

(1/8/20)

IENG 377 Engineering Economy

Section 3 3:30-4:45 TU & TH 334 Percival Hall

Number of Credit Hours – 3

Prerequisite: Engineering background or consent

Instructor: Dr. Robert C. Creese

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Office Hours: By Appointment(Initially (Weds 3-5)

Textbook: **Strategic Cost Fundamentals** for Designers, Engineers, Technologists, Estimators, Project Managers, and Financial Analysts - Morgan & Claypool Publishers (2018) (lower cost due to no commercial art work and no individual tables)

A basic calculator(non-programmable) will be required for exams and spreadsheets will be needed for some homework problems.

Course Objective:

Engineering Economy provides a systematic framework for evaluating the economic aspects of competing design solutions.

In this course the students will have understood the concepts of financial statements, cash flows and profits, cash flows before taxes, depreciation and depletion, cash flows after taxes, loans and loan interest, evaluation of alternatives, and work on a multidisciplinary team project.

IMSE Designated Outcomes and Key Abilities for IENG 377:

IMSE Outcome # 1: Students will have acquired the ability to use modern and classical Industrial Engineering methodologies such as operations research, manufacturing systems, computer programming and simulation, production systems, human factors and ergonomics, engineering statistics and quality control, and **engineering economics**.

The designated key abilities for this course for the aforementioned outcome include an understanding of the following items.

1. Income Statement and Balance Sheets
2. Cash Flow Equivalence
3. Depreciation
4. Loans, Principal & Interest
5. After Tax Economic Analysis
6. Evaluation of Multiple Alternatives

IMSE Outcome # 4 Students will have acquired the ability to work individually, on teams and on multidisciplinary teams to identify, formulate, and solve problems using industrial engineering knowledge skills and tools. The designated key abilities for this course for the aforementioned outcome includes an understanding of the following terms:

1. Work effectively in a multidisciplinary team. Teams will be formed after first report is submitted

Syllabus - Course Schedule, Topics, Text Chapters, & Assigned Problems-Spring 2020

Homework will be collected at the end of class for that assigned for that day or submitted electronically by 3:00 PM prior to class. Late homework will not be accepted. Students will not be dismissed from class until the homework is submitted and a grade of zero will be recorded for those not submitting the homework. Team homework may be accepted later in the semester. Syllabus is subject to change as semester progresses.

Week	Date	Topic(s)	Chapter(s)	Homework Due
1	Jan 14	Introduction, Textbook, Syllabus, Instructor Background		Get Textbook or E-book
	Jan 16	Fundamental Terms & Financial Statements	1	1: 3 & 8
2	Jan 21	Financial Statements and the Purcell Diagram	2	2:1 & 2
	Jan 23	Costs & Cost Estimating	3	3:4,6-9
3	Jan 28	Breakeven Analysis- Quantity & Time Based	4	4: 2,8,9
	Jan 30	Earned Value Management	5	5: 1,3,5
4	Feb 4	Fundamental Terms and Definitions	6	6: 1-9
	Feb 6	Basic Mathematical Relationships for Economic Calculations (draw the new cash flow diagram for problems 7-4&6)	7	6: 12, &7:1-6 Test 1 Formula Sheet
5	Feb 11	Basic Mathematical Relationships for Economic Calculations	7	7:10, 7:11
	Feb 13	Test 1 – Good Luck	1-7	Exam 1
6	Feb 18	Test Review, Basic Economics Factors and Equations	8	8: 1,4,6,8
	Feb 20	Basic Economic Factors & Equations		Problem 8:10 but n=1-30,50 & 100
7	Feb 25	Gradient Economic Factors and Equations- Project 1 Report Due	9	9:1-5,9
	Feb 27	Gradient Economic Factors and Equations, Project Team Formation	9	9:12,13 & 20 Problem 9:20 but n=1-30,50 & 100
8	Mar 3	Depreciation Terms, Methods & Systems & PVP for Loans	10	10:2,3,4,8,10
	Mar 5	The Impact of Loans upon Cash Flows, Taxes, & Profits Formula Sheet for Test 2	11	11:1-4
9	Mar 10	Catch-up & Project Team Formation & Project Instruction Update		
	Mar 12	Test 2 - Good Luck	7-11	Exam 2
	Spring Break	March 14-22		Spring Break
10	Mar 24	Test 2 Review, Basic Project Evaluation Techniques	12	12:1,2,4
	Mar 26	Basic Project Evaluation Techniques	12	12:7
11	Mar 31	Advanced Project Evaluation Techniques Project 2 Report Due	13	13:1,2,4
	Apr 2	Advanced Project Evaluation Techniques	13	13:7
12	Apr 7	Introduction to Risk Analysis	14	14:1,2,3
	Apr 9	Introduction to Risk Analysis	14	14:4,5
13	Apr 14	Risk Analysis with Probability Considerations	15	15: 1,2,3,4
	Apr 16	Risk Analysis with Probability Considerations	15	15:6,7,8
14	Apr 21	Final Project Report Due , Final Exam Formula Sheet Report Complete with Power Point Slides for Presentation		Project Report 3
	Apr 23	Project Presentations		
15	Apr 28	Project Presentations		
	Apr 30	Project Presentations & Course Review		
16	May 6	Test 3 - Final Examination	Wednesday @ 8:00 am	Test 3-Final Exam

