

# ENGR 360 Economic Analysis

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## Instructor

Dr. Mike Lowry, P.E.  
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## Fall Semester 2018

Class time: Mon, Wed, Fri 12:30 pm – 1:20 pm  
Class location: Renfrew Hall 126  
Instructor's office hours: M, T, W 11:00 –12:00.  
Or you can email me and I will set aside time.

## Course Description

Economic analysis and comparison of engineering alternatives.  
2 credits, prerequisite: junior standing or permission from the instructor.

## Learning Objectives

Students who successfully complete this course will be able to:

1. Conduct economic analysis for capital investment decisions faced by engineers;
2. Compare alternatives using the following traditional economic analysis methods: a) present worth analysis, b) annual worth analysis, c) future worth analysis, d) internal rate of return analysis, and e) benefit-cost analysis;
3. Calculate capitalized worth;
4. Construct MARR choice tables;
5. Consider non-monetary consequences when comparing alternatives by using the following multiattribute analysis methods: a) dominance, b) satisficing, c) lexicography, d) non-dimensional scaling, and e) additive weight technique;
6. Consider risk and uncertainty when comparing alternatives through: a) breakeven analysis, b) sensitivity analysis, c) scenario analysis, and d) probabilistic analysis;
7. Calculate straight-line and MACRS depreciation;
8. Understand and appreciate the role of economic analysis in decision-making.

This course will prepare students for the engineering economy section of the Fundamentals of Engineering (FE) exam.

## Syllabus and Class Materials

The syllabus and schedule might change during the semester. The current version and additional materials are online: <http://www.webpages.uidaho.edu/~mlowry/Teaching/syllabus.engr360.pdf>

## Required Textbook and Website Access

1. **Textbook:** *Engineering Economy*, 17th Edition (2018, Pearson) by W. Sullivan, E. Wicks, and C. Koelling
2. **Website (accessible through Bblearn):** *MyLab Engineering for Engineering Economy 17<sup>th</sup> Edition*.

You will use the textbook for all readings. You will use your access to MyLab to submit homework. Every student needs their own unique access to the MyLab website. Purchase options:

A. \$127

Go to the UI Bookstore to buy a bundle that includes a loose leaf version of the textbook, and access to the online e-text, and access to *MyLab Engineering*.

B. ~\$90

First, go online to buy access to *MyLab Engineering* for \$61:

<https://www.pearson.com/us/higher-education/product/Sullivan-My-Lab-Engineering-without-Pearson-e-Text-Instant-Access-for-Engineering-Economy-17th-Edition/9780134870694.html>

Second, decide how you will get the textbook. For example, you could buy an older edition on Amazon (I saw the 15<sup>th</sup> edition for about \$20-\$60), or you can share with a friend (maybe one of you buys the bundle from the bookstore), or you can use the textbook I have placed on Reserve in the library.

## ENGR 360 Economic Analysis

### Schedule

Session	Date	Reading*	Discussion	Due*
1	M 20-Aug	1.1 -1.6	Introduction	
2	W 22-Aug	2.1, 4.1 - 4.5	CFDs and Time value of money	
3	F 24-Aug	4.6 - 4.9	Single payment and uniform series formulas	
4	M 27-Aug	4.11 - 4.12	Equivalence and gradient formulas	HW1
5	W 29-Aug	4.15 - 4.16	Nominal interest and continuous compounding	
6	F 31-Aug	4.17 - 4.19	Using Excel and Amortization	
	M 3-Sep		<i>No class, Labor Day</i>	
7	W 5-Sep	8.1 -8.2	Inflation	HW2
	F 7-Sep	FE Ch. 51	<b>Exam 1</b>	P1
8	M 10-Sep	5.1 - 5.5, 6.1 - 6.4	Present, annual, and future worth analysis	
9	W 12-Sep	5.3.3	Capitalized worth	
10	F 14-Sep	5.6, 6.4.2	Internal rate of return analysis	HW3
	M 17-Sep		<i>No class, instructor is at a conference</i>	
11	W 19-Sep	5.6	Graphical analysis and MARR choice tables	
12	F 21-Sep	10.1 - 10.11	Benefit-cost analysis	
13	M 24-Sep	13.1-13.5	Project prioritization	HW4
	W 26-Sep	FE Ch. 53	<b>Exam 2</b>	P2
14	F 28-Sep	14.1 - 14.5	Non-monetary consequences	
15	M 1-Oct	14.6 - 14.8	Multiattribute analysis methods	
16	W 3-Oct	11.1 - 11.2	Breakeven analysis	
17	F 5-Oct	11.3 - 11.4	Sensitivity analysis and scenario analysis	HW5
18	M 8-Oct	12.1 - 12.7	Probabilistic analysis	
19	W 10-Oct	7.1 - 7.4	Taxes and depreciation	HW6
	F 12-Oct	FE Ch. 52	<b>Exam 3</b>	P3

