't make any request for quiz deadline extensions (exceptions may be made for documented emergencies, e.g. hospitalization).
- When taking the quiz, you are highly recommended to use an external text editor to write down the answers involving symbols, equations, and tables. On each quiz, there will an option to upload your work in a separate .pdf file at the end.
- No handwritten or scanned submissions will be allowed in the quizzes. You must get used to working with Canvas and an external text editor software before you start taking the quizzes. You can use tablets for taking the quizzes.

Final Quiz (20%)

The final quiz is given in **week 10**. It will have a similar set up as the weekly quizzes. You will get 150 minutes to finish this quiz. You will be given a 4 or 5 days long time window to take this quiz. No extension will be allowed outside the assigned window. Please check the actual dates for the final quiz provided in the weekly schedule document.

Canvas Discussions (20%)

- There are 5 total graded bi-weekly discussions to be participated over the course of this class.
- You will find the discussion instructions available on Canvas. Your participation will be graded on individual basis. The discussions are graded primarily based on participation and effort, rather than correctness. If you have made a reasonable effort you will receive full credit for it.
- No late submission will be graded. Please plan to participate in the discussion assigned for the particular weeks before the deadline (you will find the deadlines in the weekly schedule document). And it should not take more than one hour to complete this graded assignment.

****** If you have a problem with an assignment, quiz or discussion grade, you must contact the teaching assistant, who graded your assignment, or the instructor through EMAIL within **ONE WEEK** of receiving your grade.

Letter Grade

We will use the following grading scheme to calculate the final grade:

Grade
100 >= A >= 92.5
92.5 > A- >= 89.5
89.5 > B+ >= 86.5
86.5 > B >= 82.5
82.5 > B- >= 79.5
79.5 > C+ >= 76.5
76.5 > C > 72.5
72.5 > C- >= 69.5
69.5 > D+ >= 66.5
66.5 > D >= 62.5
62.5 > D- >= 59.5
59.5 > F

* REMINDER: A passing grade for core classes in CS is a C or above. A C-, below 72.5, is not a passing grade for CS majors.
* Final grades will not be curved.

Course Policies

Incompletes

In this online program, there should rarely be a case where an incomplete is appropriate. I will only consider giving an incomplete grade for emergency cases such as a death in the family, major disease, or child birth, while also having completed at least 50% of all coursework. If you have a situation that may prevent you from completing the coursework, let me know as soon as you can.

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval, please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**** Urgent: If you have any emergency medical information let me know before the end of the first week of classes. If you have any personal difficulties that are not registered disabilities, then contact me so we can discuss your options.**

Accessibility of Course Materials

All materials used in this course are accessible. If you require accommodations please contact Disability Access Services (DAS).

Additionally, Canvas, the learning management system through which this course is offered, provides a vendor statement certifying how the platform is accessible to students with disabilities.

Expectations for Student Conduct

Student conduct is governed by the university's policies, as explained in the Student Conduct Code.

Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility. Students will be expected to treat all others with the same respect as they would want afforded themselves. Disrespectful behavior to others (such as harassing behavior, personal insults, and inappropriate language) or disruptive behaviors in the course (such as persistent and unreasonable demands for time and attention both in and out of the classroom) is unacceptable and can result in sanctions as defined by Oregon Administrative Rules Division 015 Student Conduct Regulations. (Adapted from statements provided by Becky Warner, SOC)

In an academic community, students, faculty, and staff each have responsibility for maintaining an appropriate learning environment, whether online or in the classroom. Students, faculty, and staff have the responsibility to treat each other with understanding, dignity and respect. Disruption of teaching, administration, research, and other institutional activities is prohibited by Oregon Administrative Rule 576-015-0015 (1) and (2) and is subject to sanctions under university policies, OSU Office of Student Conduct.

Academic Integrity

The following two policies apply:

OSU Policy (https://studentlife.oregonstate.edu/files/code-of-student-conduct-102218.pdf)

College of Engineering Policy (http://engineering.oregonstate.edu/undergraduate-policy-manual#honesty)

- You **MAY** discuss the meaning of assignments, general approaches, and strategies with other students in the course.
- You **MAY** show your work to the TAs or instructor for feedback and help.
- You **MAY** use the Internet to research how to solve a problem.
- You **MUST** include a citation in the form of a comment in your homework to indicate the source of any help you received (listing TAs, the instructor, or the required textbook are not necessary).
- You **MUST ALSO** include a citation if you collaborated with any other student in any way (both the giver and receiver).

- You **MAY NOT** share work documentation of any kind with any other student in the course.
- You **MAY NOT** show your work to another student in the course for any reason.
- You **MAY NOT** use or copy work from any other source, including the Internet.
- You **MUST** write your own work for your assignments.

If you are found in violation of any of the above policies, whether you are the giver or receiver of help, you will receive a zero on the assignment or fail the course (Instructor's discretion). The academic dishonesty charge will be documented and sent to your school's dean and the Office of Student Conduct. The first offense results in a warning; the second offense results in an academic dishonesty charge on your transcript, a disciplinary hearing, and possible expulsion.

Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit Student Conduct and Community Standards, or contact the office of Student Conduct and Mediation at 541-737-3656.

OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:

a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.
b) It includes:
    i) CHEATING - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.
    ii) FABRICATION - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.
    iii) ASSISTING - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).

iv) TAMPERING - altering or interfering with evaluation instruments or documents.

v) PLAGIARISM - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.

c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

Communication

Please post all course-related questions in the Piazza Forum so that the whole class may benefit from our conversation. Please contact me privately for matters of a personal nature. I will reply to course-related questions within 24 hours. I will strive to return your assignments and grades for course activities to you within five days of the due date.

Ground Rules for Online Communication & Participation:

- *Online threaded discussions* are public messages, and all writings in this area will be viewable by the entire class or assigned group members. If you prefer that only the instructor sees your communication, send it to me by email, and be sure to identify yourself and the class.
- Posting of personal contact information is discouraged (e.g. telephone numbers, address, personal website address).
- *Observation of "Netiquette"*: All your online communications need to be composed with fairness, honesty and tact. Spelling and grammar are very important in an online course. What you put into an online course reflects on your level of professionalism. Here are a couple of references that discuss
    - netiquette (http://www.albion.com/netiquette/corerules.html)
- Please check the Announcements area, Piazza and the course syllabus before you ask general course "housekeeping" questions (i.e. how do I submit assignment 3?). If you don't see your answer there, then please contact me.

(Adapted from Jean Mandernach, PSY)

Guidelines for a Productive and Effective Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university's regulations regarding civility. Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

- Piazza and Slack are your spaces to interact with your colleagues related to current topics or responses to your peers' statements. It is expected that each student will participate in a mature and respectful fashion.
- Participate actively in the discussions, having completed the readings and thought about the issues.
- Pay close attention to what your classmates write in their online comments. Ask clarifying questions, when appropriate. These questions are meant to probe and shed new light, not to minimize or devalue comments.
- Think through and reread your comments before you post them.
- Assume the best of others in the class and expect the best from them.
- Value the diversity of the class. Recognize and value the experiences, abilities, and knowledge each person brings to class.
- Disagree with ideas, but do not make personal attacks. Do not demean or embarrass others. Do not make sexist, racist, homophobic, or victim-blaming comments at all.
- Be open to be challenged or confronted on your ideas or prejudices.

(Adapted from a statement provided by Susan Shaw, WS)

Contacting the instructor and ULAs

- Piazza is the best way to reach the instructor and TAs for any course related queries. We can refer back to our previous discussions here and also as it will be visible to the entire class. So, the other students will be able to get benefit from it. Not all posts require a reply from the instructor/ULA and often it is better for students to hash out an answer to a question. But inform the instructor if you do not get a reply within 24 hours.
- Sending email to the Instructor (ehsans@onid.oregonstate.edu) is the preferred way to only for matters of a personal nature related to the course (please include the prefix CS-225_40X_Term Name in the subject) or if you have not received a reply to your post on Piazza. If needed, Slack for discussion can be used. Please resend the email if the instructor does not respond within 24 hours.
- We will have constant ULA support, so it should be possible to get office hour help throughout the term. You will find the contact information of the Instructor and TAs on Canvas and Piazza.
- We will maintain virtual office hours using Slack/Zoom. At the beginning and end of each office hour session, the ULA would put up a message on the Slack channel(#office_hours) informing so.
- The ULAs and myself try the best we can to monitor Canvas email. But there are less options to sort and filter mail via that system so there is a much higher likely-hood that we will miss things that get sent via Canvas mail. So, I strongly recommend that you do not use it.

Technical Assistance

If you experience any errors or problems while in your online course, contact 24-7 Canvas Support through the Help link within Canvas. If you experience computer difficulties, need help downloading a browser or plug-in, or need assistance logging into a course, contact the IS Service Desk for assistance. You can call (541) 737-8787, email osuhelpdesk, or visit the IS Service Desk online.

Tutoring and Writing Assistance

- Online Tutoring - NetTutor. Access NetTutor from the course menu in your Canvas class.
- CS peer tutoring.
- The Oregon State Online Writing Suite is also available for students enrolled in Ecampus courses.

Student Evaluation of Courses

The online Student Evaluation of Teaching system opens to students during the week before finals and closes the Monday following the end of finals. Students receive notification, instructions and the link through their ONID. They may also log into the system via Online Services.

Course evaluation results are extremely important and are used to help me improve this course and the learning experience of future students. Results from the 19 multiple choice questions are tabulated anonymously and go directly to instructors and department heads. Student comments on the open-ended questions are compiled and confidentially forwarded to each instructor, per OSU procedures. The online Student Evaluation of Teaching form will be available toward the end of each term, and you will be sent instructions through ONID. You will login to "Student Online Services" to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.

I also hope to have a location on Piazza for evaluation of the course, where any student will be able to, anonymously, make comments, requests, or suggestions in regards to the design and implementation of the content of the course.