EE 103
Applied Numerical Computing

Fall Quarter, 2004
Tu, Th 8:00-9:15
3760 Boelter Hall
http://www.eeweb.ee.ucla.edu

Preliminary Course Outline

1. Motivational Examples
2. Computer Representation of decimal numbers and round-off errors
3. "Review" of linear algebra and the calculus of functions of several variables
4. Numerical solution of nonlinear equations
5. Numerical solution of systems of linear equations, and ill-conditioned systems
6. Solution of systems of nonlinear equations
7. Numerical interpolation and curve fitting
8. Numerical integration
9. Numerical solution of systems of ordinary differential equations
Objectives and Reasons for the Course

- This course is required by your major and covers material to which every engineer should be introduced. As such, this course is essentially an "engineer's general education" course. In particular, engineers need to be introduced to the facts that how one codes and what algorithms one uses may have major impacts upon the correctness of the results for most areas of engineering and scientific computing. Indeed, one of the goals of this course is to point out that engineering and scientific computation on a computer is "tricky business" and that every engineer must be somewhat skeptical at all times when it comes to accepting the output of computer programs dealing with engineering calculations and algorithms, especially those procedures that the engineer did not write. Indeed, it is the ethical responsibility of every engineer and computer scientist to be so informed.

ABET/CSAB Accreditation

- Each of the majors of SEAS is accredited by ABET (Accreditation Board for Engineering and Technology); additionally, the Computer Science, and Computer Science and Engineering majors are also accredited by CSAB. Accreditation is a major benefit for SEAS students for employment and for professional engineering licensing. Beyond basic calculus, ABET/CSAB, as well as the SEAS faculty, strongly recommends advanced mathematics courses. Numerical analysis is one of the advanced topics that are recommended by ABET/CSAB. The latter is the reason that this course is required by your respective majors and by the faculty of the SEAS departments that are responsible for those majors. The course is required of Civil Engineering, Computer Science, Computer Science & Engineering, and Electrical Engineering students. Chemical Engineering students are required to take a somewhat similar course in the Chemical Engineering Department.
Computer Work

• Numerical analysis and numerical computing are vast subjects and a one quarter course can, at best, introduce you to only a few major topics and to help you develop a "feel" for the subject and its importance for engineering computations. As such, a certain amount of computer work will be required on homework and in one or two larger computer projects. Towards this end, you should become familiar with SEASnet resources.

Recitation Section

• This is a large class for the type of material to be covered. Also, there are only 3 hours per week of basic lecture time. The recitation sections are, therefore, most important. In particular, material covered in class will be further explained, new material may be introduced, and some computer language (MatLab) and SEASnet procedures will also be explained. The recitation sections are mandatory. These recitation sections are an important part of the course since supplementary and review material will often be presented and these sections also provide you with the opportunity to ask the TAs questions about the lectures and subject material in general. Examples of the various lecture subjects will, of course, be emphasized as well.
Grade Criteria

- Homework 15%
- Project(s) 15%
- Midterm 30%
- Final 40%

Typically 15% homework assignments, 15% computer projects, 30% midterm, and 40% final examination. These percentages are approximations and may vary. For instance, if a student improves considerably, say from the midterm to the final, then the final will be more heavily weighted for that student. Also, for instance, while HW is worth 15% it will be worth considerably more for students who do not turn in several HWs. In general, if a student is missing a good portion of the HWs, that student will not pass the course. The same applies for missing MTs and projects.

Video Synchronized PowerPoint Slides Requirements

- Broadband connection
- Internet Explorer
- Series 9 Windows Media Player
- MathType Fonts
  You may download these fonts, no charge, from http://www.seas.ucla.edu/download. Follow the instructions.