\* All Readings, HW (homework), and P (projects) are due before class begins. *I will not accept homework or projects that are late.*

### Grading Criteria

Grades are posted on <https://bblearn.uidaho.edu/> and will be assigned according to the following criteria:

Participation in class or my office	1%
6 Homeworks	24%
3 Projects	15%
3 Exams	60%

Homework is accessed and submitted through Bblearn. First link your Bblearn to *Pearson MyLab Engineering*. Click any item in "Pearson Content" and follow the instructions. *MyLab/Bblearn* [video](#) and [description](#).

**\*\*Using homework, projects, or exams from previous semesters to study for exams, to help complete your assignments, or for any other purpose whatsoever is strictly prohibited. Violators will be failed. \*\***

**\*\*Make up exams due to medical excuses will only be re-scheduled if I am notified prior to the exam and provided documentation from the Dean of students or a medical professional. \*\***

### Projects

Note that 4 out of 10 points on each project are for the quality of your report. Please refer to the example on the class webpage or consult the instructor for information about making professional, high quality reports. You can name and organize the sections of your report any way you want, but at least include an "Introduction" and "Conclusion."

[P1 Buying a house.pdf](#)

[P2 Deciding to buy or rent.pdf](#)

[P3 Choosing the best.pdf](#)

# ENGR 360 Economic Analysis

## Additional Material

**\*\*Formula sheet you can use during the exams\*\***

[Engineering Economics Excerpt from FE Reference.pdf](#)

**Project Report Example**

[Professional Report Example.pdf](#)

**Excel Files**

[Lecture excel files.zip](#)

**Fundamentals of Engineering Readings and Practice Exams**

[FE Ch. 51.pdf](#)

[FE Ch. 52.pdf](#)

[FE Ch. 53.pdf](#)

[FE Diagnostic.pdf](#)

**Monte Carlo Simulation**

[Probabilistic analysis handout.pdf](#)

[MCSim Instructions.doc](#)

[MCSim.zip](#)

<http://www3.wabash.edu/econometrics/EconometricsBook/Basic%20Tools/ExcelAddIns/MCSim.htm>

**More Resources**

[USDOT Economic Analysis Primer.pdf](#)

**Great Videos and Podcasts**

PBS "The Ascent of Money" movie series: <http://www.pbs.org/wnet/ascentofmoney/>

Value of Statistical Life: <http://freakonomics.com/podcast/kenneth-feinberg/>

Decision making: <https://www.npr.org/programs/ted-radio-hour/519264798/decisions-decisions-decisions?showDate=2018-09-14>

Predicting future benefits: <https://www.npr.org/2017/08/21/545097480/you-2-0-why-were-bad-at-predicting-our-own-happiness-and-how-we-can-get-better>

## Extra Information for Engineering Outreach

- Sometimes live lectures go over or end early, so check preceding and subsequent recordings for specific topics.
- Submit homework and projects on the due date on the syllabus by the start of the live class. You can scan and email or if you are in Moscow you can send or drop assignments in my mailbox on my door or my mailbox in the CE office.
- Submit exams by 5:00pm PST the day after the exam occurs for the live class. You will have a 3 day window to take the exams.
- Class participation points are earned through email correspondence (At least once during the semester send an email to ask me a question so that I know you're interested and engaged).
- Be sure to print and bring the formula sheet for the exams (Excerpt from FE Reference above)
- On-campus students can request to view a limited number of recorded sessions for \$10 each.

