

Syllabus for Math 245, *Introduction to Proof via Discrete Math*, Spring 2009

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Office Hours: T, Th 11:00am-12:00noon, W 12-1pm and by appointment.

COURSE DESCRIPTION: Math 245 is a “bridge course” designed to be a transition for math majors and minors from the computational courses like calculus, to the proof based courses such as number theory and analysis. In this course we will study logic, sets and relations, proof techniques, and discrete math. It is hoped that by the end of the course, you will read, write and think mathematics like a mathematician. Specific topics include mathematical induction, combinatorics, cardinality and Pascal’s triangle.

TEXT: *Doing Mathematics: An Introduction to Proofs and Problem Solving*, Stephen Galovich

SUPPLEMENTAL TEXTS:

L^AT_EX: A Document Preparation System, Leslie Lamport

Mathematics: A Discrete Introduction, E. Scheinerman

How to Prove It: A Structured Approach, D. Velleman

A Transition to Advanced Mathematics, Smith, Eggen and St. Andre

A Discrete Transition to Advanced Mathematics, Richmond and Richmond

Foundations of Higher Mathematics, Fletcher and Patty

Note: These books are for reference only. You do not need to purchase any of them.

GRADING: The grading will be assigned on a 500 point scale:

A: 450-500

B: 400-449

C: 350-399

D: 300-349

F below 300

There will be no curves and no extra credit. I will assign +/- on an individual basis. WF’s will not be assigned. Points are assigned as follows:

Quizzes (10) - 100 points

Midterm exams (2) - 100 points each

Homework - 100 points

Final exam - 100 points

QUIZZES: There will be a 10 point quiz at the beginning of class each Thursday. This quiz will cover material through the previous Tuesday’s class. Quiz questions will consist mainly of definitions, theorems, short answers, and short proofs. The 10 best quiz scores will be kept, and the rest will be dropped. There will be no make up quizzes given.

MIDTERMS and FINAL: There will be two midterms during the semester worth 100 points each and a final exam worth 100 points. The questions on the exams will be similar to homework questions and will contain proofs. If you cannot make it to a scheduled exam, you **MUST** contact the instructor **BEFORE** the exam if at all possible, or if an emergency, **WITHIN 24 HOURS** after the exam if you need to schedule a make up exam. Make up exams will only be given for extreme excuses. A doctor's note or some other physical excuse is required. Dates for exams (subject to change):

Midterm I - Thursday February 26
Midterm II - Thursday April 9
Final Exam - Tuesday May 5, 8am-10am

L^AT_EX: As part of our objective to “write” mathematics (as well as to learn it and to speak it) we will learn to use the mathematical typesetting program L^AT_EX. L^AT_EX is the standard typesetting tool of mathematicians all over the world. Whether you will be teaching, working in business or in academia, L^AT_EX will be useful for preparing mathematical documents. See my website for information on installing and running L^AT_EX.

HOMEWORK: Homework will be assigned after each section. We will discuss the homework, but most of it will not be collected. Once a week or so I will assign one problem to be typed in L^AT_EX and handed in for grading. Each assignment will be worth 10 points. For each assignment, 3 of the 10 points will be for typesetting in L^AT_EX. The remaining 7 points will be for the correctness of the problem. In addition, twice during the semester, you will be required to present a proof to me in my office on the blackboard.

CLASS STRUCTURE: Each Thursday there will be a quiz at the beginning of class. Some homework problems will be discussed at the beginning of class. The rest of the class will be lecture.

ADDITIONAL HELP: You are encouraged to work together in this class and form study groups. TALK about mathematics with each other. WRITE down your thoughts and ideas. SHARE these ideas with your group and with the class. Go to the library or internet and research topics that interest you or are difficult for you. The supplementary texts listed above are a starting place. You are welcome to e-mail questions to me, but if you are referring to a homework problem, please include the entire question, because I may not have access to a book when I answer your e-mail.

HONOR CODE You are to abide by the JMU honor code at all times. Ignorance of the law is no excuse. Cheating will not be tolerated and will be prosecuted to the fullest extent. When turning in homework or groupwork, you may work together and discuss the problems, but you must write up the homework to turn in **by yourself**. Every answer requires an explanation, and no two people's explanations will be exactly the same. Copying someone else's homework and putting your name on it is a violation of the Honor Code. Do not share your L^AT_EX code with anyone. You are welcome to look at each other's code, but do not share files, and do not copy code from someone else word for word.

Math 245 Spring 2009 VERY tentative outline

Week 1 **January 13-15** Class overview, introduction to L^AT_EX, 1.1-1.2

Week 2 **January 20-22** Sections 2.1 Truth Tables, 2.2 Sets

Week 3 **January 27-29** Sections 2.3 Quantifiers, 3.1 Direct Proof

Week 4 **February 3-5** Section 3.2 Indirect Proof

Week 5 **February 10-12** Sections 3.3, Induction, 3.4 Case Analysis

Week 6 **February 17** Assessment Day, No classes
February 19 Section 3.5 Attacking the problem

Week 7 **February 24** Review
February 26 Midterm I

Week 8 **March 3-5** Sections 1.6 Looking Back, 4.1 Set Operations

Week 9 **March 10-12** Spring Break

Week 10 **March 17-19** Sections 4.2 Relations

Week 11 **March 31-April 2** Sections 5.1 Equinumerous Sets, 5.2 Finite Sets

Week 12 **April 7** Review
April 9 Midterm II

Week 13 **April 14-16** Sections 4.3 Denumerable Sets, 4.4 Uncountable Sets

Week 14 **April 21-23** Sections 6.1 Combinatorics, 6.2 Permutations and Combinations

Week 15 **April 28** Sections 6.3 Binomial Theorem
April 30 Review **Last Day of Class**

Week 16 **May 5** **Final Exam** 8:00am-10:00am