Math 110

An Introduction to Mathematical Proofs

Course description: A rigorous introduction to communicating mathematics through proofs. Topics include basic logic, set theory, functions, and various proof techniques such as induction, direct, contrapositive, contradiction, and cases. May also include equivalence relations, countability, number theory, structure of the real numbers, sequences, and continuity.

Prerequisites: Math 9B or Math 9HB or Math 7B or Math 5C, with a grade of C- or better.

Textbook: *Mathematical Reasoning, Writing and Proof*, Version 3, 2020, by Ted Sundstrom, open access, ISBN-13: 979-8622238970

Suggested Lecture Schedule: (* indicates time permitting)

Week #	Textbook Sections	Topics
1	1.1, 2.1, 2.2	Statements, logical operators, and logical equivalence
2	2.3, 2.4, 5.1	Sets, quantifiers, and negations
3	3.1, 5.2	Direct proofs using divisibility, congruence, and set relationships
4	3.2	Contrapositives, biconditionals, constructive and nonconstructive proofs
5	3.3	Proof by contradiction
6	3.4, 3.5, 3.6	Using cases in proofs and review of proof methods
7	4.1, 4.2*	The method of induction
8	5.3, 5.4, 5.5*	Algebra of sets and cartesian product of sets
9	6.1, 6.2, 6.3	Functions: domain, range, surjective, injective
10	6.4, 6.5, 6.6	Functions: composition, inverses, preimages