

BE 481 Senior Engineering Design I (3) (1 1-hr Lec, 2 3-hr Lab) First of a two-semester course sequence that provides a major design experience for senior students in bioengineering. Design process; project management; design methods; modeling and simulation; design optimization; engineering economics; engineering statistics, initiation of an open-ended design project. Pre: 350/350L and 360; or consent.

Required Text: **Fundamentals of Engineering Reference Handbook**;
Available at <http://www.ncees.org>

The course is oral and writing intensive. A written progress report is required every week; preferably as a concise email. A project journal should be kept and available on demand for review. A design proposal is due at the end of the semester.

An oral class presentation of work done and planned is required every other week. A presentation open to all BE faculty and students must be made during finals week.

A rough schedule will be:

The first 3 weeks will be spent deciding what problems will be taken on based on function and worth of the solution while practicing the design process and methods

Week 4 a general initial statement of the function of the design

Week 5 Cost and benefit analysis

Week 6 Applicable standards and regulations

Week 7 Mathematical models that apply and parameters needed

Week 8 -10 Refine statement of function, mathematical models, quantitative values for applicable parameters, Experiments to determine unavailable values

Week 11 Generate of 3 – 5 potential solutions

Week 11-15 Evaluate potential solutions using mathematical models, etc. Develop most likely solution into a bill of materials and sketch of the solution as completed for fabrication. Intermediate sketches if needed to direct fabrication. Final design proposal.

Grading rubric

A => client ecstatic about solution; final proposal could be turned over to another skilled engineer for fabrication; reports on time and easily understood; final oral presentation well received by faculty and students; and contributed to class success.

B => client satisfied with solution; final proposal could be turned over to another skilled engineer for fabrication with some supervision; reports not on time but easily understood; final oral presentation received by faculty and students without enthusiasm; and contributed somewhat to class success.

C => client accepts solution with reservations; final proposal requires interpretation by the designer; reports intermittent and difficult to understand; final oral presentation questioned on logic and clarity by faculty and students; and contributed very little to class success.

D => client accepts solution with trepidation; final proposal requires the designer to fabricate with alterations required during fabrication; reports seldom or indecipherable; final oral presentation faulted on logic and clarity by faculty and students; and contributed nothing to class success.

F => Failure to meet at least 3 of the conditions for a D

Your proposal should demonstrate you have attained the BE Program outcomes listed at <http://www.ctahr.hawaii.edu/be/undergrad.html>