

Course Math 109.

Credit Hours 4

Prerequisites Math 18, or Math 20F, or Math 31AH, and Math 20C, or consent of instructor.

Course Description This course focuses on the use of a variety of topics in mathematics to introduce the students to rigorous mathematical proof, emphasizing quantifiers, induction, negation, proof by contradiction, naive set theory, equivalence relations and epsilon-delta proofs. Required of all departmental majors.

Textbooks The consulting and reference books for this course are the following ones:

- (i) *Mathematical Proofs*, by G. Chartrand, A. Polimeni, and P. Zhang, 4th Edition, Pearson 2018.
- (ii) *Foundations of Higher Mathematics*, by P. Fletcher and C. Patty, 3rd Edition, Cengage 1995.
- (iii) *An Introduction to Mathematical Reasoning: Numbers, Sets, and Functions*, by Peter J. Eccles; 2007.

Subject Material The course comprehend the following topics:

- (i) Logic of first degree;
- (ii) Introduction to Set theory;
- (iii) Basic proof techniques;
- (iv) Proof by mathematical induction;
- (v) Functions;
- (vi) Relations and concurrence module n ;
- (vii) Basic number theory;
- (viii) Introduction to $\epsilon - \delta$ proofs.

Lectures The lectured will be held in the classroom.

Homework

Midterms There will be two midterm exams given during the quarter. See the course calendar for the dates and times of the midterm exams. You will be able to use one handwritten sheet of notes. Also, recall that calculators and any online material are not allowed during the final examination. There will be no makeup exams.

Final Examination The final examination will be held at the date and time stated in the course calendar. You will be able to use one handwritten sheet of notes. However, calculators and any online material are not allowed during the examination.

Grading Your course grade will be given based on your cumulative average at the end of the term. This cumulative average will be the best of the following two weighted averages:

- (i) 30% Homework, 20% Midterm Exam I, 20% Midterm Exam II, 30% Final Exam.
- (ii) 30% Homework, 20% Best Midterm Exam, 50% Final Exam

The cumulative average will be based on the following scale:

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|----|----|----|----|----|----|----|----|----|
| A+ | A | A- | B+ | B | B- | C+ | C | C- |
| 97 | 93 | 90 | 87 | 83 | 80 | 77 | 73 | 70 |

NOTE: You must pass the final examination in order to pass the course.