MATH 531H, RIGOROUS PROBABILITY, AU09

RATIONALE:

The developments of mathematics and its applications in recent half-century make it clear that the theory of probability has played an increasingly important role in such diverse areas as physics, statistics, cryptography, harmonic analysis, financial mathematics, combinatorics and even biology.

The proposed honors course, 531H, is intended as a rigorous probability course designed to meet the needs of advanced honors students. The course was offered AU07 as a 3-credit course and is being taught this quarter (AU08) as a 5-credit course under the H594 number.

The acquaintance with rigorous probability theory, its history and its multiple connections, will better prepare these high quality students for graduate studies and will help them get involved in research at earlier stages of their careers.

TENTATIVE SYLLABUS:

Week 1: Review of historical origins of probability and its developments before the 20th century.

Week 2: Basic concepts: sample space, elementary events, etc.; rudiments of combinatorial analysis

Week 3: Counting: diverse ways of sampling, allocation models, binomial coefficients, geometric probabilities

Week 4: Random variables. Distribution, expectation, density, moments, etc.

Week 5: Bernoulli trials. Three important distributions: binomial, Poisson, normal

Week 6: Limit theorems of theory of probability: laws of large numbers, central limit theorem and others

Week 7: Random walks and Markov chains

Week 8. Random processes in continuous time. Birth and death processes, queuing models, etc.

Week 9: Statistical independence in analysis and number theory

Week 10: What next? A glimpse into modern probability and its connections and applications.

GRADING GUIDELINES:

Two midterms worth 100 points each; final exam worth 200 point; extra points (100) for presentations/projects

SUGGESTED TEXTS:

Elementary Probability Theory with Stochastic Processes, Kai Lai Chung
Probability Theory-A Concise Course, Y. Rosanov
Heads and Tails. An Introduction to Limit Theorems in Probability, E. Lesigne
The Pleasures of Probability, Richard Isaac
Statistical Inference in Probability, Analysis and Number Theory, M. Kac

A. Disability Statement

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.

B. Academic Misconduct Statement

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp).