DISCRETE MATHEMATICS
FALL 2010

Course Number: V63.0120.002
Classroom: 710 Silver Center
Times: TuTh 11:00am–12:50pm
Course Website: Blackboard

Instructor: Dr. Tom LaGatta
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Required Texts:

Topics:
I. Certainty
• Logic (§1.3–1.5)
• Mathematical Writing and Proofs (§2.1–2.3, 2.5)
• Set Theory (§3.1–3.3)
• Functions and Relations (§4.1, 4.4, 4.5)

II. Uncertainty
• Probability Theory
• Combinatorics (§5.1–5.3)
• Discrete Probability (§6.1–6.3)
• Graph Theory (§7.1, 7.3) and Markov Chains (§6.6)

Goals: In this course, we will highlight two major themes in modern mathematics. One theme is certainty, exemplified by logic. Modern mathematics is a solid science, which stands firmly on the foundation of set theory. From the Fundamental Theorem of Calculus to the Poincaré Conjecture, every result in mathematics can be derived from basic axioms. We will learn how to use logic to reason rigorously, how to distinguish correct mathematical arguments from faulty ones, and how to write in a precise, unambiguous manner.

The second theme is uncertainty, exemplified by probability. Theoretically, we could use Newtonian mechanics to predict the outcome of the roll of a die. However, the resulting mathematical system is so complicated that it effectively random. By treating uncertainties as random, our calculations become tractable and applicable. We will learn the basics of probability theory, including the Law of Large Numbers and the Central Limit Theorem. We will also learn combinatorics in order to calculate in discrete probability, and graph theory to develop the theory of Markov Chains.

Homework: Homework will be assigned and collected once each week. Late homework will not be accepted; however, when I compute your final grade I will drop your lowest homework score. Homework is worth 10% of your final grade.

Quizzes: There will be five quizzes, each announced at least one week in advance. Quizzes will start at the beginning of class. You may not make up missed quizzes; however, when I compute your final grade I will drop your lowest quiz score. Quizzes are worth 10% of your final grade.

Midterms: There will be in-class midterm examinations on Thursday, October 14 and Thursday, November 18. I will give make-up exams only in exceptional circumstances (e.g., death in the family, outbreak of mono). Please notify me far in advance. Each midterm exam is worth 25% of your final grade.

Final Exam: The cumulative final examination for this course is scheduled for Tuesday, December 21 from 10:00am–11:50am. The location will be announced in advance. The department will not be able to accommodate early finals for non-academic, non-emergency reasons. Plan your travel schedule accordingly. The final exam is worth 30% of your final grade.