

Monday, 6:30 – 9:10 pm, Room RTH105

Professor: Virgil Adumitroaie
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Course Text: Park, Chan S. and G.P Sharp-Bette, Advanced Engineering Economics, John Wiley & Sons, Inc., 1990.
Reader: Fleischer, G. A., "Selections from Engineering Economy, A Reader," Revised edition, 2003.

Course References: In addition to the above texts, some course material and in-class problems may come from the sources listed below.

Pre-requisites: An undergraduate course in Engineering Economy (e.g. ISE 460) or similar. A course in traditional Economics is NOT an appropriate substitute for this prerequisite. Basic computational skills with spreadsheet modeling in Excel.

Course Objectives: This course builds on the economic analysis framework developed in the pre-requisite material. A variety of techniques for evaluating the economic consequences of alternative technology-based decisions will be discussed, including those based on projected cash flows (e.g., net present value [NPV] and internal rate of return [IRR]) as well as those stemming from standard accounting methods (e.g., payback and return on investment [ROI]). The effects of depreciation accounting, tax rates and capital gains taxes will be reviewed in order to provide a firm foundation for carrying out economic studies on an after-tax basis. A portion of the course will be devoted to alternative techniques for evaluating the risk and uncertainty inherent in economic forecast analysis. The latter lectures will be dedicated to portfolio selection methods and their application to prioritization of engineering R&D projects. With the methodologies presented in this course, the student will be able to conduct detailed, theoretically sound analyses of the economic consequences of any proposed projects, plans or policies, on a before- or after-tax basis, and taking into consideration uncertainties inherent in forecasted values.

Course Schedule: See below.

Course Assignments: See below.

Grading: As noted in the attached, there are 12 separate homework assignments, each of which is valued at 20 points (45% of grade). The midterm exam is 120 points (23%) and the final examination is 170 points (32%). The exams will be open book and open notes. You may bring a calculator, but not a laptop, PDA, or any wireless devices.

Under close guidance from the professor, all homework and exams will be graded by the TA. If dissatisfied with the TA's grading in a specific instance, the student may appeal to the professor to re-evaluate the grade. An appealed grade may be raised, lowered, or remain as originally scored. (Caution: The final grade in this course depends in significant measure on graded homework, and thus we take very seriously the academic integrity issue inherent in this activity. Do your own work. Copying the work of others is cheating and will be dealt with accordingly.)

Class Participation: Attendance will be taken; it is expected that students will want to attend every class meeting. Active participation in the class will be noted, although there will be no explicit credit given for participation.

Office Hours: Prof. Adumitroaie is available for office hours on Fridays, 3:45-4:45 pm, in GER 205. The TA, Chen Wang, is available TBD, in GER 309.

Homework: All written homework assignments are due at the class meetings on the dates indicated below and will be collected at the end of class. Offsite students should place softcopy in DEN dropbox or fax hardcopy on the day of the class. All relevant reading assignments should be completed before coming to class. Include your name, date, course number and assignment number in your submitted homework.

Late homework will be accepted up to two days past due date with 2 points penalty per day. Drop off late homework in the ISE office homework mailbox. Homework turned in later than past due date + 2 days will not receive any credit. No homework will be accepted after the last class meeting.

Course schedule and assignments are summarized below. This syllabus is subject to change as announced in class.

DATE	CLASS	TOPIC(S)	HOMEWORK
Aug 24	1	Engineering economic decisions. Financial statements. Cash flows, present value, future value.	Assigned: #1
Aug 31	2	Interest and equivalence. Transform techniques. Discrete and continuous compounding.	Due: #1 Assigned: #2
Sep 7	Labor Day No class.		Labor Day No class.
Sep 14	3	Inflation. Depreciation and corporate taxation. After-tax cash flow analysis.	Due: #2 Assigned: #3
Sep 21	4	Generalized cash flows. Cost of capital. Selecting MARR.	Due: #3 Assigned: #4
Sep 28	5	Measures of investment worth using net present value, IRR, B:C and payback methods.	Due: #4 Assigned: #5
Oct 5	6	Decision rules for ranking alternatives. Total investment. Incremental analysis.	Due: #5 Assigned: #6
Oct 12	7	Use of linear programming. Discrete capital budgeting models. Review for Midterm.	Due: #6
Oct 19	8	MIDTERM EXAM Based on lectures 1 - 7	
Oct 26	9	Utility theory overview. Mean-Variance analysis.	Assigned: #7
Nov 2	10	Measures of investment worth under risk. Statistical distributions of NPV.	Due: #7 Assigned: #8
Nov 9	11	Methods for comparing risky projects. Decisions under uncertainty.	Due: #8 Assigned: #9
Nov 16	12	Monte Carlo simulations. Portfolio theory.	Due: #9 Assigned: #10
Nov 23	13	Decision tree analysis. Replacement analysis.	Due: #10 Assigned: #11
Nov 30	14	Selection of technology R&D Portfolios. Real options. Review for Final Examination.	Due: #11 Assigned: #12 (Due Dec 4)
Dec 7	Study Day		
Dec 14	15	FINAL EXAM Comprehensive	

Course References:

Ayyub, B. M., "Elicitation of Expert Opinions for Uncertainty and Risks," CRC Press, 2002.
 Chien, C.F., "A Portfolio-Evaluation Framework for Selecting R&D Projects" . *R&D Management*, Vol. 32, pp. 359-368, 2002.
 Guikema, S.D. and M.W. Milke, "Sensitivity Analysis for Multi-Attribute Project Selection Problems," *Civil Engineering and Environmental Systems*, Vol. 20, No. 3, pp. 143-162, 2003.
 Keeney, R. L. and H. Raiffa, "Decisions with Multiple Objectives," Cambridge University Press, 1993.
 Lev B., "Intangible Assets: Concepts and Measurements," *Encyclopedia of Social Measurement*, Elsevier Inc., Vol. 2, pp.299-305, 2005.
 Park, C. S., "Contemporary Engineering Economics," 4rd ed., Prentice-Hall, 2006.
 Weisbin C.R., G. Rodriguez, A. Elfes, and J.H. Smith., "Toward a Systematic Approach for Selection of NASA Technology Portfolios," *Systems Engineering Journal*, Vol. 7, No. 4, pp. 285-302, 2004.

Academic Integrity. The Viterbi School of Engineering adheres to the University's policies and procedures governing academic integrity as described in SCampus (<http://www.usc.edu/dept/publications/SCAMPUS/>). Students are expected to be aware of and to observe the academic integrity standards described in SCampus, and to expect those standards to be enforced in this course.

Students with Disabilities. Any Student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.