University of Oklahoma
School of Computer Science
CS 2813: Discrete Structures
Spring 2026

Class Format: In Person **Time**: T/R 1:30 pm-2:45 pm	Canvas Link **Location**: Dale Hall 0218
Instructor: Ziming Liu **Student Support Hours**: W 2:00 pm-4:00 pm and F 12:00 pm-1:30pm	**Email**: ziming.liu-1@ou.edu **Location**: Sarkeys 1170
Teaching Assistant: Yale Gray **Student Support Hours:** TBD / By appointment ** All times are in Central Time (CT)	**Email:** yale.p.gray-1@ou.edu **Location:** DEH 115

Student Support Hours (Purpose and Expectations): Student Support Hours are intended to support your progress on proof-based homework, problem-solving strategies, and short programming exercises in this course. Students are encouraged to come with specific questions, attempted solutions, and any relevant code snippets so we can work efficiently through key reasoning steps and common proof techniques. To make the most of this time, it is helpful to review the material and begin assignments in advance, so we can focus on clarifying concepts, strengthening understanding, and improving your overall problem-solving approach.

Prerequisite:

- **CS 2334** (Programming Structures and Abstractions)
- **MATH 2423** (Calculus and Analytic Geometry II) or **MATH 2924** (Differential and Integral Calculus II)

Course Description*: Introduction to the theory of discrete structures useful in computer science. Topics include combinatorics, relations, functions, computational complexity, recurrences, and graph theory.

Course Goals: The goals of this course are to provide students with a rigorous foundation in discrete mathematics and formal reasoning that underpins computer science. This course emphasizes mathematical thinking, proof techniques, and discrete modeling skills that will support students in later coursework such as algorithms, theory of computation, software correctness, and data structures.

Learning Outcomes:

- Understand the fundamentals of set theory, logic, and mathematical proof.
- Grasp key concepts in counting techniques, relations, and graph theory.
- Apply core discrete structures and functions to represent computational problems.
- Analyze computing problems and use discrete-structure concepts to develop correct solutions.

Course Materials:

Required Textbook:

- Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 8th edition, McGraw-Hill, 2019. Link

Optional Reference:

- Gary Chartrand and Ping Zhang, *Discrete Mathematics*, Waveland Press, 2011. Link

Expectations: Students are expected to spend approximately **1–2+ hours per week** outside of class on practice and completing assignments. Unless explicitly stated otherwise, all assignments must be completed independently.

For written homework, students are expected to present solutions in a **clear, logical, and complete manner**, with appropriate justification and correct reasoning, especially for proof-based problems. For programming assignments, any programming language may be used, but submissions must include a brief **README explaining how to run the code**.

Students are strongly encouraged to make use of Student Support Hours for help with course concepts, proof strategies, and assignment questions.

This course follows a structured set of milestones and deadlines. Assignments submitted after the deadline are considered late and will be subject to the late policy. For Written Homework (HWs), submissions within 24 hours after the deadline will receive a **15%** penalty, and submissions more than 24 hours late will receive **no credit**. For Coding Assignments (Labs), submissions within 24 hours after the deadline will receive a **15%** penalty; submissions more than 24 hours and up to 3 days late will receive a **50%** penalty; submissions more than 3 days and up to 7 days late will receive a **75%** penalty; and submissions more than 7 days late will receive no credit. In addition, each assignment may be revised once for partial credit recovery; if a revision is submitted according to the revision instructions and deadline, students may earn back up to **50%** of the points lost.

