

MTH 244: Discrete Mathematics

Course Syllabus Fall 2012
Chatham University

Meeting Times: TTH 10:00-11:15 in Buhl Hall 024

Instructor: Mr. John Wenskovitch

Email: jwenskovitch@chatham.edu

Office: Buhl 218

Office Hours: Monday 1:00-2:00, Thursday 11:15-12:15, Friday 1:00-2:00

Course Catalog Description

This course is an introduction to the fundamental logic and mathematical concepts of discrete quantities. Emphasis will be on the careful and precise expression of ideas. Topics include sets and logic, relations and functions, proof techniques, algorithms, combinatorics, discrete probability, graphs, and trees.

Prerequisites: None.

Relationship to the College Mission

This course is required for the B.A. and B.S. in mathematics. Additionally, this course is part of the mathematics curriculum that prepares World-Ready Women.

General Objectives

The objective of this course is to understand:

1. The application of logic and notation to mathematical proof.
2. Set, functions, and relations as mathematical abstractions.
3. Combinatorial techniques and their application to probability.
4. Graphs and trees as tools for describing systems of nodes, edges, and walks.

Course Outcomes

1. Prepare students to do well on **written exams** featuring a variety of topics, including logic, mathematical writing, set theory, functions and relations, combinatorics, probability, and graphs and trees.
2. Foster in students **text-based critical thinking**.
3. Make **connections to computing**.
4. Students will gain experience in the **design of algorithms**.
5. Heavy **focus on the applications** of discrete mathematics, including computers and algorithms, reasoning, graphics, and cryptography.
6. Students will develop skills in basic **logic** and logical analysis.
7. Students will learn how to **critically evaluate information** in problem statements.
8. Students will develop skills in **numerical and algebraic manipulation**.
9. Students will learn standard **mathematical notation**, its uses, and its applications.

Student Learning Outcomes

Students completing this course should be able to:

1. Determine recursive and closed formulas for numerical sequences.
2. Apply the operations of propositional logic to determine the equivalence of propositions and the truth of implications.
3. Apply proof by induction, by contradiction, and the pigeonhole principle.
4. Apply the language of sets and set properties to number systems.
5. Determine the properties of a particular relation.
6. Apply permutations, combinations, and the binomial theorem to counting.
7. Determine probabilities of events using combinatorics.
8. Categorize systems of vertices and edges using graphs and trees.

Teaching and Learning Methods

The main mode of learning in this class is reading the textbook and working and presenting assigned homework exercises from the text. Lectures will provide explanation and emphasis for material and examples in the textbook. The instructor will ask questions to stimulate thinking and participation. Students' comments and questions are highly encouraged. Computer utilities and other Internet resources will be used to supplement lectures and discussions.

Required Texts and Materials

- **Required Text:** *Discrete Mathematics: Mathematical Reasoning and Proof with Puzzles, Patterns, and Games*, Douglas E. Ensley and J. Winston Crawley, 1st Edition (ISBN: 978-0-471-47602-3)
- **Calculator:** A calculator is required, preferably one with combinatorics, logarithmic, and exponential functions, and should be brought to all classes and exams.
- **Moodle:** Chatham's Moodle class management software will be used to post information (syllabus, schedule, assignments, grades, announcements) and to post some assignments.
- **PACE Center (Library):** provides FREE tutoring for all students at Chatham

Grading and Evaluation

Your total grade for the course will be based on the following, weighted appropriately:

- Exam 1 (20%)
- Exam 2 (20%)
- Exam 3 (20%)
- Homework & Quizzes (30%)
- Attendance & Participation (10%)

Three exams will be given in this class, spaced roughly five weeks apart. The final **will** be cumulative, as later parts of the course will build on your knowledge from previous weeks. Graded homeworks and quizzes will alternate, spaced such that a quiz will fall midway between each of the exams, and a graded homework will be due near each exam. Ungraded homeworks will be provided for practice during the periods when quizzes are expected.

The participation grade will be based on attendance (includes arriving on time, remaining until class is dismissed, and notifying the instructor in advance if you know you will be absent), asking pertinent questions demonstrating evidence of completing reading assignments, and participation in the class discussions and problem-solving sessions.

The grade scale is as follows, with a plus or a minus added to a grade within 2 points of a break point:

A – 90-100	A	4.00	excellent
B – 80-89	A-	3.67	
C – 70-79	B+	3.33	good
D – 60-69	B	3.00	
F – below 59	B-	2.67	
	C+	2.33	satisfactory
	C	2.00	
	C-	1.67	
	D+	1.33	minimal performance
	D	1.00	
	D-	0.67	
	F	0.00	unsatisfactory performance, no credit

Raw grades for the exams are based on the accuracy and merit of the content. In addition, the grades for the exams will be affected negatively if the quality of language use or the mechanics of the calculations undermine the overall logic and credibility of the content.

