

IEE 3100

ENGINEERING ECONOMY

Course Syllabus

Catalog Data: Topics covered in this course include time value of money, analysis of alternatives using net present value and internal rate of return, depreciation, taxes, and inflation. Monte Carlo simulation is used throughout the course to study variability in engineering designs and the resulting economic impact. Engineering ethics case studies are presented and analyzed. Contemporary economic issues affecting engineers are discussed.

Text: Engineering Economic Analysis, Newnan, Eschenbach, Lavelle. Oxford,

References: Principles of Engineering Economic Analysis, White, Case, and Pratt.
Wiley & Sons

Coordinator: Dr. Bob White, Professor, Industrial and Entrepreneurial Engineering

Prerequisites by topic:

1. Differential and integral calculus. MATH 1230.
2. Understanding and familiarity with computer programming.

Course Objectives	Performance Criteria (department) ¹ Course
1. Understand professional and ethical responsibility.	(F1) Engineering ethics case study assignment.
2. Demonstrates knowledge of professional, societal, and global issues.	(H2) Weekly Wall Street Journal quizzes.
3. Understand how Monte Carlo simulation can be used to improve designs from an engineering and economic perspective.	Case Studies.

Calculator Requirements: The course is taught using a TI BAI Plus calculator. Homework and exams are structured assuming you have this calculator or a calculator with similar capabilities.

Topics:

- Weeks 1-4 Cost accounting and time value of money relationships.
- Analysis of how to calculate the cost of developing and producing products
 - Determining time based cash flow equivalencies
 - Development of financial statements and ratios
 - Using Monte Carlo simulation to optimize engineering design
 - Stock and Bond Valuation

- Weeks 5-8 Comparing mutually exclusive and independent projects.
 Development of internal rate of return (IRR) and net present value (NPV)
 Calculation of break even points and payback periods
 Construction of a retirement planner using Monte Carlo simulation
- Weeks 9,10 Including taxes in economy studies.
 Determination of after tax cash flows, NPV and IRR
 One variable sensitivity analysis using Excel
 Impact of debt financing
 Simultaneous variable sensitivity analysis using Monte Carlo simulation
 Short-Term Financing and Cash Management
- Weeks 11,12 Including inflation in economy studies.
 Adjusting cash flows for the impact of inflation
 Modeling unknown inflation and interest rates using Monte Carlo simulation
 Entrepreneurial Case Study
- Weeks 13-14 Risk and uncertainty.
 Calculation of expected NPV and IRR
 Determining the distribution of NPV and IRR using Monte Carlo simulation
 Capital Asset Pricing Model (CAPM)

Schedule:

Week	Chapter	TEXT READING
1	Chapter	17,1
2		2,3
3		4
4		4
5		5,6
6		7,8
7		8, Exam #1
8		9
9		10
10		11
11		12
12		12, Exam #2
13		13
14		14
15		Final Exam

This is an approximate schedule. Actual class assignments may vary from this as the class proceeds throughout the semester. When deviations occur, they will be announced in class.

Evaluation:

2 Exams, 100 pts each	200	40%
Final Exam	150	30%
Computer Assignments/reports	50	10%
Case Study Assignments/homework	50	10%
Wall Street Journal Quizzes	50	10%
Total	500	100%

Homework Problems: Recommended homework problems will be given in class. You are encouraged to work these problems to help you learn the course material. A three ring homework notebook containing all the problems assigned will be due at the final exam. **Engineering problems paper must be used in this notebook.** During the semester, homework will be periodically collected when announced in class. The homework notebook will be turned in only at the final exam for evaluation. All problems, handouts, and case studies assigned during the course must be in the notebook. Homework must be turned in when due.

Computer Assignments: Several computer assignments will be made during the semester. The assignments will require students to use Excel and Crystal Ball Monte Carlo simulation software. Written reports will be required discussing and explaining the solutions.

Engineering Ethics/Case Studies – Communication Skills: Several case studies will be discussed and presented during the semester. These case studies will illustrate how engineers need to include engineering ethics when presented with conflicting objectives involving engineering design and engineering economics. Your evaluation on these case studies will be equally determined by how well you **analyze** the scenario and by how well you **communicate** your results in a written report.

Contemporary Issues: Contemporary issues are an important part of IEE 3100. Each student will be required to read the Wall Street Journal and each class will begin with a short discussion of current issues (particularly those that affect engineers) that are in the Wall Street Journal and other appropriate publications. Each week there will be a quiz over these issues. These quizzes are intended to evaluate your understanding of the impact engineering economics decisions have with respect to a global and societal context. These quizzes comprise 10% of your grade.

Cell Phone Use: Cell phone use is not permitted during class. Please be sure your phone is turned off and put away during class.

Class Attendance: You are expected to be in class on time. Late arrivals are distracting for everyone and will not be permitted.

Grading Scale:

The following points are the APPROXIMATE points required for the corresponding grades. Actual points required may vary slightly.

A	400	C	320
BA	380	DC	300
B	360	D	280
CB	340		

Extra credit opportunities may be made available during the semester. Extra credit points can be added to your total points only if your total from all other sources is D (280 points) or better.