Tentative Schedule (Subject to change):

Week	Date	Content	Written Homework	Coding Assignment
1	01/20-01/22	Logic and Proofs (Ch 1)		
2	01/27-01/29	Logic and Proofs (Ch 1)	HW1 release	
3	02/03-02/05	Logic and Proofs (Ch1)		Lab1 release
4	02/10-02/12	Basic Structures (Ch 2)	HW1 Due, HW2 release	
5	02/17-02/19	Basic Structures (Ch 2)		Lab1 Due, Lab2 release
6	02/24-02/26	Relations (Ch 9)		
7	03/03-03/05	Graphs (Ch 10)	HW2 Due, HW3 release	
8	03/10-03/12	Trees (Ch 11) *Midterm Exam (03/10)*		Lab2 Due, Lab3 release
9	03/17-03/19	Algorithms (Ch 3)		
10	03/24-03/26	Number Theory and Cryptography (Ch 4)	HW3 Due, HW4 release	
11	03/31-04/02	Number Theory and Cryptography (Ch 4)		Lab3 Due, Lab4 release
12	04/07-04/09	Spring Break		
13	04/14-04/16	Induction and Recursion (Ch 5)	HW4 Due, HW5 release	
14	04/21-04/23	Counting (Ch 6)		Lab4 Due, Lab5 release
15	04/28-04/30	Discrete Probability (Ch 7)		
16	05/05-05/07	Advanced Counting Techniques (Ch 8)	HW5 Due	Lab5 Due
17	05/12-05/14	Finals Week *Final Exam (05/14)*		

Assignment Deadlines*: All Written Homework (HW) and Coding Assignments (Labs) are due by **Friday at 11:59 PM (CT).** Submissions after this deadline will be considered late and will follow the course late policy.

Learning Activities, Assignments, and Assessments:
This course includes three primary components of learning and assessment: Written Homework (**HWs**), Coding Assignments (**Labs**), and Exams (**Midterm and Final**). These components are designed to help students develop strong discrete-mathematical reasoning skills, clear proof writing, and practical problem-solving ability.

Written Homework (HW): There will be regular written homework assignments posted on Canvas. Students are expected to complete the homework by hand (or using clearly written digital handwriting) and submit a scanned as a single PDF through Canvas.
Written homework solutions must include complete steps, clear logic, and correct justification, especially for proof-based problems. Answers without sufficient reasoning (e.g., only the final result) may receive limited credit.

Coding Assignments (Lab): Coding assignments will be released as Lab assignments on Canvas. Each lab submission must include:

- the source code, and
- a brief README file describing how to run the program, including any dependencies or required commands.

Each lab will provide example inputs and expected outputs. Grading will include additional hidden test cases beyond the examples provided to verify correctness and robustness.

Students may use any programming language, unless otherwise specified.

Exams: There will be two exams: a Midterm Exam and a Final Exam. The exams are designed to assess students' understanding of key course concepts, ability to reason formally, and skill in solving discrete-structure problems.

Unless otherwise announced, exams are closed-book and closed-notes, and students may not use external resources during the exam. A non-programmable calculator is permitted, but no other materials or aids are allowed.

Assessments and Assigning Grades:

Assessments:

Written Homework x5 (HWs)	40%
Code Assignment x5 (Labs)	20%
Midterm Exam	20%
Final Exam	20%

Assigning Grades:

A	90-100
B	80-89
C	70-79
D	60-69
F	<60

Course Policies:

Academic Integrity and Plagiarism:

- The work you turn in must be your own. This includes writing proof-based solutions in your own words and logical structure, and writing and submitting your own code for programming assignments. If you discuss problems with classmates, seek help from a tutor, use campus resources (including the Writing Center and Math Center), and/or use online resources (including AI software), the work you submit must still reflect your own understanding and reasoning developed through the learning process.
- You may discuss course concepts and high-level approaches with others, but you may not copy or share written solutions, proof outlines, code, or completed answers. Submissions that are substantially similar to another student's work may be considered academic misconduct.
- Penalties for serious offenses may include **a zero on the assignment or exam**, and egregious offenses may be reported to the University and could result in additional disciplinary action. It is important to understand and follow these expectations.
- Plagiarism, as defined by the OU Integrity Office, includes (but is not limited to):
    - Copying words and presenting them as your own writing.
    - Copying words, even if you give the source, unless you also indicate that the copied words are a direct quotation using quotation marks (" ").
    - Copying words and then changing them a little, even if you give the source.
    - Using someone else's idea or solution structure as your own, even if you express it in your own words.
    - Copying or submitting answers from a solutions manual, online forum, or any external source.