No late assignments are accepted without a documented illness or emergency. If you are unable to attend class for any other reason, you must make arrangements with me to turn in your assignment BEFORE class. Exams must be taken at scheduled times. This includes the final exam. Please check the syllabus and with the instructor BEFORE making any travel plans for the end of the semester. Missed exams will receive a grade of zero without a documented illness or emergency.

Mathematicians frequently make use of technology in their work. However, technology can sometimes make assignments too easy, and can prevent students from learning the calculations behind various mathematical techniques. Therefore, all homework assignments should be hand-written, unless specifically noted that a problem should be solved using technology. Additionally, students are permitted to collaborate on the procedures and theory behind solving individual homework problems; however, the homework that you submit should be your own (solutions should not be shared), and you must note any and all collaborators at the top of your homework.

All Chatham students have been provided with a laptop computer, and we will occasionally use these computers during lessons where the focus is solving statistics problems with technology. At other times during class, laptops are permitted to be used for taking notes, but not for any other purpose (e.g. quizzes, exams, surfing the Internet). Please do nothing to distract other students from learning.

Attendance Policy

The University Catalog states: Every student enrolled at Chatham accepts the responsibility to attend all required class meetings. To obtain the fullest benefit from their courses, students must participate fully. This implies attending regularly, engaging in course activity, completing work on time, and making up work missed because of an emergency absence.

In this course, students are expected to attend all class meetings. Students who are absent from class without excuse cannot expect assistance with obtaining missed lecture notes or handouts, and are responsible for obtaining any information regarding changes in assignment due dates, testing dates, and other requirements. According to the University Catalog, the Vice President for Academic Affairs may excuse absences only in the case of a documented illness or other serious emergency.

The Catalog also states that it is the student's responsibility to let the instructor know within the drop-add period at the start of the term if she will have to miss class for religious reasons, athletic activities, or other scheduled events.

Disability Statement

Chatham University is committed to providing an environment that ensures that no individual is discriminated against on the basis of her disability. Students with disabilities, as defined under the Americans with Disabilities Act of 1990 (ADA) and who need special academic accommodations, should notify the assistant dean of the PACE Center as soon as possible. The PACE Center will work with students and the course instructor to coordinate and monitor the provision of reasonable academic accommodations.

Cheating and Plagiarism

Cheating is defined as the attempt, successful or not, to give or obtain aid and/or information by illicit means in meeting any academic requirements, including examinations. Plagiarism is defined as the use, without proper acknowledgement, of the ideas, phrases, sentences, or larger units of discourse from another writer or speaker. Procedures for handling cheating and plagiarism are discussed in detail in the Chatham University Catalog.

Chatham University Honor Code

Chatham University students pledge to maintain the Honor Code, which states in part: "Honor is that principle by which we at Chatham form our code of living, working, and studying together. The standards of honor at Chatham require that all students act with intellectual independence, personal integrity, honesty in all relationships, and consideration for the rights and well-being of others." Information about the Honor Code is available in the Student Handbook.

Behavior

This is a learning environment, and it is expected that the students and the instructor will respect each other and refrain from any conduct that disrupts the learning process. Such norms are set forth in the Catalog under Student Rights and Responsibilities, and in the Student Handbook under Honor Code and Policies. Please be sure that you have read and understood these materials, as classroom behavior that violates these norms will not be tolerated. Such behavior will be grounds for withdrawal from the class, instigation of dismissal proceedings, or failure of the course. If warranted, students engaging in such behavior will be removed from class by security personnel and may be required to undergo counseling. The use of electronic devices such as cell phones or music players is distracting and not permitted during class.

Non-Registered Students Policy

In accordance with University policy, only officially registered students may attend this class and all other classes offered at the University after the drop/add period. Please confer with your academic advisor if you need assistance with the registration process or you need additional information.

Learning Resources

The PACE Center provides tutorial and other types of assistance for any course taught at Chatham University. When you encounter problems in this, or any other, course, you should start by going to your instructor's office and asking for help. After this, if you find that you need more help, then you should call or visit the PACE Center.

Concerns

All concerns about the course content, instructional material or methods, or the instructor, should first be discussed with the instructor, in person or through email. If a resolution of the complaint is not achieved, the complaint(s) should be taken to the division chairperson and then, if necessary, to the Academic Vice President.

Tentative Structure of the Semester

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| 1. Puzzles, Patterns, and Mathematical Language (Chapter 1) | Weeks 1-3 |
| 2. Mathematical Writing (Chapter 2) | Weeks 3-5 |
| Exam 1 | <i>Roughly 9/27</i> |
| 3. Sets and Boolean Algebra (Chapter 3) | Weeks 6-8 |
| 4. Functions and Relations (Chapter 4) | Weeks 9-10 |
| Exam 2 | <i>Roughly 11/1</i> |
| 5. Combinatorics (Chapter 5) | Weeks 11-12 |
| 6. Probability (Chapter 6) | Weeks 12-13 |
| 7. Graphs and Trees (Chapter 7) | Weeks 14-15 |
| Exam 3 | <i>12/13, 8:45 AM</i> |