Math 557-01 Probabilistic Methods in Combinatorics Spring 2010

Lecture	TR 1:50-3:15pm, E1 124	Problem Session	To be determined
Instructor	Robert Ellis, Asst. Prof. of Appl. Math	Phone	(312)567-5336
Office	E1 Rm 105c	E-mail	rellis@math.iit.edu (for brief questions/clarification)
Office Hours	MW walk-in TR by appointment (for in-depth questions)	Course Homepage	http://math.iit.edu/~rellis/teaching/557S10/

Text:

The Probabilistic Method, Noga Alon and Joel Spencer, 3rd edition, Wiley Interscience.

Description:

Graduate level introduction to probabilistic methods, including linearity of expectation, the deletion method, the second moment method, and the Lovász Local Lemma. Many examples from classical results and recent research in combinatorics and graph theory will be included throughout, including from Ramsey Theory, random graphs, coding theory, and number theory. Topics are to be presented/drawn from the individual experience of participants.

Attendance:

Successful completion of this course and mastery of the techniques therein requires uniformly good attendance. Exceptions for absolute necessity will of course be understood. The instructor reserves the right to reduce a student's final course percentage proportionately to the number of unexcused absences.

Grade Breakdown:

1. (35%) Scribe Notes, Homework, and Recitation
    a. (5%) Scribe notes – writing and reviewing
    b. (15%) Written homework solutions
    c. (15%) Presentation (recitation) of solutions in class
2. (15%) Presentation and Project
    a. (5%) Early-term presentation on individual interests (template to be provided)
    b. (10%) Course project and late-term presentation
3. (50%) Exams
    a. (25%) Midterm exam, with possible take-home component
    b. (25%) Final exam, with possible take-home component

1. **Scribe notes.** For each class, one student will act as the scribe for the class, and one student will act as the reviewer of the notes. The **scribe's duty** is to take careful notes during the lecture, and compose these notes into a LaTeX document (see templates on course homepage). The notes should have good formatting into sections with separate statements for theorems and proofs, complete and understandable explanations, and full citations for any material referred to (such as the section in the course textbook). The **reviewer's duty** is to review the document that the scribe has drafted, and supply the scribe with a list of any errors, including mathematical, grammatical, or in terms of missing references or citations. Every student will be both a scribe and a reviewer on a rotating basis, but not both for the same lecture.

Scribe notes and review timeline

Scribe notes first draft due (send to reviewer, cc instructor on email): 48 hours (2 days) after lecture

Reviewer's response due (send to scribe, cc instructor on email): 96 (4 days) hours after lecture

Scribe's final version due (send to instructor): 144 hours (6 days) after lecture

Late penalty: 20% late penalty per day or fraction thereof

Homework exercises will be posted weekly, and consist of problems due with a written solution, and problems for presentation (recitation) to the class, possibly during a mutually agreed additional problem session. Written homeworks are expected to be well-organized, legible, and of good writing quality; for full credit, a solution must be easily readable, with a balanced composition of expository text and mathematical equations.

2. The early-term presentation by each student is a short presentation following a given template whose purpose is to inform the class and the instructor about each student's interests and/or research. The course project and late-term presentation is meant to provide each student the opportunity to apply probabilistic methods to his/her own research; alternatively, one or more appropriate published research papers or book topics may be selected and presented to the class.

3. There will be an in-class component for both the midterm and final exams. At the option of the instructor, there may be a take-home component for either.

Topics:

See sample course syllabus.

Homework Collaboration, Avoiding Plagiarism:

You may conduct oral collaborations on the homework with the other students in the course only. This means all written materials generated during discussions must be discarded afterward, and solutions written down separately by each student. This includes both recitation and written homework problems. The justification is that learning is cemented by working a problem out step-by-step on one's own, and being led through a solution does not allow mastery. This principle applies also to assistance in office hours. I will enforce this principle strictly, so if you are unsure in a particular situation contact me. Copying solutions to exercises from reference materials of any kind, including previous solutions obtained in any fashion, is strictly prohibited. Small components of a solution obtained from any outside source **must include a citation**. If you are unsure of what constitutes a "small component of a solution" you are advised to contact the instructor. All incidences of plagiarism will be treated seriously according to the IIT Code of Academic Honesty.

Final Project:

A final project is required, to be finished in the second half of the course and presented during the last week. The purpose of the final project is to explore a problem related to the student's research or personal interest, by formulating questions from the problem to which probabilistic methods can be applied. If it is unfeasible to do a project associated with personal research, a student may select a pre-existing problem and explore an unstudied avenue; in this case project work must be much more complete and precise, depending on the existing literature. In either case, the result does not have to be "publishable." The project requires an approximately 20 minute oral presentation and an associated written report (as long as necessary, but no shorter than 4 typed pages, including examples, figures, and computations, but not counting the list of references). It is recommended to plan and execute a final project that contributes to eventual publication of some of your own research; a discussion with your research advisor may be appropriate.