

IE 3913 – ENGINEERING ECONOMY I – SECTION 02 – FALL 2012

Class Lectures: MWF 12:00pm – 12:50pm
Class Room: SIMRALL 203
Instructor: Shaheen Ahmed
Office Hours: MWF 1:00pm – 2:40pm or by appointment
Contact: Room 320A, McCain Engineering Building
Email: sa293@msstate.edu
Office Phone: 662.325.1174

CATALOGUE DESCRIPTION

(Prerequisite: MA 1713). Three hours lecture. Principles of evaluating alternative engineering proposals. Economic measures of effectiveness, costs and cost estimates, basic comparative models, break even and replacement analysis.

LEARNING GOAL

The overall learning goal of this course is to make better economic decisions through systematic investigations of multiple competitive alternatives. After successfully completing this course, students will be able to analyze complex problems in engineering economics as well as perform excellent in the engineering economics section of the Fundamental of Engineering (FE) Exam.

REQUIRED TEXT

Newnan, D. G., Eschenbach, T., & Lavelle, J. P. (2011). *Engineering economic analysis*. New York: Oxford University Press. Eleventh Edition.

THE DESIGN OF THE COURSE

Reading Assignments	8 X 0.75%	= 06%
In Class Quizzes	8 X 2.5%	= 20%
Case Studies	5 X 4%	= 20%
Exams	3 X 18%	= 54%
		= 100%

TENTATIVE GRADE

Grade A	= 90% or higher
Grade B	= 80 % or higher but less than 90%
Grade C	= 70% or higher but less than 80%
Grade D	= 60% or higher but less than 70%
Grade F	= Less than 60%, FAIL

MSU HONOR CODE

“As a Mississippi State University Student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.”

More information on Honor Code of MSU can be obtained from the honor code website at <http://www.honorcode.msstate.edu/>

LEARNING OBJECTIVES

After successfully completing this course, students should be able to achieve the learning objectives mentioned in Table 1.

Table 1: Topics in the Syllabus and Learning Objectives

	Topics	Specific Learning Objectives
1	Engineering Costs and Cost Estimating	<ul style="list-style-type: none"> I. Define various cost concepts and their importance. II. Define engineering cost estimating. III. Explain three types of engineering estimates, as well as common difficulties in cost estimating. IV. Discuss the impact of the learning curve on cost estimates. V. Draw cash flow diagrams to show project costs and benefits.
2	Interests and Equivalence	<ul style="list-style-type: none"> I. Define and provide examples of the time value of money. II. Distinguish between simple and compound interest, and use compound interest in engineering economic analysis. III. Explain equivalence of cash flows. IV. Solve problems using the single payment compound interest formulas. V. Distinguish and apply nominal and effective interest rates. VI. Use continuously compounded interest with single payment interest factors.
3	Equivalence for Repeated Cash Flow	<ul style="list-style-type: none"> I. Solve problems modeled by the uniform series compound interest formulas II. Use arithmetic and geometric gradients to solve appropriately modeled problems. III. Use continuously compounded interest with uniform payment series.
4	Present Worth Analysis	<ul style="list-style-type: none"> I. Define and Apply the present worth criteria II. Compare two competing alternative choices using present worth (PW) III. Apply the PW model in cases with equal, unequal, and infinite project lives. IV. Compare multiple alternatives using the PW criteria
5	Annual Cash Flow Analysis	<ul style="list-style-type: none"> I. Define Equivalent uniform annual cost (EUAC) and equivalent uniform annual benefits (EUAB) II. Resolve an engineering economic analysis problem into its annual cash flow equivalent. III. Conduct and equivalent uniform annual worth (EUAW) analysis for a single investment. IV. Use EUAW, EUAC, and EUAB to compare alternatives with equal, common multiple, or continuous lives, or over some fixed study period.
6	Rate of Return Analysis	<ul style="list-style-type: none"> I. Evaluate project cash flows with the internal rate of return (IRR) measure. II. Plot a project's present worth (PW) against the interest rate. III. Use an incremental rate of return analysis to evaluate competing alternatives.
7	Choosing the Best Alternative	<ul style="list-style-type: none"> I. Use a graphical technique to visualize and solve problems involving mutually exclusive choices. II. Define incremental analysis and differentiate it from a standard present worth, annual worth, and internal rate of return analyses.

