

AMS 7 and 7L: Statistical Methods for the Biological and Environmental Sciences

Undergraduate probability and statistics classes at UCSC

Now that you've (almost) finished AMS 7, there are five more courses on probability and statistics offered by the Department of Applied Mathematics and Statistics (AMS) and allied Departments that may interest you.

- CMPE 107 (Stochastic systems analysis). Introduction to fundamental tools of stochastic analysis. Probability, conditional probability, Bayes' Theorem, random variables, independence, discrete-time stochastic processes, and Markov chains. Prerequisites: CMPE 16 and AMS 27 or permission of instructor. Currently offered F, W.
- AMS 113 (Managerial statistics). Practical methods for analyzing data relevant to the management sciences, with particular emphasis on information systems management. Basic topics in probability and statistics, including correlation and simple linear regression, and multiple linear and logistic regression. Experience using statistical software package. Case studies drawn from business problems. Students cannot receive credit for this course and Economics 113. Prerequisite(s): Economics 1 and 2; and either Economics 11B or Mathematics 11B or 19B, or permission of instructor. (General Education Code: Q.) Usually offered W (will not be offered in 2006–07 while we re-evaluate the market for the course).
- AMS 131 (Introduction to probability theory). Combinatorial analysis, axioms of probability and independence, random variables (discrete and continuous), joint probability distributions, properties of expectation, Central Limit Theorem, Law of Large Numbers, Markov chains. Prerequisites: MATH 100 or CMPS 101 or permission of instructor. Currently offered S.
- AMS 132 (Introduction to statistical inference). This will be a new course (as of 2007–08) that will provide a calculus-based introduction to the ideas and methods of how optimal statistical inferential procedures are derived. Topics will include maximum-likelihood estimation, sufficiency, unbiasedness, optimal hypothesis tests, and Bayesian methods, in the context of a series of examples in one-sample and two-sample problems, correlation and regression, analysis of variance, and categorical data analysis. Will be offered in F.
- AMS 162 (Design and analysis of computer simulation experiments). Methods for the design and analysis of computer simulation experiments: random number generation; estimation of sample size necessary to achieve desired precision goals; antithetic variables and other devices for increasing simulation efficiency; analysis of the output of large “deterministic” computer programs, exploring the sensitivity of outputs to changes in the inputs. Applications drawn mainly from engineering and environmental sciences. Prerequisite(s): course 5 or 7 or CMPE 107 or AMS 131 or permission of instructor. Currently offered S (may not be offered next year).

CMPE 107 and AMS 131 are calculus-based probability courses at a level noticeably higher and more detailed than the coverage of probability we undertook in AMS 7.

AMS 113 is a statistics class which (if you took it) would review a number of topics you've seen in AMS 7 and then would go on to several important extensions of ideas this quarter, including *multiple linear regression* (which comes up in situations in which you have one quantitative outcome variable and more than one predictor variable), and *logistic regression* (which is like multiple linear regression except that the outcome is a 0/1 variable).

AMS 162 is a relatively new class on design and analysis of computer simulation experiments. I mentioned several times in this class that one way to work out things like the long run mean, SD, and histogram of the imaginary data set would be to use computer simulation — this class will tell you how to do this, and a lot more besides. If you like computer programming and math this course may well interest you.

In the next few years we expect to offer several more new upper-division undergraduate statistics courses — in particular, in 2008–09 I intend to develop a course called something like AMS 107 (*A Second Course in Statistics for the Biological, Environmental and Health Sciences*), which would cover multiple linear regression, 2- and higher-way analysis of variance, and logistic regression and other models for categorical data analysis.

If you'll still be on campus and the subject interests you, please visit the AMS web pages at

www.ams.ucsc.edu

sometime this spring to see what the AMS curriculum plan for 2007–08 will be.