    - Copying any downloaded code, scripts, or solutions (whether documented or undocumented) is considered academic misconduct and will be treated as such.
- Exams must be completed individually. Unless otherwise announced, exams are closed-book and closed-notes, and only permitted materials (e.g., a non-programmable calculator) may be used.
- For more information, please review the student's guide to academic integrity and OU policies on academic misconduct.

Generative AI Policy: Generative AI tools (e.g., ChatGPT and similar systems) may be used as learning support in this course, such as for discussing concepts, reviewing definitions, exploring examples, or receiving feedback on understanding. Students are welcome to use these tools as a tutor to help guide their learning process. However, all submitted work must reflect your own original reasoning and understanding.

For written homework, your submission must be written in your own words, include complete logical steps, and clearly demonstrate your own reasoning process. You may not submit AI-generated solutions, proof write-ups, or polished explanations. Any submission that shows **evidence of AI-generated content or reasoning** that is not your own will be treated as a violation of academic integrity.

For labs, you may use AI tools to help you understand programming concepts or debug issues, but the code you submit must be written and understood by you. Submitting **AI-generated code (in whole or in part)** as your own work is not allowed and will be treated as academic misconduct.

Generative AI tools are strictly prohibited during exams. Exams are closed-book and closed-notes unless otherwise announced, and students may not use any external resources, including AI systems.

Violations of this policy will be handled under the course academic integrity policy and OU academic misconduct procedures.

Late Work Policy: HWs and Labs are subject to the following late submission policy.

HWs:
- Submitted **within 24 hours** after the deadline: **15%** penalty
- Submitted **more than 24 hours** after the deadline: **no credit**

Labs:
- Submitted **within 24 hours** after the deadline: **15%** penalty
- Submitted **more than 24 hours and up to 3 days** after the deadline: **50%** penalty
- Submitted **more than 3 days and up to 7 days** after the deadline: 75% penalty
- Submitted **more than 7 days** after the deadline: **no credit**

(All late penalties are applied to the earned score. For example, a lab graded as 80/100 submitted within 24 hours late will receive a final score of 60/100.)

Attendance Policy: Regular attendance is expected. Students are expected to arrive on time and remain for the full duration of each class session.

If you anticipate missing a class, you must notify the instructor at **least 24 hours in advance** whenever possible. Absences without prior notice may be considered unexcused.

Excused absences will be considered for legitimate and serious reasons such as medical emergencies (including physical or mental health concerns with appropriate documentation), family emergencies, university-sponsored activities, and legally required obligations (e.g., jury duty or emergency military service). In cases where advance notice is not possible due to an emergency, students should contact the instructor as soon as reasonably possible.

Technology: This course does not require any specialized technology beyond access to Canvas for course announcements and assignment submissions. For exams, students may use a non-programmable calculator. No other electronic devices or external resources are permitted during exams unless otherwise announced.

Group/Lab Partner Work Policies: All assignments in this course, including written homework and coding labs, are individual work. Students may discuss course concepts and general problem-solving strategies with classmates, but all submitted solutions and code must be completed independently and reflect the student's own understanding. Any unauthorized collaboration or sharing of answers/code is subject to the course academic integrity policy.

University Policies:

Mental Health Support Services: Support is available for any student experiencing mental health issues that are impacting their academic success. Students can either been seen at the University Counseling Center (UCC) located on the second floor of Goddard Health Center or receive 24/7/365 crisis support from a licensed mental health provider through TELUS Health. To schedule an appointment or receive more information about mental health resources at OU please call the UCC at 405-325-2911 or visit University Counseling Center. The UCC is located at 620 Elm Ave., Room 201, Norman, OK 73019.