Table 1: Topics in the Syllabus and Learning Objectives continue.....

	Topics	Specific Learning Objectives
8	More Analysis Techniques	<p>I. Use future worth, benefit-cost ratio, payback period, and sensitivity analysis methods to solve engineering economy problems.</p> <p>II. Link the use of future worth analysis to the present worth and annual worth methods developed earlier.</p> <p>III. Mathematically develop the benefit-cost ratio, and use this model to select alternatives and make economic choices.</p> <p>IV. Understand the concept of the payback period of an investment, and be able to calculate this quantity for prospective projects.</p> <p>V. Demonstrate a basic understanding of sensitivity and breakeven analyses and the use of these tools in an engineering economic analysis.</p>
9	Depreciation	<p>I. Describe depreciation, deterioration, and obsolescence.</p> <p>II. Distinguish various types of depreciable property and differentiate between depreciation expenses and other business expenses.</p> <p>III. Use historical depreciation methods to calculate the annual depreciation charge and book value over the asset's life.</p> <p>IV. Explain the differences between the historical depreciation methods and the modified accelerated cost recovery system (MACRS).</p> <p>V. Use MACRS to calculate allowable annual depreciation charge and book value over the asset's life for various cost bases, property classes, and recovery periods.</p> <p>VI. Fully account for capital gains/losses, ordinary losses, and depreciation recapture due to the disposal of a depreciated business asset.</p> <p>VII. Use the units of production and depletion depreciation methods as needed in engineering economic analysis problems.</p>
10	Income Taxes	<p>I. Calculate taxes due or taxes owed for both individuals and corporations.</p> <p>II. Understand the incremental nature of the individual and corporate tax rates used for calculating taxes on income.</p> <p>III. Calculate a combined income tax rate for state and federal income taxes and select an appropriate tax rate for engineering economic analyses.</p> <p>IV. Utilize an after-tax tax table to find the after-tax cash flows for a prospective investment project.</p> <p>V. Calculate after-tax measures of merit, such as present worth, annual worth, payback period, internal rate of return, and benefit-cost ratio, from developed after-tax cash flows.</p> <p>VI. Evaluate investment alternatives on an after-tax basis including asset disposal.</p>
11	Replacement Analysis	<p>I. Recast an equipment reinvestment decision as a challenger vs. defender analysis.</p> <p>II. Use the replacement analysis decision map to select the correct economic analysis technique to apply.</p> <p>III. Calculate the minimum cost life of economic challengers.</p> <p>IV. Incorporate concepts such as repeatability assumption for replacement analysis and marginal cost data for the defender to select the correct economic analysis techniques.</p> <p>V. Perform replacement problems on an after-tax basis, utilizing the defender sign change procedure when appropriate.</p>

CLASS LECTURES

Because we will be practicing many exam type problems during our lectures, regular attendance is essential. Active participation by asking questions and engaging in active learning enhances your ability to retain information and makes class meetings more interesting. Research on learning shows that taking detailed notes during class lectures is the most effective way to organize and store information on students' minds. Other methods such as simply listening, recording lectures, or just writing down the outline and key words, do not compare. Use the outline I provide as a basic structure, and fill in details from the lecture.

Research shows that taking good notes and getting good grades are significantly correlated.

Materials you must bring in the class

1. Textbook
2. A paper notebook, pencils/pens, a calculator, reading memo, and
3. The materials I provide

COURSE WEBSITE

Log in at <https://mycourses.msstate.edu> and find the Section 02 of Engineering Economy I. The website for Engineering Economy I includes materials used in the class, question bank, practice tests for exams and quizzes, answer keys to selected text problems (The Question Bank), and links to external sites of interest. In addition, I will post grades on the website. Finally, the website has a discussion board for you to post questions and comments regarding course content. I may look at the discussion board once in a while to see if there are issues I should address in class, and if I perceive that it is being used inappropriately, I may intervene. In general, though, this discussion board is for peer interaction.

You are not allowed to post answers to a problem in the discussion board.

COMMUNICATION WITH ME REGARDING TEACHING

I am available for consultation. I hope you will contact me if you have questions or if you would like to learn more about the contents covered in this course. If your schedule allows it, I prefer that you visit me during my office hours, since I have set aside that time to focus my attention on this course. However, if you have scheduling conflicts, you may also make appointments outside of office hours.

In addition, you may contact me by e-mail. If you need a response, it is important that you leave a realistic amount of time. I may not be able to respond to your e-mail for a day or two. This consideration becomes most crucial shortly before exams. If you send an e-mail the night before an exam, you may not receive a response in time for it to be helpful for you.

Federal privacy regulations require that we discuss matters such as health issues and class performance only when we can be certain that the recipient is the student. This is only possible if you use your MSU email address, which is secure. If we receive an email from another system such as hotmail or yahoo, we have no guarantee that the author is who he or she claims to be. For this reason, we will discuss class matters only if you send us the request from your MSU account.

Developing sophisticated communications skills is one goal of your education. For this reason, you should employ university-level English – including correct capitalization, punctuation, sentence structure, salutations, and signatures – in your e-mails with me. Proofread your messages before sending them to insure that they meet university-level standards.

I may send e-mails to the entire class through the *mycourse* system. Please check your *mycourse* e-mail account regularly, even if you usually use a different e-mail address. You will be responsible for information contained in such e-mail messages.

READING ASSIGNMENTS

I will assign 11 reading assignments (10-15 pages per assignment) throughout the semester. It is very important that you complete the reading assignment at least by reading the assigned number of topics/pages/problems before you come to a class. Most of the class time will be used for higher order learning such as developing problem solving skills, critical thinking skills and communication skills with peers in an engineering setting and practical life in general.

Research shows that higher order learning is archived in the long term memory of human's brain for life time.

You will have to develop a reading memo by taking notes in your textbook, class notebooks, or separate notebooks while you read the assigned topics for each reading assignment.

Grading policy for reading assignments

1. I will check the reading memo in the class periodically and you will be graded PASS or FAIL
2. Only the best 8 will be counted towards your final grade

IN CLASS QUIZZES

There will be ten (10) quizzes given usually on Fridays. Only the best eight (8) will be counted towards your final grade. No make-up quizzes will be given.

What should you study to get better grades in quizzes?

1. The example problems in the book
2. The problems discussed and solved in the class
3. At least take one practice test for each quiz, which has already been posted in the course website

EXAMS

There will be four exams including the comprehensive final exam. The best three exams out of four exams will be counted towards your final grade. Therefore, the exam that you miss or perform worst will be automatically dropped. A make-up exam will only be provided under special conditions such as attending a conference during the exam. However, you have to provide proof of evidence to justify for a make-up exam. You may have to get a letter from the Dean of Students at MSU if I do not think your situation is strong enough to administer a make-up exam. I advise you to contact me early enough so that everything is arranged for your make-up exam.

What should you study to get better grades in exams?

1. The example problems in the textbook
2. The problems discussed and solved in the class
3. Question bank which has already been posted with answer keys in the course website
4. At least take one practice test for each exam, which has already been posted in the course website

EXAM AND QUIZ POLICY

All quizzes and exams are closed books and closed notes. You will only have your calculator and pen/pencil. I will provide all other supplies such as formula sheet, questions, paper, tables to solve problems, etc. that you need during the exam. No hats can be worn during quizzes or exams. All meeting days including lectures, exams, quizzes, are NO-TECH-ZONE; meaning that no cell phone unless you are working for an emergency service, no internet connection, and etc. If you use a device such as a personal computer to take notes, it has to be for that purpose only.

