湖北工業大學
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Introduction to Discrete Mathematics
Course Code	MATH 2293
Semester	Summer 2026
Course Length	8 Weeks, 60 Contact Hours, 90 Independent Work Hours
Credits	4
Instructor	Wang Mei
Office	NO.2 Teaching Building B206
Email	15072447699@163.com
Prerequisite	N/A
Antirequisite	MATH 2291 Introduction to Discrete Mathematics (4 Weeks)

Course Description:

A course designed to prepare math, computer science, and engineering majors for future coursework by introducing formal mathematical concepts and techniques that are fundamental for modeling and analyzing discrete structures. An emphasis will be placed on developing skills in abstraction, notation, and critical thinking. Topics include: logic, proofs, basic set theory, functions, number theory, mathematical induction, recursion, counting techniques, recurrence relations, algorithms, and graph theory.

Delivery Mode: In-Person, Face-to-Face Instruction

Course Goals:

Students who successfully complete this course will demonstrate competency in the following general education core goals:

- **Critical thinking skills** – Students will engage in creative and/or innovative thinking, and/or inquiry, analysis, evaluation, synthesis of information, organizing concepts, and constructing solutions.
- **Communication skills** – Students will demonstrate effective written, oral, and visual communication.
- **Teamwork** – Students will demonstrate the ability to work effectively with others to support a shared purpose or goal and consider different points of view.
- **Social responsibility** – Students will demonstrate intercultural competency and civic knowledge by engaging effectively in local, regional, national, and global communities.

Student Learning Outcomes:

Upon completion of this course, students will be able to:

- Understand and utilize the formal language of mathematical logic, including propositions, quantifiers, and logical equivalences;
- Construct and critique direct, indirect, and inductive mathematical proofs;
- Apply concepts of set theory, functions, and relations to analyze mathematical structures;
- Solve problems in number theory using principles of divisibility, modular arithmetic, and the Euclidean Algorithm;
- Employ basic combinatorial techniques to count structured collections of objects;
- Define and identify properties of binary relations, and understand the connection between equivalence relations and partitions.

Textbooks/Supplies/Materials/Equipment/ Technology or Technical Requirements:

Discrete Mathematics and Its Applications, 8th Edition, by Kenneth H. Rosen, McGraw-Hill, 2019.

Course Requirements:

Workload Expectation
In addition to our 60 hours of classroom time, allocating approximately 90 hours for deep-dive readings, assignment drafting, and consistent weekly review is essential for mastering the material.

Quizzes (10%)
Quizzes will be conducted regularly throughout the semester, typically at the start of a lecture. Their primary purpose is to provide both the student and the instructor with timely, low-stakes feedback on the comprehension of recently covered material, such as key definitions, core concepts, and basic proof structures.

Homework Assignments (30%)
Homework is the primary means for practicing the concepts introduced in lecture. Students will regularly complete problem sets that require them to apply logical reasoning, construct proofs, and solve discrete mathematical problems.

Midterm Exam (20%)
The midterm exam serves as a critical benchmark of student comprehension halfway through the semester. It assesses mastery of the foundational units, including logic, proof techniques, set theory, and functions, ensuring a solid grasp of the core principles before advancing to more complex topics.

Final Exam (40%)
The cumulative final exam provides a comprehensive evaluation of the entire course. While it includes questions on later topics like combinatorics and relations, it will also require students to demonstrate retained knowledge of earlier material, such as logic and proof methods, by applying them to new problems. This assessment verifies the overall achievement of the course's main objective: to think and reason like a mathematician using the tools of discrete mathematics.

Assessments: Activity	Percent Contribution
Quizzes	10%
Homework Assignments	30%
Midterm Exam	20%
Final Exam	40%

Grading:

Final grades will be based on the sum of all possible course points as noted above.

Grade	Percentage of available points
A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D	64-69
D-	60-63
F	0-59

Course Schedule:
The schedule of activities is subject to change at the reasonable discretion of the instructor. Minor changes will be announced in class, major ones provided in writing.

MATH 2293 Schedule

Lecture	Topic	Readings
L1	The Language of Logic (Propositions, Connectives, Truth Tables)	Chapter 1
L2	Logical Equivalences and Predicate Logic	Chapter 1
L3	Introduction to Set Theory (Operations, Power Set, Cartesian Products)	Chapter 2
L4	Functions: Definitions, Types (Injective, Surjective, Bijective)	Chapter 2
L5	Composition, Inverses, and Sequences	Chapter 2
L6	Introduction to Proofs: Direct Proof and Proof by Contrapositive	Chapter 1
L7	Proof by Contradiction and Proof by Cases	Chapter 1
L8	Introduction to Algorithms and Complexity	Chapter 3
L9	Review (Logic, Sets, and Functions) & Problem-Solving Session	/
L10	The Fundamentals of Counting (Product and Sum Rules)	Chapter 6
L11	The Pigeonhole Principle and Its Applications	Chapter 6
L12	Permutations and Combinations	Chapter 6
L13	The Binomial Theorem and Combinatorial Identities	Chapter 6
L14	Introduction to Discrete Probability	Chapter 7
L15	Binary Relations and Their Properties	Chapter 9
L16	Equivalence Relations and Partitions	Chapter 9
/	**Miterm Exam**	/
L17	Midterm Exam Debrief & Combinatorics Problem Workshop	/
L18	Divisibility and Modular Arithmetic	Chapter 4
L19	The Euclidean Algorithm and Greatest Common Divisor	Chapter 4

L20	The Principle of Mathematical Induction	Chapter 5
L21	Strong Induction and Well-Ordering Principle	Chapter 5
L22	Recursive Definitions (Connecting to Induction)	Chapter 5
L23	Congruences and Applications Introduction to the Chinese Remainder Theorem	Chapter 4
L24	Introduction to Graph Theory: Definitions and Basic Properties	Chapter 10
L25	Course Review	/
/	**Final Exam**	/

Accommodation Statement

Academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow.

Academic Integrity Statement

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Other Items:

Attendance and Expectations

All students are required to attend every class, except in cases of illness, serious family concerns, or other major problems. We expect that students will arrive on time, be prepared to listen and participate as appropriate, and stay for the duration of a meeting rather than drift in or out casually. In short, we anticipate that students will show professors and fellow students maximum consideration by minimizing the disturbances that cause interruptions in the learning process. This means that punctuality is a must, that cellular phones be turned off, and that courtesy is the guiding principle in all exchanges among students and faculty. You will be responsible for the materials and ideas presented in the lecture.

Assignment Due Dates

All written assignments must be turned in at the time specified. Late assignments will not be accepted unless prior information has been obtained from the instructor. If you believe you have extenuating circumstances, please contact the instructor as soon as possible.

Make-Up Work
The instructor will not provide students with class information or make-up assignments/quizzes/exams missed due to an unexcused absence. Absences will be excused and assignments/quizzes/exams may be made up only with written documentation of an authorized absence. Every effort should be made to avoid scheduling appointments during class. An excused student is responsible for requesting any missed information from the instructor and setting up any necessary appointments outside of class.

Access, Special Needs and Disabilities
Please notify the instructor at the start of the semester if you have any documented disabilities, a medical issue, or any special circumstances that require attention, and the school will be happy to assist.