Math 17 Sec _____

Title: An Introduction to Exploration, Conjecture, and Proof in Mathematics

Description

Catalog: Prepares students for Math 107A and Math 107B. Students will explore mathematical patterns and relations, formulate conjectures, and prove their conjectures. Topics from number theory, probability and statistics, and geometry **.**

Course: This course is designed to introduce you to the spirit of mathematics. It will probably be quite different from any other mathematics course you've experienced. In it you will work with classmates to explore ideas from various areas of mathematics such as number theory, probability, geometry, and topology. With guidance from me, you will *explore* an idea through experiments, then make plausible *conjectures* based on your experiments, and finally try to *prove* (or disprove) the conjectures.
The primary emphasis of this course is your involvement in all aspects of the mathematical process. Rather than follow along in a textbook and merely practice what others have done, you will have the opportunity to record your own mathematical journey. **It is therefore extremely important that you participate in each class meeting** and keep all your Math 17 papers together and well organized. Another important aspect of the course is its writing component. Homework assignments will emphasize exercises in which you are required to think through the concepts of the course and express your ideas in clear well-organized English prose.

Prerequisites: Math 9 or three years of high school mathematics which includes two years of algebra and one year of geometry; completion of the ELM requirement and a passing score on the Intermediate Algebra diagnostic test.

Learning Objectives:
Explore mathematical patterns and relations
Formulate conjectures based on their explorations
Construct logical arguments to prove or disprove their conjectures.
Present the conclusions from their explorations, formulations, and proofs in clear well-organized English prose.

Text: No published text required. Handouts, class notes and study notes will be provided.

Coverage: Topics from number theory, probability and statistics, and geometry **.**

Homework: Written assignments that develop ideas, draw out generalizations, form summaries and explore new ideas.

Writing

Component: This is an area B4 GE course and has a writing component. To satisfy the writing requirement graded assignments involving writing and understanding of complex technical prose, interpretation of theoretical ideas, and the use of mathematical ideas will be part of the course.

Examinations: There will be three midterm examinations and a comprehensive final examination for this course.
The examination schedule is given below.

Midterm I	Feb. 16
Midterm II	Mar. 16
Midterm III	Apr. 27
Final	May 18

Grading: Written work is scored on the following scale and your grade in this course is assigned according to the following percentages.

Homework	150 (10.0%)	88% - 100%	A
Midterms (150 pts each)	450 (45.0%)	76% - 87%	B
Final	400 (40.0%)	65% - 76%	C
		50% - 64%	D
Total	1000	below 50%	F

Drops: You may drop this course without penalty until and including March 9th. On or after March 10th you must be passing this course (have a grade of C or better) and must have a written medical excuse from a M.D. in order to drop this course without penalty.

TOPICS COVERED:

Number Theory (5 weeks)

Divisibility, greatest common divisor, division algorithm, Euclidean algorithm, primes

Statistics (3 weeks)

estimators, presentation of data, measure of central tendency and dispersion

Probability (3 weeks)

geometric probability ("Buffon Needle/Noodle Problem", "Buffon Coin/Blob Problem"), relative frequency experiments, methods of counting, sample spaces, joint events, independent events, simulation techniques

Sequences and Series (2 weeks)

"handshake" problems, "pizza-cutting" problems, "equidissectable sets", "bouncing ball" problems

Geometry (3 weeks)

"Shortest path" problems ("Heron's Problem"), Eulerian paths, Euler's formula for polytopes, application of graphs, Hamiltonian paths, "Sperner's lemma" (divided segments and divided triangles)