Grading policy for exams and quizzes

1. Approach or Method to solve a problem (70%)
2. Solution: use of appropriate table(s), calculation, finding correct answers, etc. (30%)

CASE STUDY

Each case study is designed based on a real life scenario based problem. Therefore, this will give you an opportunity to apply the theory you have learned to solve a complex problem in engineering economics. Five case studies will be assigned throughout the course. You can work in a group of maximum 5 students. You will have to write only one report per group for each case. Each case study will be graded based on the approach that you take to solve the problem and the solution you get. I recommend you to use Microsoft Excel for all calculations, including calculating the compound interest factors by using excel formulas.

Please submit case studies by Email at sa293@msstate.edu, before 11.59pm on the schedule date.

Grading policy for case studies

1. The approach or method (70%): brainstorming through discussions and meetings within the group members is very important to find a better approach for the case study assignment
2. Solution (30%): correct tables, correct formulas in excel, calculations, and finding answers

Distribution of grades to individual group members

1. Group Grading * 50%
2. Peer Evaluation * 50%
 - a. You will have to evaluate other group members of your group
 - b. Please download the peer evaluation form from the course website (in the case study folder)
 - c. Please send the peer evaluations by email at sa293@msstate.edu
 - d. The peer evaluation is due with the case study

Research on learning shows that peer evaluation is an effective learning tool to engage students in active learning thereby developing communication and leadership skills.

I may require oral presentation of the case study to improve your grade. In that case, I will randomly choose one or more of the group members to present the work to me for further demonstration.

In the course website, I have already uploaded an example solution for a case study so that you could understand the solution approach, solution, and report writing.

10% grade will be penalized for each day of delay after the deadline. Therefore, you get nothing from a case study if you submit 10 days after the deadline mentioned in the schedule.

What should you do to perform better in case studies?

1. Understand the materials
 - a. Active participation in the class
 - b. Complete reading assignment before you come to each class
2. Working together with other group members

FRAUD POLICY

I strongly encourage you to discuss with me if you have questions regarding fraud or academic dishonesty. For this particular course, in-person help in quizzes and exams, using unauthorized materials, copying case studies from others, etc. will be considered as academic fraud. I will consult the dean of students (<http://www.students.msstate.edu/>) if necessary. More information regarding academic policy can be obtained from here at: <http://www.msstate.edu/dept/audit/mainindex.html>

ADDITIONAL PROCEDURES AND RESOURCES

Procedure for Students with Disabilities

I encourage students with disabilities to participate fully in this course. Students with disabilities should consult with me early in the semester to arrange any necessary accommodations. Student Disability Services is Located at 01 Montgomery Hall, P.O. Box 806, Mississippi State, MS 39762, Mail Stop 9724, Phone:(662) 325-3335, Office Hours : 8 a.m. to 5 p.m., M-F. Website: <http://www.sss.msstate.edu/disabilities/>

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Maroon Alert and the siren warning system, visit the Public Safety website: <http://www.emergency.msstate.edu/>

MSU Academic Policy

Please visit <http://www.msstate.edu/dept/audit/mainindex.html> if you have more questions about the policies of MSU

University Counseling Service

The University has resources for students experiencing non-academic difficulties, such as personal strain. The University Counseling Service offers confidential consultation for students for free. You may contact Student Counseling Center, P.O. Box NL, 115C Hathorn Hall, Mississippi State, MS 39762, Telephone (662) 325-2091, Monday through Friday: 8:00 am - 5:00 pm. <http://www.health.msstate.edu/scs/>

ACKNOWLEDGEMENT

Dr. John Usher, Professor and Head, Department of Industrial & Systems Engineering, MSU
Dr. Kari Babski-Reeves, Associated Professor, Department of Industrial & Systems Engineering, MSU
Dr. Hugh Medal, Assistant Professor, Department of Industrial & Systems Engineering, MSU

