



湖北工业大学
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Introduction to Abstract Mathematics
Course Code	MATH 2711
Semester	Fall 2027
Course Length	4 Weeks, 60 Contact Hours
Credits	4
Instructor	TBA
Office	TBA
Email	TBA
Prerequisite	MATH 1112 Calculus II

Course Description:

Sets, symbolic logic, propositions, quantifiers, methods of proof, relations and functions, equivalence relations, math induction and its equivalents, infinite sets, cardinal numbers, and number systems.

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:

- gain proficiency in set operations, relations, functions, and cardinality, and understand power sets and partitions;
- apply mathematical reasoning to solve complex problems in both theoretical and applied contexts;
- develop skills to write clear, rigorous proofs using standard mathematical symbols;

- understand countability, uncountability, and Cantor's theorem.

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

Ted Sundstrom *Mathematical Reasoning: Writing and Proof*, 2nd ed (2006), Pearson.

Course Requirements:

Class Participation

Active participation in class discussions and problem-solving sessions is a key component of the learning process. This grade reflects both the quantity and quality of your contributions during lectures. Engaging in discussions, asking insightful questions, and offering solutions to problems will help you grasp the material more effectively.

Quizzes

5 quizzes will be given. These will cover recent lectures, focusing on both conceptual understanding and the ability to perform computations and proof techniques discussed in class. The quizzes are intended to be short (10–15 minutes) but rigorous, providing immediate feedback on your progress. Each quiz is designed to reinforce the material presented in the most recent lectures, helping you identify any areas that require further study.

Homework Assignments

You will complete and submit approximately 8 homework assignments throughout the semester. These assignments must be well-organized, clearly written, and justified with appropriate mathematical reasoning.

Midterm Exam

A written midterm exam will be held in class around the middle of the semester. The exam will focus on the first half of the course, testing your ability to apply the proof techniques and mathematical reasoning learned up to that point. The midterm will be closed-book and will consist of both theoretical questions and problems requiring mathematical proofs.

Final Exam

The final exam will be cumulative, covering all topics discussed throughout the course. This exam will be closed-book and will assess your overall understanding of the material, including your ability to solve complex problems using the techniques and concepts you have learned. The final exam will be longer than the midterm and will feature both theoretical and applied questions.

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

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, and major ones provided in writing.

MATH 2711 Schedule		
Lecture	Topic	Readings
L1	Course Introduction	Ch. 1
	Introduction to Writing Proofs in Mathematics	
L2	Logical Reasoning	Ch. 2
	Statements and Logical Operators	
L3	Logically Equivalent Statements	Ch. 2
L4	Open Sentences and Sets	Ch. 2
L5	Quantifiers and Negations	Ch. 2
	HW 1 due	
L6	Constructing and Writing Proofs in Mathematics	Ch. 3
	Direct Proofs	
	Quiz 1	
L7	More Methods of Proof	Ch. 3
	Proof by Contradiction	
L8	Divisibility and the Euclidean Algorithm	Ch. 3
	Remainders and Congruence	
	HW 2 due	
L9	Greatest Common Divisors and the Euclidean Algorithm	Ch. 3
L10	Sets and Functions	Ch. 5
	Set Notation and Describing a Set	
	Subsets	
L11	Unions, Intersections, and Complements	Ch. 5-6
	Introduction to Functions	
	Quiz 2	
	HW 3 due	
L12	Mathematical Induction and Well-Ordering	Ch. 4
	Investigating Recursive Processes	
L13	Proof by Induction	Ch. 4
	HW 4 due	
L14	Well-Ordering and the Principle of Mathematical Induction	Ch. 4

	Strong Induction	
L15	Midterm Exam	/
L16	Set Theory, Part II	Ch. 5
	Cartesian Products	
L17	Power Sets	Ch. 5
	Indexed Collections of Sets	
	HW 5 due	
L18	Relations and Partitions	Ch. 7
	Relations	
	HW 6 due	
L19	Functions Revisited	Ch. 6
	Quiz 3	
L20	Equivalence Relations	Ch. 7
	Partitions	
	HW 7 due	
L21	Well-Definition, Rings and Congruence	Ch. 7
	Functions and Partitions	
	Quiz 4	
L22	Finite and Infinite Sets	Ch. 9
	Equivalent sets	
L23	Cardinalities of Infinite Sets	Ch. 9
	Cantor's Notion of Cardinality	
	HW 8 due	
L24	Countable and Uncountable Sets	Ch. 9
	Quiz 5	
L25	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.