CS 0441: Discrete Structures

Spring, 2024-2025

Class Room: Room **S501** SCUPI Building

Class Hours: Monday 1:50-2:35 pm, 2:45-3:30 pm, 3:40-4:25 pm

Instructor: Kunpeng Wang

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Office hours: Tue. 1-4 pm. Wed. 1-3 pm, Thurs. 10-11 am.

Office: Room **N-515** SCUPI Building

Course Description

This course offers a survey of the following areas: set theory, mathematical induction, number theory, relations, functions, algebraic structures, and introductory graph theory. The topics to be discussed are fundamental to most areas of Mathematics and have wide applicability to Computer Science.

Prerequisites

MATH 0220 Analytic Geometry and Calculus 1 or MATH 0230 Analytic Geometry and Calculus 2 or MATH 0235 Honoured Analytic Geometry and Calculus

Course Objectives

We will cover most of the material from Chapters 1-2 & 4-7 & 9-10 in the textbook.

Learning Outcomes

This course presents the theory and applications of discrete mathematics. In this course, students will be able to:

1. Understand the structure of logical arguments and mathematical proofs.
2. Become familiar with the basic concepts of logic, set theory, number theory, and combinatorics.
3. Perform computations in modular arithmetic and to understand the relevant number systems.
4. Calculate the number of possible outcomes for problems involving combinations and permutations.
5. Know the basics of the graph theory.

Class Structure

Lectures.

Course Materials

Textbook: Discrete Mathematics and Its Applications, 7th Edition, by Kenneth H. Rosen, McGraw-Hill, 2012.

Blackboard

Please regularly log on and check https://learn.scupi.cn/. We will upload there lecture notes, assignments, announcements and your grades.

Course Assessment

Biweekly assignments, class activities, tests and a final exam.

Schedule of Exams, Assignments and Quizzes

Exams

Date	Time	Component
Week 7	2 hours	Test 1
Week 12	2 hours	Test 2
Final Exam Week (June 16)	2 hours	Final exam

Assignments

Homework assignments will be given out biweekly. They will not be collected or graded. It is the responsibility of the students to complete the homework assignments. Also, questions from the homework assignments will be selected in the class activities. Failing to answer the questions will lead to a penalty in your assignment assessment.

Quizzes

Students will be asked to complete a quiz in tutorials each week. Normally, a quiz will consist of a short question. No make up for quizzes.

Grading Policy

The final grade will be computed according to the following scheme:

Scheme: Total grade = 5 % Assignments + 20 % Test 1 + 20% Test 2 +30 % Final Exam + 15 % Class Activities + 10 % Attendance.
Note: All tests and final exam will be closed-book.

Conversion of Numerical Grades to Final Letter Grades Follows the SCUPI Common Grade

A $[90,100]$ A- $[85,90)$ B+ $[80,85)$ B $[76,80)$ B- $[73,76)$ C+ $[70,73)$ C $[66,70)$
C- $[63,66)$ D+ $[61,63)$ D $[60,61)$ F $(60,0)$

Schedule and weekly learning goals

The schedule is tentative and subject to change. The listed objects below should be viewed as the key concepts you should grasp after each week, and also as a study guide before each exam, and at the end of the semester. Each test will base on material that was taught up until the second last week prior to the test, namely, Test 1 covers Weeks

02-05, Test 2 is based on Weeks 6-10. The final exam will cover all topics taught in this semester.

Week 01, 02/24-02/28

- Cover Sections 1.1-1.2
- Course introduction.
- Propositional logic.

Week 02, 03/03-03/07

- Cover Sections 1.1-1.2
- Propositional logic continued.

Week 03, 03/10-03/14

- Cover Sections 1.3-1.4
- Propositional equivalence.
- Predicates and quantifiers.

Week 04, 03/17-03/21

- Cover Section 1.5
- Nested quantifiers.

Week 05, 03/24-03/28

- Cover Sections 1.6-1.7
- Rules of inference, proofs.

Week 06, 03/31-04/04

- Cover Sections 1.8, 2.1-2.2
- Proof strategies.
- Sets.

Week 07, 04/07-04/11

- **Test 1**

Week 08, 04/14-04/18

- Cover Sections 2.3-2.5

- Set identities, functions.
- Sequences and summations.

Week 09, 04/21-04/25

- Cover Section 4.1
- Number theory.

Week 10, 04/27-04/30

- Cover Sections 4.3, 5.1 & 5.2
- Primes, GCDs.
- Proof by induction.
- Strong induction.

Week 11, 05/05-05/10

- **May Break**. No class.

Week 12, 05/13-05/17

- **Test 2**.

Week 13, 05/19-05/23

- Cover Section 5.3
- Recursive definitions, structural induction.

Week 14, 05/26-05/30

- Cover Sections 6.1-6.2
- Combinatorics.
- Pigeonhole principle.

Week 15, 06/02-06/06

- Cover Sections 9.1 and 9.3
- Relations.

Week 16, 06/09-06/13

- Cover Section 9.2
- N-ary relations.

Weeks 17- 19, 06/16-06/30 Final Exam Week

Course Policies

There will be no special treatments for any students in this course! For example, if you have a heavy course load, you should expect a steep learning curve and be prepared for it. You will not be exempted from any assignments.

During Class

Computers may be allowed in class for the electronic recording of notes. But please refrain from using computers for any activities that are unrelated to the course. Phones are prohibited as they are rarely useful for anything in the course. Eating and drinking are allowed in class but please keep from it affecting the course.

Attendance Policy

Attendance is expected in all lectures. Valid excuses for absence will be accepted before class. In extenuating circumstances, valid excuses with proof will be accepted after class. Perfect attendance can be given a full mark in attendance. **SCU has announced a very strict policy on class attendance. Consecutive absences for 3 weeks may lead you to an F in this class.**

Class Activities policy

Each week students will be asked to present materials (which will be related the topics introduced in the previous week and assignment questions) in class (in English). Each class activity will last 20-30 minutes depending on weekly progress.

Policies on Late Assignments and Exams

Students should start their homework assignments immediately after the assignments are given, and DO NOT wait until the last minute to meet the deadlines. **Late assignments will be NOT accepted except for emergencies and health issues. Any other late assignments handed in will be marked but will be given 0**. At most **Two** extensions for assignments will be given in this course. All assignments will be counted in your total grade. **Late submission for previous assignments during the final exam period will NOT be accepted in any form for any excuses**.

All tests and the final exam are mandatory. There will be absolutely no makeup exam for each test. If you miss the final, a makeup exam may be given for the final exam if the student has the approval from the instructor or emergencies and health issues **with a valid proof**. I will not accept the student deceleration for absence form for the final exam.

Academic Integrity

At Sichuan University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do.

Everyone at SCUPI is expected to treat others with dignity and respect. The Code of Student Conduct allows Sichuan University to take disciplinary action if students don't follow this community expectation.