

**School of Engineering
University of Guelph**

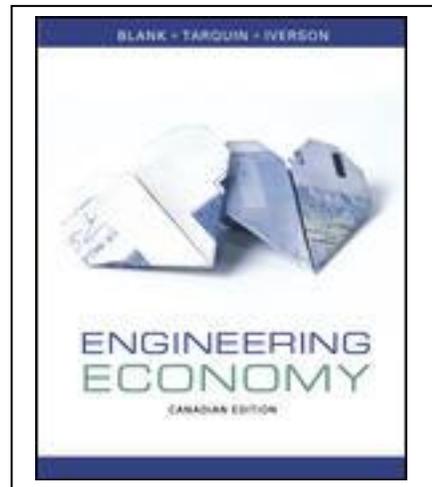
**ENGG*3240 Engineering Economics
Course Description & Outline - Fall 2008**

CALENDAR DESCRIPTION

Principle of project evaluation, analysis of capital and operating costs of engineering alternatives, benefit-cost ratio, break even studies, evaluation recognizing risk, replacement and retirement of assets, tax consideration, influence of sources of funds.

TEXTBOOK

Title: Engineering Economy, Cdn edition
Authors: Leland Blank; Anthony Tarquin; Scott Iverson;
Publisher: McGraw-Hill Ryerson, 2008.
ISBN-13: 9780070963108 (ISBN-10: 007096310X)
Available at the University of Guelph Bookstore



INSTRUCTOR

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TEACHING ASSISTANTS

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LECTURE TIMES & LOCATION

MacKinnon



Monday 12:30-1:20pm Mack 120
Wednesday 12:30-1:20pm Mack120
Friday 12:30-1:20pm Mack 120

COURSE OBJECTIVES:

This course deals with economic analysis and evaluation of engineering projects. The concepts in engineering economics are also important in the process of planning, design and implementation of engineering systems. It involves quantification of benefits and costs associated with engineering projects in order to determine their economic and financial feasibility, and choose among project alternatives. Specific objectives of the course are to:

- develop skills in the evaluation of alternative capital investments,
- master how to deal with inflation, taxes, depreciation and uncertainty,
- learn problem solving techniques involving economic evaluations,
- familiarize with current national and international economic challenges related to investment projects and expansion of business operations, and
- assess risks and uncertainty associated with engineering economic decisions.

MARK DISTRIBUTION:

Assignments:	25%
Research Report	15%
Midterm	25%
Final Examination:	35%
	100%

MID-TERM and FINAL EXAMINATION

MID-TERM

Date: October 24, 2008. Time: 12:30 – 2:00 pm, chapter 1 to 8.

Location: Mack 120

FINAL

Date: December 10, 2008

Time: 8:30 a.m. - 10:30 a.m

Location: To be announced

ASSIGNMENTS

There will be 5 assignments. Each assignment is worth 5% and together they contribute 25% to your final grade. Due dates will be listed on the WebCT. All assignments must be completed and submitted electronically, on time for the student to be successful in the course.

COURSE MATERIAL TO BE COVERED

Chapter 1 Foundations of Engineering Economic

- Why Engineering Economy is Important to Engineers
- The role of engineering economic in Decision Making
- Performing an Engineering Economy Study
- Simple and compound interest
- Equivalence concepts
- Minimum Attractive Rate of Return (MARR)
- Cash flow diagram

. Chapter 2 Factors: How Time and Interest Affect Money

- Single-Payment Factors (F/P and P/F)
- Uniform-series Present Worth Factor and Capital Recovery Factor (P/A and A/P)
- Sinking Fund Factor and Uniform-series Compound Amount Factor (F/A and A/F)
- Interpolation in Interest Tables
- Arithmetic Gradient Factors (P/G and A/G)
- Geometric Gradient Factors
- Determination of an Unknown Interest Rate

Chapter 3 Combining Factors

- Calculations For Uniform Series That Are Shifted
- Uniform Series and Randomly Placed Single Amounts
- Calculations for Shifted Gradients
- Shifted Decreasing Arithmetic Gradients

