**Mathematics 202 Linear Algebra and Probability Spring 2011**

## Synopsis:

This course will explore fundamental concepts, from two distinct realms of mathematics, which are especially relevant to college students majoring in computer science -- although students from other disciplines may also be advantaged by these studies. Computer graphics, web sciences, artificial intelligence, and parallel programming are a few examples of areas within computer science where ideas from linear algebra and from probability are illuminating and useful. Although it is more typical for these two mathematics subjects to be taught in separate courses, we will attempt here to tie them together wherever possible, and especially to show how they apply to specific kinds of questions that computer science students encounter.

The planned course-topics include:

- matrix arithmetic
- laws of matrix algebra
- determinants and inverses
- solutions for linear systems
- geometric applications
- matrices as transformations
- vectors in 2- and 3-dimensions
- equations for lines and planes
- discrete probability and counting
- independent and dependent events
- random variables and sampling
- discrete and continuous distributions
- the binomial and normal distributions
- expected value and variance

The pair of textbooks which accompany this course were selected with clarity, cost, coverage, and convenience in mind: they offer us succinctly presented ideas, accompanied by a rich collection of examples and worked out exercises which facilitate self-study and review -- and they have a long record of successful use by college students at a diversity of institutions. While their 'dry' style may not make for exciting reading, it does offer rapid expositions of key technical details, allowing our classroom to be the place where 'life' will get breathed into these topics. :-)

## Prerequisites:

From the university catalog, the official prerequisites for enrollment in this class are: Math 108: *Precalculus* (or suitable scores on the Math Placement, Math SAT, or Math ACT Exams), and C.S. 110: *Introduction to Computer Science I* (or equivalent coursework taken at another institution).

## Learning Outcomes:

- You will know how to gauge the significance of probability measurements.
- You will be able to distinguish randomness from deterministic behaviors.
- You will understand the basis for inferences based upon opinion polling.
- You will know how to represent any linear system with a suitable matrix.
- You will know how to compute the general solution for any linear system.
- You will be able to recognize geometric properties inherent in matrices.
- You will gain familiarity with laws and terminology from modern algebra.
- You will have a fresh appreciation for mathematics' role in computation.

## Instructor:

Dr. Allan B. Cruse, Emeritus Professor of Mathematics and Computer Science, Harney Science Center - Room H-222A, Tel. (415) 422-5692
Office Hours: Mon-Wed 2:15pm - 3:00pm, and Fri 12:00pm-12:45pm.
Email: cruse@usfca.edu Website:<http://cs.usfca.edu/~cruse/math202>

## Textbooks:

Seymour Lipschutz and Mark Lipson , *Probability (2nd Edition)*,
Schaum's Outline Series: McGraw-Hill (2009), ISBN 978-0-07-154352-1

Seymour Lipschutz and Mark Lipson , *Linear Algebra (4th Edition)*,
Schaum's Outline Series: McGraw-Hill (2000), ISBN 978-0-07-135203-1

## Exam Dates:

Midterm Exam will be Friday, March 11, 1:00pm
Final Exam will be Monday, May 16, 12:30pm

## Grading scheme:

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|---|---|
| Class Participation | 10% |
| Programming Projects | 10% |
| Weekly Quizes | 20% |
| Midterm Exam | 20% |
| Final Exam | 40% |

*NOTE: Unprofessional conduct, such as an abuse of USF computer privileges (unauthorized access), or a violation of academic integrity (plagiarism or fraud), will result in the student receiving a failing grade.*