Fall 2019

IE 334-001: Engineering Economy and Capital Investment

Golgen Bengu

New Jersey Institute of Technology M&IE – Course Syllabus

IE 334. Engineering Economy and Capital Investment.

3 credits, 3 contact hours (3;0;0).

By Prof. Bengu

Instructor Information

Instructor:	Prof. Bengu
E-mail:	bengu@njit.edu
Office Hours:	Before and after classes and others by appointment MR 4:00pm – 5:00:pm or by appointment

Course Identification

Course Number:	IE334
Course Name:	Engineering Economy
Course Location:	ITC 2nd floor 2305
Class Times:	MR 2:35am – 3:54pm
Prerequisites:	Restriction: junior standing.

Course Description/Overview

IE 334. Engineering Economy and Capital Investment. 3 credits, 3 contact hours (3;0;0).

Introduction to the principles of engineering economics for utilization and evaluation of capital investments, including time value of money, depreciation, cost of capital, life cycle cost, net present value, and payback. Consideration of decisions involving multiple choice replacement, uncertainty, and risk.

Prof. Bengu introduces these fundamentals of engineering cost analysis concepts with emphasis on problem solving and utilizing computer tools. A high-level usage of spreadsheet is recommended and serves as the vehicle to illustrate many of the concepts, especially for the '***analysis of cash*** flows' including cost, revenue, and benefits that occur at different times and in various forms. Evaluation of engineering projects are illustrated using equivalent worth, benefit-cost, and rate of return, and statistical risk. Upon Completion of the Semester project, the students build a personal loan analysis tool that can be used as your after-school life- the financial analysis tool.

Course Policies

1. ***Attendance is mandatory***. A student who misses > 5 classes will be dropped, without credit. Getting to class late or leaving early counts as half an absence.

2. ***You must bring the textbook to class.*** The text illustrates examples and homework that will be done in the class.
3. ***Homework and projects*** must be submitted in hard copy at the beginning of class on the due date. They will not be accepted late except for special circumstances (such as jury duty or medical problem), for which you must provide documentation. Semester project will consist of a written and oral presentation. All submitted work (including exams) must include your name and student ID.
4. ***Plagiarism*** will result in zero credit for the assignment and/or an F grade in the course.
5. ***Cell phones or any other electronic devices*** must be turned off during class and are not permitted during exams (exceptions: approved computers use)

Course Resources

Course Website(s)

- Moodle<http://moodle.njit.edu> will be used for course discussion.

Required Course Text

1. Engineering Economic Analysis, 14 th Edition, Newnan, and Lavelle and Eschenbach, , Oxford University Press.
   14 th edition
2. Study Guide for Engineering Economic Analysis, 14th Edition, Newnan and Wheeler, Oxford University Press. (optional)

Grading System

Letter Grade	*Percentage*	*Grade points/credit*	*Rating*
A	93% & above	4.00	Excellent
A-	88% – 92%	3.50	Very good
B	82% – 86%	3.00	Good
B-	76% – 81%	2.50	Above average
C	70% – 75%	2.00	Average
C-	65% – 69%	1.50	Below average
D	60% - 64%	1.00	Inferior
F	59% and below	0.00	Failure
I	Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control. A grade of incomplete may be given only when approved in writing by the department chair or school dean.		
X	Conditional, with no grade points per credit; given only when the student is at fault in failing to complete a minor segment of a course, but in the judgment of the instructor does not need to repeat the course. It must be made up within the next semester in residence or the grade becomes a failure (F). A (X) grade is computed into the grade point average as a (F) grade.		

Grading Policy

Grades will be based on the following formula:

6 Homeworks (or more)	10%
2 Projects (Same Topic) **Final Exam WK**	20%
Midterm 1 **Oct**	20%
Midterm 2 **Nov**	20%
Final Exam **Dec** ***see registrar FE list***	25%
Instructor Assessment : Class attendance/participation Team Work & Integrity	5%
Total	**100%**

Late Assignments

They will not be accepted late except for special circumstances (*such as jury duty or medical problem*), for which you must provide documentation.

