BE/CEE 405 Engineering Economics
Fall 2008
TR 10:30 to 11:45, Webster 104

Instructor: PingSun Leung (psleung@hawaii.edu; http://www.ctahr.hawaii.edu/LeungP/)
Office & Phone: Gilmore 111, 6-8562
Office Hours: MW 2:00-3:00 p.m. and by appointment
Teaching Assistant: Scott Shibata (scott4@hawaii.edu)
Office & Phone: Gilmore 108, 6-8810
Office Hours: MW 1:00-2:00 p.m. and by appointment

Catalog Description: Economic analysis in engineering and management decision-making, interest, depreciation, income tax, cost classification, break-even analysis, economic comparisons of alternatives, benefit-cost analysis. Prerequisites: Econ 120 or 130, and senior standing; or consent.

Course Objectives: BE 405/CEE 405 prepares engineering students in making decisions regarding the acquisition and retirement of capital goods. Student will learn about the economic effects of such decisions and methods for comparing engineering alternatives using economic criteria. The overall goals are

(a)   to provide a one-semester introductory survey of engineering economics concepts and techniques that can assist engineering and engineering management personnel to make sound investment decisions;
(b)   to develop practical knowledge and hands-on experience in solving common engineering economics problems including the use of electronic spreadsheets;
(c)   to cultivate an appreciation for the economic environment of engineering and engineering management decision making.

Skills and Knowledge to be Acquired:

Investment analysis of engineering projects is the essence of this course. Students will come to understand and apply modern engineering economics techniques for sound decision-making in evaluating engineering alternatives, including capital budgeting and project financing; impact of price level changes, depreciation and taxation on choice of alternatives; replacement analysis; uncertainty and risk in operation and financing; important factors affecting investment decisions for private and public projects. Students will learn to formulate and solve problems utilizing MS Excel and investment analysis add-ins. Several examples of the applications of engineering economics concepts and techniques introduced in lectures and utilized in computer assignments will be from scaled-down 'real world' case studies.

Required Text:

William G. Sullivan, Elin M. Wicks, and James Luxhoj. 2006. *Engineering Economy, 13/E*, Prentice Hall, 675pp.

Course Organization and Administration:

While the focus of the course is to provide a survey of modern engineering economics methods for effective engineering and engineering management decision making, it is organized closely parallel the textbook around the following topics:

(1)   Introduction to engineering economics;
(2)   Cost concepts and design economics;
(3)   Cost estimation techniques;
(4)   Money-time relationships and equivalence;
(5)   Applications of money-time relationships;
(6)   Comparing alternatives;
(7)   Depreciation and income taxes;
(8)   Price changes and exchange rates;
(9)   Replacement analysis;
(10)   Dealing with uncertainty;
(11)   Evaluating projects with the benefit/cost ratio method;
(12)   Probabilistic risk analysis;
(13)   Capital financing and allocation;
(14)   Dealing with multiattributed decisions.

Class meetings are lecture-oriented. However, you are required to read the assigned materials before each class meeting in order to *participate* by raising questions and generating discussion. Make use of the student CD packaged with the textbook to master spreadsheet modeling using Excel to solve engineering economics problem in addition to the examples used in the lectures. PowerPoint lecture notes and Excel examples will be posted several days before the lectures at the Laulima site (https://laulima.hawaii.edu).

You are required to complete 13 *homework assignments* and prepared to discuss the solutions on the due date. Your completed homework assignments should be prepared in two parts: a narrative part answering the questions (in MS Word or handwritten) and an Excel attachment if appropriate. Turn in your assignments in your individual Drop Box in Laulima before class (10:15 a.m.) on the due date. **NO** late homework will be accepted.

There will be *2 midterms and a final exam*. Exam will be *open* book and notes. Also, calculators may be used. Exam questions will be similar to examples in the texts, problems discussed in class and homework assignments. Each exam will covered only topics after the last exam. For example, final exam will covered only topics after the 2nd midterm exam.

Grades will be determined from a class curve with the following grade weights:

Midterms @ 100 points	200
Final Exam	100
13 Homework Assignments @ 10 points	130
TOTAL	**430**

Tentative Schedule

Date			Topics	Assigned Readings
Aug	26	T	Introduction to Engineering Economics	Ch 1, Appendix A
	28	R	Cost Concepts and Design Economics	Ch 2, Appendix 2A
Sept	*1*	*M*	*Holiday: Labor Day*	
	2	*T*	*Last Day to Drop Classes and Switch Sections (Without "W" Grade)*	
	2	T	Cost Estimation Techniques	Ch 3
	4	R	Cost Estimation Techniques	Ch 3
	9	T	Money-Time Relationships and Equivalence	Ch 4
	11	R	Money-Time Relationships and Equivalence	Ch 4
	16	T	Money-Time Relationships and Equivalence	Ch 4
	18	R	Money-Time Relationships and Equivalence	Ch 4
	23	**T**	**1st MIDTERM**	
	25	R	Applications of Money-Time Relationships	Ch 5
	30	T	Applications of Money-Time Relationships	Ch 5
Oct	2	R	Comparing Alternatives	Ch 6
	7	T	Comparing Alternatives	Ch 6
	9	R	Depreciation and Income Taxes	Ch 7
	14	T	Depreciation and Income Taxes	Ch 7
	16	R	Evaluating Projects with Benefit-Cost-Ratio Method	Ch 11
	21	T	Evaluating Projects with Benefit-Cost-Ratio Method	Ch 11
	23	R	Price Changes and Exchange Rates	Ch 8
	24	*F*	*Last Day for In-Person Restricted Withdrawal (With "W" Grade)*	
	28	T	Price Changes and Exchange Rates	Ch 8
	30	**R**	**2nd MIDTERM**	
Nov	*4*	*T*	*Holiday: Election Day*	
	6	R	Dealing with Uncertainty	Ch 10
	11	*T*	*Holiday: Veterans' Day*	
	13	R	Dealing with Uncertainty	Ch 10
	18	T	Probabilistic Risk Analysis	Ch 12
	20	R	Probabilistic Risk Analysis	Ch 12
	25	T	Replacement Analysis	Ch 9
	27	*R*	*Holiday: Thanksgiving Day*	
Dec	2	T	Replacement Analysis	Ch 9
	4	R	Capital Financing and Allocation	Ch 13
	9	T	Capital Financing and Allocation	Ch 13
	11	R	Dealing with Multiattributed Decisions	Ch 14
	16	**T**	**Final Exam 9:45-11:45**	

Course Learning Objectives:

The Accreditation Board for Engineering and Technology (ABET) states that engineering "is the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, **economically**, the materials and forces of nature for the benefit of mankind."

Upon completing this course, the student will be able to:	Level[†]	BE Outcome[‡]
i) write structured code to simulate a system;	M	f)
ii) objectively discuss the problem and the merits of possible solutions;	D	g)
iii) formulate an effective strategy for action;	D	g)
iv) understand the social, cultural, political, and environmental impacts of biological engineering practice;	D	j)

[†] I = Introductory; D = Developmental; M = Mastery.

[‡] UH Biological Engineering Course Outcomes:

    f) The graduate has the ability to use modern engineering techniques, skills, and tools to define, formulate, and solve engineering problems.

    g) The graduate has the ability to function effectively on multi-disciplinary teams.

    j) The graduate has the background to understand the impact of engineering solutions on the surrounding context.