Course Objectives in a Nutshell: This course serves to introduce the new engineering undergraduate to expected practices for engineering coursework and the use of basic computational tools for problem solutions. Most students will be co-enrolled in MATH 2200 (Calculus I) and will not have taken any collegiate level physics or engineering science. The desired outcomes, as defined by the ad hoc committee for ES 1060 redesign, Fall of 2006, are as follows:

- Problem solving and critical thinking skills
- Visualization skills
- Data organization and presentation skills
- Dimensional and unit analysis
- Solution of linear and nonlinear systems of equations
- Use of computer tools
- Programming of computer algorithms

Specific course mechanisms which will be implemented for the Spring 2008 to achieve the desired outcomes are summarized as follows:

- The practice of maintaining an accurate and complete course notebook will be demonstrated and assessed. This emphasis will include suggested practices for maintaining an electronic archive of solution files on both networked server storage as well as portable back-up media.
- An instructor-specified format for homework and laboratory solutions (both handwritten and electronic) will be introduced and refined throughout the semester.
- Visualization of problem descriptions by hand-sketched figures and perspective views (2D and 3D) will be introduced and refined.
- Use of an engineering/scientific calculator will be required for most numerical homework and exam solutions.
- Microsoft Word and Excel will be introduced for use in electronic documentation and communication of problem solutions (primarily in lab, but will also be required for some independent homework).
- Proper use of gravitational and absolute units of measure will be emphasized in homework, laboratory and exam solutions, as will the use of appropriate significant figures in numerical results.
- Simple first and second order statistics will be studied, including summary frequency table and histogram presentations.
- Presentation of data on linear and logarithmic two-dimensional plots will be studied, including principles of linear regression for obtaining functional fits to measured data sets.
- Roots of nonlinear equations in one variable will be studied via both hand-computed Newton-Raphson and bisection iterations and via Microsoft Excel's numerical goal seek and solver tools.
- Simultaneous linear and nonlinear equations will be introduced and developed as follows:
  - Their origin will be motivated, when possible, through analysis of simple engineering problems.
  - Solution of linear systems of up to three unknowns will be required by hand calculation on exams.
  - Matrix formulations for linear systems of equations will be introduced and their numerical solution obtained with Microsoft Excel's matrix operations.
  - Solution of linear and nonlinear systems of three or more unknowns will be examined using the numerical solver tool in Microsoft Excel.
- Laboratory exercises will consist of both purely computed solutions as well as physical measurements combined with analysis and computation.
- Extended use of Microsoft Excel will include authoring of simple Visual Basic functions requiring the understanding of sequential, conditional and looping program flow, with both numerical and text data variables.

Instructor Responsibilities: Each instructor will be responsible for two registration sections.

- The two sections will meet for lecture at the same time.
- The two sections will meet for computer-based laboratories at back-to-back times once each week.
- A Teaching Assistant (TA) will be assigned to each instructor to assist with laboratory and homework delivery and grading.
- Homework and regular hour exams will be designed by each instructor and administered per that instructor's protocols. TAs, under the guidance of the instructors, will be responsible for grading student homework solutions.
- The weekly laboratory exercises will be in common and coordinated across all sections of ES 1060. The course coordinator will be responsible for placing the lab procedures on the class website in advance of lab and for ensuring that auxiliary equipment (as needed) is available at the required times. Course instructors and their TAs will be responsible for administering each lab session. TAs, under the guidance of the instructors, will be responsible for grading each student lab solution.
- The laboratory final exam will be authored and administered by each individual instructor during the regular lab meeting time, during the last week of classes. Emphasis will be placed upon student generated computer solutions, with electronic solutions submitted at the end of the exam period. Typically the lab final exam will count as equivalent in "weight" to two regular lab solutions (e.g., 2/14 of the lab grade when a total of 12 lab procedures plus the lab final are scheduled).
- The course final exam will be comprehensive and cooperative, with all ES 1060 students sitting for a common exam authored and administered by the collective (authoring and grading) efforts of all ES 1060 instructors and TAs.
- All instructors and TAs will meet briefly each week to coordinate common activities.