Chapter 4 **Nominal and Effective Interest**

- Interest Rates and the Bank of Canada
- Nominal and Effective Interest
- Effective Annual Interest Rates
- Continuous Compounding
- Interest Rates that Vary over Time

Chapter 5 **Present Worth Analysis**

- Mutually Exclusive Alternatives
- The present worth (PW) Analysis of Equal-Life Alternatives
- Present worth (PW) Analysis of Different –Life Alternatives
- Future Worth Analysis
- Capitalized Cost Calculations
- Payback Period Analysis
- Life Cycle Costs

Chapter 6 **Annual Worth Analysis**

- Advantages and uses of Annual Worth
- Capital Recovery and AW Values
- Mutually Exclusive Analysis
- AW of a Perpetual Investment

Chapter 7 **Rate of Return Analysis (ROR): Single Alternative**

- Interpretation of a Rate of Return Value
- ROR using Present Worth
- Cautions when using the ROR Method
- Multiple Rates of Return
- Composite ROR Approach
- Rate of Return on a Bond Investment

Chapter 8 **Rate of Return Analysis (ROR): Multiple Alternatives**

- Why Incremental Analysis is Necessary
- Incremental Cash Flows
- Interpretation of ROR on the Extra Investment
- Incremental ROR by PW
- Incremental ROR by AW
- Multiple Alternatives

Chapter 9 **Benefit-cost ratio analysis and Public Sector Economics**

- Public Sector Analysis
- Benefit-cost ratio analysis
- Alternative Selection
- Incremental Benefit-cost ratio analysis of Multiple Alternatives

Chapter 10 **Making Choices: The Method, MARR, and Multiple Attributes**

- Comparing Mutually Exclusive Alternatives by Different Evaluation Methods
- MARR Relative to the Cost of Capital
- Debt to Equity Mix and Weighted Average Cost of Capital
- Debt Financing
- Sources of Equity Capital
- Effect of Debt-Equity Mix on Investment Risk
- Multiple Attribute Consideration
- Scoring the Alternatives

Chapter 11 **Replacement and Retention Decisions**

- Basics of Replacement Study
- Economic Service Life
- Performing a Replacement Study
- Additional Considerations in a Replacement Study
- Replacement Study over a Specified Study Period

Chapter 12 **Selection from Independent Projects Under Budget Limitation**

- Capital Rationing rationale
- Use of PW analysis in capital rationing among independent projects
Use of PW to select from several unequal-life independent projects
- Application of Linear Programming to the solution of capital budgeting problems

Chapter 13 **Breakeven Analysis**

- The Breakeven Point.
- Breakeven Analysis Between Two Alternatives.

Chapter 14 **Effective of Inflation**

- Impacts of Inflation
- Present Worth with Inflation
- Future Worth with Inflation
- Capital Recovery Calculations Adjusted for Inflation.

Chapter 15 **Depreciation Methods**

- Depreciation terms
- Straight line
- Declining Balance
- Capital Cost Allowance
- Depletion

Chapter 16 **After-Tax Economic Analysis**

- Income Tax Terminology and Relations for Corporations
- Before Tax and After Tax Cash Flow
- Depreciation Recapture, Capital Gains, and Terminal Losses: For Corporations
- After Tax PW, AW and ROR Evaluation
- Capital Cost Tax Factors

Chapter 17 **Formalized Sensitivity Analysis and Expected Value Decisions**

- Sensitivity to Variation
- The Three Estimates
- Expected Value
- Expected Value of Cash Flows
- Decision Trees
- Scenario Analysis and Utility Theory
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Chapter 18 **More on Variation and Decision Making Under Risk**

- Certainty and Risk
- Variables and Distributions
- Random Sampling
- Average and Dispersion
- Monte Carlo Sampling
- Stochastic Simulation and Deterministic Simulation

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT

Academic misconduct, such as plagiarism, is a serious offence at the University of Guelph. Please consult the Undergraduate Calendar and School of Engineering programs guide, for offences, penalties and procedures relating to academic misconduct.

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

DISCLAIMER

The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to University of Guelph Academic Regulations