

ISYE 3025 ESSENTIALS OF ENGINEERING ECONOMY

Credit: 1-0-1

Prepared Prof. Gebraeel, Spring 2012

Prerequisite(s): None.

Catalog Description:

Methods of economic analysis in engineering, including time value of money, equivalence, economic measures of worth, selection rules for alternatives, income taxes and equipment depreciation, inflation, and uncertainty.

Text:

Materials provided on the T-square web site for GT students:

<https://t-square.gatech.edu/portal>

Video Streams:

<http://www.isye.gatech.edu/engecon/lectures.php>

Objective

To enable the student to characterize the cash flows associated with engineering projects and evaluate them from the viewpoint of after-tax-cash flows.

Topical Outline

1. Financial Mathematics: Concept of Equivalence; Equivalence Formulas; Interest Rates.
2. Economic Decision Criteria. Fundamentals of Economic Decisions, Future, Present, and Annual Worth, Internal Rate of Return, Benefit/Cost Ratio and Payback Period.
3. Multiple Alternatives.
4. Taxes: Corporate Income Taxes, Depreciation Accounting, Sale of and Asset, Financing with a Loan.
5. Inflation and Uncertainty.

Outcomes

At the end of this course, students will be able to:

1. Manipulate cash flows to obtain equivalent values for a different time point or time frame.
2. Understand engineering economic decision criteria, including net present value, internal rate of return, and benefit cost ratio.
3. Form alternatives and derive valid cost/benefit estimations from available data.
4. Compare alternatives having unequal economic lives.
5. Perform after tax cash flow analysis, applying standard depreciation accounting rules.
6. Reflect inflation and uncertainty in analyses.

Course outcome \ Program Outcomes	1. identify, formulate solve engg prob by engg, sci & Math	2. produce solutions consider public health, safety, welfare, global, cultural, social, environ & economic	3 communicate with a range of audience	4 recognize ethical & professional responsibilities, make informed judgement consider resolutions in global, economic, environ and societal context.	5. effective on a team provide leadership, collaborative and inclusive environ, plan tasks & meet objectives	6. develop and conduct experiment, analyze and interpret data & use engineering judgement to draw conclusions.	7. acquire and apply new knowledge using appropriate learning strategies
1. Manipulate cash flow to obtain equivalent values	H						
2. Understand economic decision criteria, present value, IRR, benefit/cost ratio							
3. Form alternatives and derive cost/benefit estimates							
4. Compare alternatives with unequal economic lives	H						
5. Perform after tax cash flow, apply depreciation accounting rules	M						
6. Reflect inflation and uncertainty in analysis.							

Evaluation of the important outcomes

- H will be assessed by direct questions on exams

The approximate relationship from prior ABET a – k to new ABET 1 – 7.

<p>OLD Criterion 3. Student Outcomes The program must have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.</p>	<p>NEW Criterion 3: Student Outcomes The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program.</p>
<p>(a) an ability to apply knowledge of mathematics, science, & engineering (e) an ability to identify, formulate, and solve engineering problems</p>	<p>(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.</p>
<p>(b) an ability to design and conduct experiments, as well as to analyze and interpret data</p>	<p>(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.</p>
<p>(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health & safety, manufacturable, & sustainable</p>	<p>(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration for public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.</p>
<p>(d) an ability to function on multidisciplinary teams</p>	<p>(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative & inclusive environment, establish goals, plan tasks, and meet objectives.</p>
<p>(f) an understanding of professional and ethical responsibility (h) the broad education necessary to understand the impact of engg solutions in a global, economic, environmental, & societal context (j) a knowledge of contemporary issues</p>	<p>(4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.</p>
<p>(g) An ability to communicate effectively.</p>	<p>(3) An ability to communicate effectively with a range of audiences.</p>
<p>(i) a recognition of the need for, and an ability to engage in life-long learning</p>	<p>(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.</p>
<p>(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.</p>	<p>Implied in 1, 2 and 6</p>

Course outcome \ Program Outcomes	a. apply math	b. Design, conduct experiment, analyze interpret data	c. Design system	d. team	e. problem solving	f. prof/ and ethical responsibilities	g. communication	h. global, eco, envi and soc context	i. Life-ling learning	j. Contemporary issues	k. use tools for eng. practice
Ability to manipulate cash flows to obtain equivalent values for a different time point or time frame	H	M									
Ability to understand engineering economic decision criteria, including net present value, internal rate of return, and benefit cost ratio	M	M	H		H						
Ability to form alternatives and derive valid cost/benefit estimations from available data	M	H	H		H						
Ability to compare alternatives having unequal economic lives	M	H	H		H						
Ability to perform after tax cash flow analysis, applying standard depreciation accounting rules		M	H								
Ability to reflect inflation and uncertainty in analyses	M	M	M		M						
Ability to learn concepts using video streams											

Evaluation of important outcomes

The following outcomes will be assessed through the course exams:

1. Ability to apply engineering economic decision criteria to situations that require equivalence transformations on cash flows.
2. Ability to identify tax-deductible expenses, obtain profit after tax, and obtain cash flow after taxes, interest, and principal.
3. Ability to perform breakeven and expected value analysis using engineering economic decision criteria.