M 77A (SCI 77A) Course Outline
11 - 11:50 am (MWF, Lec), 12-12:50 am (MW, Lab), RH421
Instructors: Profs. Jack Xin (Lecture) and J. Ernie Esser (Lab)
Offices: RH 540E (JX); RH425 (EE)
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Class webpage: https://eee.uci.edu/11w/36635

This is an undergraduate introductory computational mathematics course on signal processing and applications. It is part of the UCI Interdisciplinary Computational and Applied Mathematics Program (iCAMP) sponsored by the National Science Foundation.

Signal processing is a useful and powerful tool for handling data in the information age, from sound and image compression in MP3 and JPEG2000 to bioinformatics and financial data analysis. It is a nice blend of theory, computation and application. We shall study mainly one dimensional signals with an emphasis on sound signals so that you can hear the outcome on MATLAB, the computational platform for this course. Linear algebra is the foundation.

Topics to be discussed are: fundamentals of linear algebra and MATLAB computations, continuous signals, sampling, discrete signals, amplitude, frequency, noise; discrete Fourier transforms; blurring, mixing, filtering and demixing. Besides linear algebra, elements of statistics and optimization will be covered as well for signal modeling and filter construction. Applications to sounds and images will be included in hands-on MATLAB exercises during class and lab sessions.

Our Lab (RH421) is equipped with new PCs, smart boards and new furniture. Each of you will have an individual PC with remote access for doing project related work.

Lecture notes will be available. Class grades will be based on take home projects.

By completing the course, you may apply for a well-paid summer research position supported by the PRISM grant of the National Science Foundation. Over the summer of 2011, students will investigate a particular problem in the area from this course or one of the companion courses in the sequence (M77BCD). In addition to the mentored research opportunity, students will practice reading research articles, improve presentation skills, and learn about career opportunities in the field. New research findings may lead to publications in applied mathematics journals for undergraduate students, and help your future career in science and mathematics.

More information on iCAMP can be found at:
http://www.math.uci.edu/~icamp