Collaboration/Plagiarism Rules

Specific course rules or policies regarding collaboration on graded academic exercises.

Example: Cell phones, Blackberries, iPods, PDAs, or any other electronic devices are not to be used in the classroom. Information exchanges on these devices during class are also prohibited and violate the Academic Integrity Code of New Jersey Institute of Technology.

University Policies

Academic regulations and procedures are governed by University policy. Academic dishonesty cases will be handled in accordance the University's policies.

If you have a disability that could affect your performance in this class or that requires an accommodation under the Americans with Disabilities Act, please see me as soon as possible so that we can make appropriate arrangements. The Affirmative Action Office has asked that you be made aware of the following:

New Jersey Institute of Technology complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. If you have a disability and need a reasonable accommodation for equal access to education or services at New Jersey Institute of Technology, please call the Dean of Students Office, at 973-596-3470.
For other concerns about discrimination, you may contact Computer Science Department Chair at 973-596-5488.

Academic Integrity:
Every student should read the University Code on Academic Integrity (http://www.njit.edu/academics/integrity.php). All work that you represent as your own must, in fact, be your own. Work done by others must be given proper credit.

Course Schedule
(Based on class progress deviations may occur- consult with instructor)

Week 1

Course introduction

Chapter 1 – Introduction

- Course introduction, syllabus review, Spreadsheets (1 class)
- Application of Making Economic Decisions – the process of decision making and common ethical concerns for engineers (1 class)

Week 2

Chapter 2 – Engineering Cost and Benefits

Engineering costs and estimates – fixed, variable, break event (2 class)

Check Last day to drop full semester courses with a refund

Week 3

Chapter 3 – Interest and Equivalence

Cash Flows, compounding, and time value of money (1 class)

- Introduction to economic equivalence: present future and annual worth (2 class)

HW Due: TBA

Check Last day to drop full semester courses without a grade appearing on the academic record - No Refund

Week 4

Chapter 4 – Equivalence for Repeated Cash Flows

- Cont.' economic equivalence: present future and annual worth (2 classes)

HW Due: TBA in class -

Week 5

Chapter 5 – Present Worth Analysis

- Arithmetic series, geometric gradient, rates (2 classes)

Nominal and effective rates, compounding periods, spreadsheets

Week 6

Midterm #1 (Chapters 1-5) Oct

Chapter 6 – Annual Cash Flow

Annual and future worth equivalent cash flow (2 classes)

Week 7

M 2/25 Chapter 6 –Annual Cash Flow (cont.)

W 2/27 Chapter 7 – Rate of Return

Week 8

Chapter 7 – Rate of Return (cont.)
HW Due: TBA

Check Last day to drop full semester courses with a grade of 'W'

Week 9

Break (no class scheduled)

Break (no class scheduled)

Week 10

Chapter 8 – Choosing best Alternative

Project # 1 Step 1 Completion is Due.

Week 11

Chapter 9 – Other techniques

- Project comparison using IRR and incremental analysis (2 class)
- Other Techniques – B-C, Payback (1 class)

HW Due: TBA

Week 12

- Project comparison using IRR and incremental analysis (2 class)
- Other Techniques – B-C, Payback (1 class)

Midterm #2 (Chapters 5-9) Nov

Chapter 10 – Uncertainity

Week 13

Chapter 11 –

- Depreciation – basic and historical, MACRS (1 class)
- Depreciation and income taxes (2 class)

HW Due: TBA

Week 14

Chapter 11 – cont.'

- Depreciation and income taxes (2 class)

Chapter 12 –

- Project portfolio analysis – rationing capital

HW Due: TBA

Week 15

- Project portfolio analysis – rationing capital

*Repl*acement

Week 16

- Project portfolio analysis – rationing capital
- Inflation & Min. rate of return

Class review

Project Hard/Soft Copy Final Submission

Final Week

Reading Day (no class scheduled)

Last class: Dec 12.

Final Exam Week Dec 10th??

– Confirm with the registrar for the exact FE date