

<b>CS 506, Sect 002</b> <b>Course Syllabus</b> <b>Spring 2014</b>	<b>Foundations of Computer Science I</b> <b>(Discrete Mathematics for CS)</b> M,W 11:30 am – 12:55 pm, TIER 113	<b>Dr. David Nassimi</b>
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**Course Description:** This is a graduate bridge course that provides the mathematical and analytical foundations of computer science. It is designed for entering MS students who need to strengthen their math background before taking the core course CS 610. According to a new CS department policy starting Fall 2010, this course carries credits towards MS degree. The course covers the material traditionally known as “discrete mathematics”, with special emphasis on CS applications and analysis of algorithms. The course topics include sets and logic, proof techniques, proof by induction, functions and relations, analysis of algorithms, recursion, recurrence equations, divide-and-conquer design technique, counting methods (permutations and combinations), basic discrete probability, and if time permits, introduction to number theory and a brief introduction to graphs and trees.

**Text:** R. Johnsonbaugh, *Discrete Mathematics*, 7th Edition, Pearson Prentice Hall, 2009. ISBN-13: 978-0-13-159318-3; ISBN-10: 0-13-159318-8

**Course Objectives (what you are expected to know to complete this course)**

1. Know basic mathematical tools and terminologies used in computer science
2. Know set algebra, propositional logic, reasoning, and basic proof techniques
3. Know induction, recursion, recurrence equations, and how they are interrelated
4. Know the mathematical tools used to analyze efficiency of algorithms
5. Implement simple programs and run experiments to measure their time complexity
6. Learn permutations/combinations, basic discrete probability, and applications

**Course Evaluation (Assessment):**

<b>Evaluation:</b>		<b>Exam Dates:</b>	
Assignments	25%		
Exam1	25%	Week 6	Wed Feb 26
Exam2	25%	Week 12	Wed April 16
Final	25%	Finals week	To be announced by the Registrar

**Notes:** Pictured NJIT ID required for all exams. All exams are closed books/notes.

**Policies:**

1. Assignments must be done by you individually. Team-work not allowed.
2. Submit paper-copy of assignments at the start of the class period on the due date.
3. Late assignments will not be accepted.
4. **Website:** You must check the course website regularly for posting of syllabus, assignments, announcements, and old exams.

5. **Academic Integrity:** Familiarize yourself with NJIT Honor Code: <http://integrity.njit.edu>. Any evidence of dishonesty will be dealt with seriously and reported to the Dean of Students.

### CS 506 Course Outline

Week (Approx)	Topic	Reading from Johnsonbaugh (7 <sup>th</sup> Ed.)
1	<b>Algebra Self-Review</b>	Appendix B, pp.631-643
1-2	<b>Sets and Logic</b> Sets Propositional Logic (Application: Google Search) Quantifiers (Application: Database operations)	Ch. 1
3-4	<b>Proof Techniques</b> Direct Proof, Counterexample, Contrapositive, Proof by Contradiction, Enumeration Proof Proof by Induction; Strong Induction	Ch. 2 Skip 2.3: Resolution proofs
5	<b>Functions and Relations</b> Functions Relations Properties: Reflexive, Symmetric, Transitive Partial Order, Total Order, Equivalence Relations Matrices of Relations Application: Relational Databases	Ch. 3
	<b>Exam 1 (See page 1 for Exam Date)</b>	
7-8	<b>Algorithms</b> Analysis of Algorithms Recursive Algorithms Use of Recurrences to Analyze Algorithms	Ch. 4
9-10	<b>Recurrence Equations</b> Divide-and-Conquer Recurrences Master Theorem Linear Recurrences	Ch. 7 Posted Notes
	<b>Exam 2 (See page 1 for Exam Date)</b>	
12	<b>Counting Methods</b> Permutations and Combinations Principle of Inclusion/Exclusion Pigeonhole Principle Introduction to Basic Probability	Ch. 6
13	<b>Introduction to Number Theory</b> (if time permits)	Ch. 5
14	<b>Introduction to Trees and Graphs</b>	Ch. 8, 9