

## Math 4032 (Combinatorial Analysis) Spring '11

- **Instructor:** Asaf Shapira
- **Time/Location:** Skiles 154, Tuesday/Thursday 16:30-18:00
- **Office hour and location:** Skiles 262. Please schedule with me.
- **Contact info:** asafico@math.gatech.edu
- **Prerequisites:** MATH 3012 or equivalent

### Suggested Reading:

- *Combinatorics: Topics, Techniques, Algorithms*, by P. Cameron, 1994.
- *Invitation to Discrete Mathematics*, by J. Matoušek and J. Nešetřil (Second Edition), 2008.
- *How to Count: An Introduction to Combinatorics*, by R.B.J.T. Allenby and A. Slomson (Second Edition), 2011.
- *A Course in Combinatorics*, by J.H. van Lint and R.M. Wilson (2<sup>nd</sup> edition), 2001.

**Course Objective:** To develop interest in a variety of topics in Discrete Mathematics.

**General grading policy : Homeworks 40%, Final Exam 60%. You must pass the final exam!**

Homeworks will be assigned, collected and graded on a regular basis. You are strongly advised to (attempt to) solve all the homework problems. You are allowed to discuss your homework assignments with other students, but you are required to write the solutions on your own. In other words, you are **not** allowed to copy another student's solution.

**Late submission of HWs is discouraged with a penalty of 20%.**

### Suggestions:

- Please feel free to ask questions at any time: before, after or during the class.
- Please make use of my office hours.
- Class participation and discussion is highly encouraged.

**Academic Dishonesty:** All students are expected to comply with the Georgia Tech Honor Code. Any evidence of cheating or other violations of the Georgia Tech Honor Code will be submitted directly to the Dean of Students. The institute honor code is available at <http://www.deanofstudents.gatech.edu/Honor/honorcode.txt>

# Course: Math 4032 (Combinatorial Analysis) Spring '007

**Instructor :** Prasad Tetali, office: Skiles 126, email: tetali@math.gatech.edu

**Office Hours:** Mon, Wed. 11am – noon; Thurs. 2:00 – 3:00pm

## Course Outline:

### Suggested Text books:

(1) *Extremal Combinatorics : with applications in computer science*, by Stasys Jukna (Springer 2001). (2) *Combinatorics: Topics, Techniques, Algorithms* by Peter Cameron, (Cambridge University Press, 1996 (reprinted)).

Another good source: (3) *A Course in Combinatorics*, by J.H. van Lint and R.M. Wilson. Cambridge University Press (Second Edition, 2001).

### Course Objective.

• Introduction to advanced topics in combinatorics; to demonstrate the strength (and joy) of combinatorics when used in conjunction with other branches of mathematics such as analysis, probability and linear algebra.

**Topics include the following:** Most topics will be discussed for about a week.

Introduction to

- Extremal graph theory
- Extremal set theory
- Ramsey theory
- The Probabilistic Method
- Revisiting : Recurrence relations and Generating functions
- Permanents
- Entropy techniques and asymptotic enumeration
- $(0,1)$ -matrices
- Hadamard matrices and Reed-Muller codes
- Projective and Combinatorial geometries
- Polya's theory of counting
- Linear algebraic methods
- Lattices and Mobius inversion

**General grading policy : Homeworks 20%, Tests 50%, Final exam 30%**

**Test 1:** February 7th    **Test 2:** March 14th    **Test 3:** April 18th

**No make-up tests will be allowed.**

Homeworks will be assigned, collected and graded on a regular basis. You are strongly advised to (attempt to) solve all the homework problems. **Late submission of HWs is discouraged with a penalty of 20%.**

### Suggestions:

- Please feel free to ask questions at any time: before, after or during the class.
- Please make use of my office hours.
- Class participation and discussion is highly encouraged.