

TOPICS IN MATHEMATICS

Math 101, Spring 2015

Meeting Time and Location: MW 12:30-1:45 pm, Trumbower 347

Professor: Yusra Naqvi

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Office Hours: M 11:00am-12:00pm, W 3:30pm-5:00pm, F 10:00am-11:30am

Additional office hours are available by appointment!

Course Webpage: <http://mathcs.muhlenberg.edu/~naqvi/math101sp15/>

Textbook: *For All Practical Purposes, Ninth Edition* by COMAP, published by W. H. Freeman and Company, 2011. (ISBN-13 978-1464101571)

Calculator: You are welcome to have a calculator available in class and while doing homework. You do not need anything sophisticated; it only needs to do addition, subtraction, multiplication, and division. If you would like to have a calculator but do not wish to purchase one, you may rent one from the department for a small fee.

Course goals: This course will introduce you to a variety of concepts in contemporary mathematics. We will focus on how mathematical thinking applies to real world problems and learn a variety of tools and problem solving strategies that will help us study these applications.

This course will provide an introduction the following learning outcomes: use analytic tools, quantitative methods, and algorithms to solve problems in mathematics; read and comprehend technical material; write and argue effectively using the language of mathematics; and know the key definitions in a mathematical subject.

This course satisfies the Reasoning Requirement (G) and (RG) - the ability to understand and utilize mathematical and/or logical relationships, to analyze data, to construct and assess arguments, and to make sound judgments.

Course unit instruction: This course meets for 3 hours per week. Additional instructional activities for the course include group work outside of class and other learning opportunities such as workshops and colloquia distributed across the semester.

Homework: Homework will be assigned each week and will take on a variety of formats, such as readings, written solutions to problems or presentations. It is extremely crucial that you keep up with readings from the textbook since they go into more detail than class time allows. Additional readings from outside of the textbook may be assigned later in the semester.

Written solutions to assigned homework problems will be collected on periodically. Most written work will be done in groups, and the solutions should have the names of all contributing group members. The responsibility for writing will rotate among all members of the group. Each group member will receive the same grade on the homework, so please make sure that you understand and are satisfied with the final draft that is submitted. Submitted work should be neat, organized and stapled, and will be graded for both correct solutions and also a clear explanation of your work.

Occasionally, groups may also be asked to present their work to the class, and your presentation grade will count towards your overall homework grade.

Absences: You are expected to attend every class and arrive on time for class. An absence due to emergency may be excused, provided that you can supply acceptable written evidence if required, and that you notify me *as soon as possible*. Two late arrivals will be treated as an absence. Students with no more than two unexcused absences will be given 10 extra points towards their homework grade.

A short informal quiz may be given during any class meeting. These will primarily be used to keep track of attendance and to gauge student progress and understanding. In addition, there will be several in-class assignments that may be collected at the end of the day.

Exams: There will be two 75 minute midterm exams (in class) and a three-hour cumulative final exam. All exams must be taken at the scheduled time. Make-up exams will only be allowed if you can supply *acceptable* written evidence, and that you notify the lecturer *before the end of the missed exam*.

Midterm Exam 1: Wednesday, February 18
Midterm Exam 2: Monday, March 30
Final Exam: TBA

The final exam will be scheduled by the registrar at some point in the middle of the semester. Please make sure that you are available until 3pm on Friday, May 8 to take the final exam.

Grading: The overall grade will be based on the results of exams, the scores on homework, and on class participation, which will be measured in various ways, including participation in group work, in-class assignments and short quizzes. It will be determined using the following point distribution:

Homework & Class Participation	200
1st Midterm Exam	100
2nd Midterm Exam	100
Final Exam	200
Total	600

Academic Integrity Code: Please read the AIC which is printed in full in the Student Handbook. Homework must represent your groups own efforts. Do not copy from another groupss work or other source. Use of an unapproved source, collaboration outside of ones group, or cheating on an exam may result in zero credit and referral to the Dean of Academic Life. On all exams, quizzes, and assignments you must write AIC and sign your name to indicate that the exam, quiz, or assignment was completed in compliance with the academic integrity code. On group assignments, this means that the only people who contributed to the assignment signed the paper, and each person listed on the assignment made a contribution.

Accomodations for Students with Disabilities: Students with disabilities requesting classroom or course accommodations must complete a multi-faceted application/approval process through the Office of Disability Services prior to the development and implementation of an Accommodation Plan. Each Accommodation Plan is individually and collaboratively developed with the Directors or staff of the following Departments, as appropriate: Academic Resource Center, Office of Counseling Services, Student Health Services, and the Office of Disability Services. If you have not already done so, please contact the appropriate Department to have a dialogue regarding your academic needs and the recommended accommodations, auxiliary aides, and services. Then, when you have all the proper paperwork for instructors from that office, please come see me right away so that we can make any necessary arrangements.

Course Outline: The following plan for the course is tentative and may be subject to change.

Lecture	Date	Sections	Topics
1	M 1/12	1.1 1.2	Graphs and Circuits Euler Circuits
2	W 1/14	1.3	Eulerization
3	W 1/21	2.1 2.2	Hamiltonian Circuits Travelling Salesman Problem
4	M 1/26	2.3	Heuristic Algorithms for TSP
5	W 1/28	2.4	Minimal Cost Spanning Trees
6	M 2/2	9.1 9.2	Introduction to Voting Theory Majority Rule and Plurality Voting
7	W 2/4	9.2	Condorcet's Method
8	M 2/9	9.3	Other Voting Systems
9	W 2/11	9.3	Fairness Criteria
10	M 2/16	9.4 9.5	Arrow's Theorem Approval Voting
11	W 2/18		FIRST MIDTERM EXAM
12	M 2/23	10.1	Manipulability of Voting Systems
13	W 2/25	10.2	Nonmanipulable Systems
14	M 3/9	10.3	Manipulating Runoff Systems
15	W 3/11	10.4 10.5	Impossibility Theorem Chair's Paradox
16	M 3/16	11.1	Weighted Voting Systems
17	W 3/18	11.3	Banzhaf Power Index
18	M 3/23	11.2	Shapley-Shubik Power Index
19	W 3/25	11.4	Comparing Voting Systems
20	M 3/30		SECOND MIDTERM EXAM
21	W 4/1	14.1	Apportionment
22	W 4/8	14.2	Hamilton Method
23	M 4/13	14.3	Jefferson and d'Hondt Method
24	W 4/15	14.3	Webster and Sainte-Lague Method
25	M 4/20	17.1 17.2	Binary Codes Parity Check Sums
26	W 4/22	17.3	Data Compression
27	M 12/27	17.4	Cryptography
28	W 12/29		Review