Grading Scale	Graded Materials	Percent
A ≥ 90	2 Exams @ 25% each	50%
80 ≤ B < 90	Homework Total	8%
70 ≤ C < 80	Project Total	12%
60 ≤ D < 70	Final Exam @ 30%	<u>30%</u>
F < 60		Total 100%

Note: Exams will be closed book & without a computer, but exams will require the use of a basic non-programmable calculator that can perform exponential calculations.

Team Formation

The engineering economy project is a group project that involves using engineering economic relationships and cost fundamentals to solve an engineering management case. The case will reflect a multidisciplinary situation to those encountered by engineers within the first three to five years of their professional careers. Students will work on the project in groups of four to six members (7 members upper limit if class size is greater than 100) and must contain members from at least two CEMR departments/majors. The project is in three parts – the first part is individual and the remaining two parts are a team project.

1. The first project determines the total revenues and the total expenses for each year and the total amounts. This report, a cover page and an excel sheet, will be due Feb 25 – paper(in class) & electronic to the TA/Instructor.

2. The second project expands the spread sheet adding CFBT, Loan Cash Flow, CFAL , Loan Principal, Loan Interest, Depreciation, Taxable Income, Net Profits(NP), Cumulative NP, CFAT, Cumulative CFAT, Discounted NP, Cumulative Discounted NP, Discounted CFAT, Cumulative Discounted CFAT. Project Report will be due March 26. The report cover page will include the names & signatures of the team members and the team name & number and be submitted via paper (in class) and electronically.

3. The third project considers various evaluation techniques including, Present Worth, Payback Periods, Average Annual Cost, ROI, IRR, MIRR, B/C, MB/C, and PB. Others, such as Sensitivity Analysis can be attempted but may be difficult – but changes in the MARR or Tax Rate seem possible. Project Report Due April 21 and will include cover sheet, discussion of results as your preferred evaluation method, power point slides for presentation, and other information submitted via paper and electronically.

4. The team will give a 5 minute Power Point presentation of the team's assumptions, flow chart of the model developed, alternatives considered, analysis, and recommendations. Each member must present at least one Power Point slide.

Statement on Attendance

If a student is absent without an acceptable excuse on the day of a scheduled exam, you must obtain prior approval from me unless you are incapable of calling, e-mailing, or otherwise getting in contact with me. Otherwise you will receive a zero on the exam. I excuse absences due to sanctioned WVU events where your participation is required (such as a member of a WVU sport team or at a national professional society meeting). For scheduled events, one should arrange to take the test prior to the absence.

Errors

Since this is a new textbook, I would appreciate the reporting of errors that you find so they may be removed in future editions of the book. Make a list of your suggested corrections and submit it in on the last day of classes.

Academic Integrity Statement

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, instructors will enforce rigorous standards of academic integrity in all aspects and assignments of their courses. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the West Virginia University [Academic Standards Policy](http://catalog.wvu.edu/undergraduate/coursecreditstermsclassification)(<http://catalog.wvu.edu/undergraduate/coursecreditstermsclassification>). Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see your instructor before the assignment is due to discuss the matter.

Academic Standards Policy, including Academic Dishonesty

The WVU Catalog contains the full [Undergraduate Academic Standards Policy](#) and [Graduate Academic and Professional Standards Policy](#).