Title IX Resources and Reporting Requirement: The University of Oklahoma faculty are committed to creating a safe learning environment for all members of our community, free from gender and sex-based discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking, in accordance with Title IX. There are resources available to those impacted, including: speaking with someone confidentially about your options, medical attention, counseling, reporting, academic support, and safety plans. If you have (or someone you know has) experienced any form of sex or gender-based discrimination or violence and wish to speak with someone confidentially, please contact OU Advocates (available 24/7 at 405-615-0013) or University Counseling Center (M-F 8 a.m. to 5 p.m. at 405-325-2911)

Because the University of Oklahoma is committed to the safety of you and other students, and because of our Title IX obligations, I, as well as other faculty, Graduate Assistants, and Teaching Assistants, are mandatory reporters. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This includes disclosures that occur in: class discussion, writing assignments, discussion boards, emails and during Student/Office Hours. You may also choose to report directly to the Institutional Equity Office. After a report is filed, the Title IX Coordinator will reach out to provide resources, support, and information and the reported information will remain private. For more information regarding the University's Title IX Grievance procedures, reporting, or support measures, please visit Institutional Equity Office at 405-325-3546.

Reasonable Accommodation Policy: The University of Oklahoma (OU) is committed to the goal of achieving equal educational opportunity and full educational participation for students with disabilities. If you have already established reasonable accommodations with the Accessibility and Disability Resource Center (ADRC), please submit your semester accommodation request through the ADRC as soon as possible and contact me privately, so that we have adequate time to arrange your approved academic accommodations.

If you have not yet established services through ADRC, but have a documented disability and require accommodations, please complete ADRC's pre-registration form to begin the registration process. ADRC facilitates the interactive process that establishes reasonable accommodations for students at OU. For more information on ADRC registration procedures, please review their Register with the ADRC web page. You may also contact them at (405)325-3852 or adrc@ou.edu, or visit www.ou.edu/adrc for more information.

Note: disabilities may include, but are not limited to, mental health, chronic health, physical, vision, hearing, learning and attention disabilities, pregnancy-related. ADRC can also support students experiencing temporary medical conditions.

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. [See Faculty Handbook 3.15.2]

Adjustments for Pregnancy and Related Issues: Should you need modifications or adjustments to your course requirements because of pregnancy or a pregnancy-related condition, please request modifications via the Institutional Equity Office website or call the Institutional Equity Office at 405/325-3546 as soon as possible. Also, see the Institutional Equity Office FAQ on Pregnant and Parenting Students' Rights for answers to commonly asked questions.

Final Exam Preparation Period: Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to OU's Final Exam Preparation Period policy.

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.

Additional Weather Safety Information is available through the Department of Campus Safety.

The University of Oklahoma Active Threat Guidance: The University of Oklahoma embraces a Run, Hide, Fight strategy for active threats on campus. This strategy is well known, widely accepted, and proven to save lives. To receive emergency campus alerts, be sure to update your contact information and preferences in the account settings section at one.ou.edu.

RUN: Running away from the threat is usually the best option. If it is safe to run, run as far away from the threat as possible. Call 911 when you are in a safe location and let them know from which OU campus you're calling from and location of active threat.

HIDE: If running is not practical, the next best option is to hide. Lock and barricade all doors; turn of all lights; turn down your phone's volume; search for improvised weapons; hide behind solid objects and walls; and hide yourself completely and stay quiet. Remain in place until law enforcement arrives. Be patient and remain hidden.

FIGHT: If you are unable to run or hide, the last best option is to fight. Have one or more improvised weapons with you and be prepared to attack. Attack them when they are least expecting it and hit them where it hurts most: the face (specifically eyes, nose, and ears), the throat, the diaphragm (solar plexus), and the groin.

Please save OUPD's contact information in your phone.
NORMAN campus: *For non-emergencies call (405) 325-1717. For emergencies call (405) 325-1911 or dial 911.*
TULSA campus: *For non-emergencies call (918) 660-3900. For emergencies call (918) 660-3333 or dial 911.*

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