Level. The course is intended for freshman with advanced placement in math and physics, and sophomores. It is not recommended to be taken by undergraduates who have already taken sophomore/junior-level courses in mechanics, thermodynamics, or fluid mechanics (such as E14, E15, E30, ME70).

Objective. Analysis is the way that modern engineers use math and science to figure out how to build great things. This course provides a unified treatment of the fundamental concepts and principles used in engineering analysis. The fundamental concepts are mass, linear momentum, angular momentum, energy, and entropy. The five associated fundamental principles express the conservation of the fundamental quantity. The course is built around the notions of balances for the fundamental quantities; getting the balances right is the most important part of any analysis, and once you have these, the rest is pretty easy. The balances themselves are easy, once you get the hang of it, so analysis (which is crucial to high-tech design) is not only important, it is easy, creative, and fun!

Credit. E10 is an approved Engineering Elective, which means you can use it to satisfy this requirement in any engineering major. It also satisfies the Engineering/Applied Science GER.

Instructor. Professor M. A. Cappelli, cap@stanford.edu, Building 520, Room 520D, 725-2020 (Office). I have an open door policy for E10 students. Most afternoons (outside of class time), 1:15-3:15 pm, are always good times. I will always make myself available, as long as I am not in a meeting or conference with graduate students.

Administrative Assistant. Mr. Perry Thorsell, Building 520, Room 520I, 723-1745 (Office). This office has my mailbox too. Use Mr. Thorsell to turn in homework, or to find me if I am not in my office and it is an emergency!

Course Assistant. Our course assistant is Ms. Eunsun Cha. Ms. Cha is finishing her Ph.D. in Mechanical Engineering. She will have weekly recitations and office hours. Her contact information and schedule will be shared with you later.

Class Schedule. Lectures will normally be on Tuesday and Thursday, 12:50 – 2:05. We will have a 50 minute workshop/recitation held weekly (time to be determined). Participation in this workshop is highly recommended because the pace of the course is fast and recitations are where you will see examples.

Workshops. I will hold weekly workshops where they will review course material through examples. Some of your participation grade will depend on your performance and attendance at these workshops. These workshops are where problem sets and exams are returned to you, and where some physical demonstrations of engineering principles will be given.

Lab Visits. We may schedule occasional (optional) laboratory visits. This is a good chance for you to scout for interesting opportunities for undergraduate research.
**Homework.** Homework will be due every week, in class (see dates below). Homework will be graded and returned the following week. Homework is designed to help you learn the material and will count for 40% of the course grade, so take it seriously!

**Homework Format.** When you do an analysis, if you do it neatly and in an organized way from the beginning, you are likely to get it right the first time and hence spend less time on it than if you do it first in a sloppy way, and then copy it over. See the methodology outlined in section 1.6 of the reader. Be sure to explain the problem briefly, and how you solved it. Don’t just give a bunch of equations with no explanations; the person reading the analysis can’t ask you questions, and so you need to be clear (but brief) in your explanation. The green engineering pads sold in the bookstore are widely used and recommended here. The lines on the backside make it easy to be neat and organized. A solution presented in pencil is fine, although pen is more permanent, and will be appreciated many years down the road.

**Homework Set 1.** Due Tuesday, July 3rd. Start early, so that you have plenty of time to get help, if needed. Do problems 1.3, 1.4, 1.5, 1.6, 1.8, and 1.9 in the Course Reader. MATLAB is not required for these problems, but will be used in future homework.

**Homework Set 2.** Due Thursday, July 12th. Do problems 2.3, 2.8, S2.1, S2.2, S2.3

**Homework Set 3.** Due Thursday, July 19th. Do problems 2.5, 2.6, 2.7, 3.1, 3.2

**Homework Set 4.** Due Thursday, July 26th. Do problems 3.3, 3.5, 3.6, 3.7, S4.1, S4.2

**Homework Set 5.** Due Thursday, August 2nd. Do problems S5.1, S5.2, S5.3, 4.1, 4.2

**Homework Set 6.** Due Thursday, August 9th. Do problems, S6.1, S6.2, S6.3, 4.3, 4.4, 4.5

**Homework Set 7.** Due Thursday, August 16th. Do problems 5.1, 5.3, 5.4, S7.1, S7.2, S7.3

**Reader.** “Introduction to Engineering Analysis”, by W.C. Reynolds, course notes for E10, available as a pdf file(s) on the course website. We will use MATLAB throughout the class. We will have some workshops for MATLAB review for those who need a primer. In lieu of a text, please purchase the student version of MATLAB at the University Bookstore.

**Midterm Exam.** Time/location TBD.

**Final Exam.** Time/location TBD.

**Course Grade.** The homework (40%), workshop participation (5%) combined is worth 45% of the grade. The final exam is worth 35%, and the midterm exam is worth 20%.