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TENTATIVE SCHEDULE

M	W	Date	D	C	Q	Notes/Deadlines
1		20-Aug-12	M			
2	01	22-Aug-12	W	2		RA01 Due: Pages 36-44 & 58-59 (34-42 & 56-57 of 10 th ed.)
3		24-Aug-12	F	3	1	Edie Irvin, Senior Coordinator, MSU Co-op Program
4		27-Aug-12	M	3		RA02 Due: Pages 74-92 (72-89 of 10 th ed.)
5	02	27-Aug-12	W	3		
6		31-Aug-12	F	3	2	Kamalesh Mandal, PhD, Sr. Metallurgist, Severstal Columbus, LLC
X		3-Sep-12	M			Labor D Holiday
7	03	5-Sep-12	W	4		RA03 Due: Pages 104-114 & 118-128 (96-106 & 110-125 of 10 th ed.)
8		7-Sep-12	F	4	3	
9		10-Sep-12	M	4		
10	04	12-Sep-12	W	4		
11		14-Sep-12	F	4	4	
12		17-Sep-12	M			Case Study 1: Case # 27 submission due; Review on Exam I
13	05	19-Sep-12	W			Exam I: Chapter 1-4
14		21-Sep-12	F	5		RA04 Due: Pages 152-170 (152-168 of 10 th ed. & Handout)
15		24-Sep-12	M	5		
16	06	26-Sep-12	W	5		
17		28-Sep-12	F	5	5	
18		1-Oct-12	M	6		RA05 Due: Pages 191-202 (186-196 of 10 th ed.)
19	07	3-Oct-12	W	6		Case Study 2: Case # 10 submission due
X		5-Oct-12	F			Fall Break
20		8-Oct-12	M	7		RA06 Due: Pages 221-242 (212-232 of 10 th ed.)
21	08	10-Oct-12	W	7		
22		12-Oct-12	F	7	6	
23		15-Oct-12	M	8		RA07 Due: Pages 272-284 (260-272 of 10 th ed.)
24	09	17-Oct-12	W	8		
25		19-Oct-12	F	9	7	RA08 Due: Pages 299-318 (284-303 of 10 th ed.)
26		22-Oct-12	M	9		Ms. Gokce Palak, Industrial & Systems Engineering
27	10	24-Oct-12	W			Case Study 3: Case # 14 submission due; Exam II review ONLINE. ***** I will be out of town for a conference, no class today. *****
28		26-Oct-12	F			Exam II: Chapter 5-9
29		29-Oct-12	M	11		RA09 Due: Pages 374-397 (356-379 of 10 th ed.)
30	11	31-Oct-12	W	11		
31		2-Nov-12	F	11	8	
32		5-Nov-12	M	11		
33	12	7-Nov-12	W	12		Case Study 4: Case # 26 Submission Due
34		9-Nov-12	F	12	9	RA10 Due: Pages 411-423 (390- 402 of 10 th ed.)
35		12-Nov-12	M	12		
36	13	14-Nov-12	W	13		RA11 Due: Pages 442-462 (418-439 of 10 th ed.)
37		16-Nov-12	F	13	10	
38		19-Nov-12	M	13		
X	14	21-Nov-12	W			No Class Thanks Giving Holiday
X		23-Nov-12	F			No Class Thanks Giving Holiday
39		26-Nov-12	M	13		
40	15	28-Nov-12	W			Case Study 5: Case # 34 submission due; Exam III review
41		30-Nov-12	F			Exam III: Chapter 11-13
42		3-Dec-12	M			Review on Final Exam
43		7-Dec-12	F			Comprehensive Final Exam: 12.00pm – 3.00pm

*M=Meeting Day, W=Week, D=Day, C=Chapter, Q=Quiz, RA=Reading Assignment