- [Resources for Faculty and Students for Reporting and Appealing Violations of Academic Standards](#)

Adverse Weather Statement

In the event of inclement or threatening weather, everyone should use his or her best judgment regarding travel to and from campus. Safety should be the main concern. If you cannot get to class because of adverse weather conditions, you should contact your instructor as soon as possible. Similarly, if your instructor(s) are unable to reach the class location, they will notify you of any cancellation or change as soon as possible, using agreed upon methods to prevent students from embarking on any unnecessary travel. If you cannot get to class because of weather conditions, e-mail homework assignments that are due to TA/Instructor. Instructors will make allowances relative to required attendance policies, as well as any scheduled tests, quizzes, or other assessments. [adopted 9-8-2014]

Appropriate Use of Technology Statement

Use of technology in the classroom should always be directly related to class activities and/or course learning outcomes. Inappropriate technology use can be an impediment to learning and a distraction to all members of the class. As such, inappropriate use of technology in the classroom may be considered a disruption of the class and constitute a violation of the [WVU Student Conduct Code](#) and could potentially result in a referral to the Office of Student Conduct. Use of technology in the classroom when specifically prohibited by the instructor may also constitute a violation of WVU's [Academic Integrity](#) policy.

Attendance Policy

The WVU Catalog contains the full [Attendance Policy](#).

Campus Safety Statement

The WVU Police are committed to creating and maintaining a safe learning environment for all students, faculty, and staff. Part of this mission includes educating the campus community on how to respond to potential campus threats, such as the threat of an active shooter on campus or other suspicious behaviors. Fortunately, WVU Police offer training - both online and in-person - on how to handle a variety of campus safety scenarios. All students are encouraged to visit the [WVU Police](#) (<https://police.wvu.edu/>) webpage, in particular the content under the [Active Shooter](#) (<https://police.wvu.edu/files/d/9cd33254-6b62-4858-b126-86899da4c0b7/2015-shots-fired-student.pdf>) training program. Students are also encouraged to report any suspicious behaviors on campus using the [Report a Threat](#) (<https://police.wvu.edu/emergency-management/threat-assessment>) portion of the webpage. Additional materials on campus safety prepared by WVU Police, including special safety tips and training, will also be provided on our eCampus page. [adopted 10-2-17]

Inclusivity Statement

The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in your classes, please advise your instructors and make appropriate arrangements with [the Office of Accessibility Services](#). (<https://accessibilityservices.wvu.edu/>)

More information is available at the [Division of Diversity, Equity, and Inclusion](#) (<https://diversity.wvu.edu/>) as well. [adopted 2-11-2013]

Incomplete Policy

The WVU Catalog contains the full [Incomplete Policy](#).

Sale of Course Material Statement

All course materials, including lectures, class notes, quizzes, exams, handouts, presentations, and other course materials provided to students for their courses are protected intellectual property. As such, the unauthorized purchase or sale of these materials may result in disciplinary sanctions under the [Student Conduct Code](#). (<https://studentconduct.wvu.edu/campus-student-code>) [adopted 5-11-2015]

Sexual Misconduct Statement

West Virginia University does not tolerate sexual misconduct, including harassment, stalking, sexual assault, sexual exploitation, or relationship violence [[BOG Rule 1.6](#)]. It is important for you to know that there are resources available if you or someone you know needs assistance. You may speak to a member of university administration, faculty, or staff; keep in mind that they have an obligation to report the incident to the [Title IX Coordinator](#). (<https://titleix.wvu.edu/staff>)

If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the [Carruth Center](#), **304-293-9355** or **304-293-4431** (24-hour hotline), and locally within the community at the [Rape and Domestic Violence Information Center](#) (RDVIC), **304- 292-5100** or **304-292-4431** (24-hour hotline).

For more information, please consult [WVU's Title IX Office](#) (<https://titleix.wvu.edu/resources-offices>).

Student Evaluation of Instruction Statement

Effective teaching is a primary mission of West Virginia University. Student evaluation of instruction provides the university and the instructor with feedback about your experiences in the course for review and course improvement. Your participation in the evaluation of course instruction is both strongly encouraged and highly valued. Results are strictly confidential, anonymous, and not available to the instructor until after final grades are released by Admissions and Records. Information about how you can complete this evaluation will be provided by your instructor. [adopted 4-14-2008]

Prepared by:

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January 2020