## ENGR 360 Economic Analysis

### **Student Conduct and Policies:**

Each student is expected to assist in maintaining a classroom environment that is conducive to learning. In order to assure that all students have the opportunity to gain from time spent in class, unless otherwise approved by the instructor, students are prohibited from engaging in any other form of distraction. Inappropriate behavior in the classroom shall result, minimally, in a request to leave class.

- **Attendance.** Attendance at all course activities is expected. Make up exams due to medical excuses will only be re-scheduled if I am notified prior to the exam and provided documentation from the Dean of students or a medical professional. Missing more than one period in this class is considered excessive. Lastly, you are expected to arrive to class on time.
- **Deadlines.** Assignments must be turned in by the due date and time unless prior arrangements have been made. Late assignments will not be accepted.
- **Classroom Engagement.** Use of personal phones, music players, tablets, iStuff, etc. is not permitted in class. This includes texting. Please place your ringer on silent before entering class. Reading or working on other materials while in this class is strongly discouraged.
- **Student Conduct:** All students are expected to honor the UI Student Code of Conduct. Violations include, but are not limited to: copying homework assignments completed by others, plagiarism, and cheating on exams. Please be aware that any violation of the UI Student Code of Conduct may result in a course grade of "F". [<http://www.uidaho.edu/DOS/judicialaffairs/studentcodeofconduct>]
- **Plagiarism:** Plagiarism occurs when you use but do not cite someone else's work, even if it is re-worded, or by not indicating that a passage (paragraph, sentence, or even a small part of sentence) is directly quoted even if the reference is cited. Following the structure or organization of someone else's work is also plagiarism. Students caught plagiarizing will be given a grade of "F".

### **Religious Accommodation:**

A student who observes a religious holy day should make that intention known to the instructor prior to the absence.

### **University of Idaho Classroom Learning Civility Clause:**

In any environment in which people gather to learn, it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning.

Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. Additional resources for expression of concern or requesting support include the Dean of Students office and staff (885-6757), the UI Counseling & Testing Center's confidential services (5-6716), or the UI Office of Human Rights, Access, & Inclusion (885-4285).

### **DISABILITY SUPPORT SERVICES REASONABLE ACCOMMODATIONS STATEMENT:**

Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through Disability Support Services, located in the Idaho Commons Building, Room 306, in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course. Contact DSS at 208-885-6307, email [dss@uidaho.edu](mailto:dss@uidaho.edu) or go to [www.uidaho.edu/dss](http://www.uidaho.edu/dss).

London, September 19, 1772

Dear Sir,

In the Affair of so much Importance to you, wherein you ask my Advice, I cannot for want of sufficient Premises, advise you what to determine, but if you please I will tell you how.

When these difficult Cases occur, they are difficult chiefly because while we have them under Consideration all the Reasons pro and con are not present to the Mind at the same time; but sometimes one Set present themselves, and at other times another, the first being out of Sight. Hence the various Purposes or Inclinations that alternately prevail, and the Uncertainty that perplexes us.

To get over this, my Way is, to divide half a Sheet of Paper by a Line into two Columns, writing over the one Pro, and over the other Con. Then during three or four Days Consideration I put down under the different Heads short Hints of the different Motives that at different Times occur to me for or against the Measure. When I have thus got them all together in one View, I endeavour to estimate their respective Weights; and where I find two, one on each side, that seem equal, I strike them both out: If I find a Reason pro equal to some two Reasons con, I strike out the three. If I judge some two Reasons con equal to some three Reasons pro, I strike out the five; and thus proceeding I find at length where the Ballance lies; and if after a Day or two of farther Consideration nothing new that is of Importance occurs on either side, I come to a Determination accordingly.

And tho' the Weight of Reasons cannot be taken with the Precision of Algebraic Quantities, yet when each is thus considered separately and comparatively, and the whole lies before me, I think I can judge better, and am less likely to take a rash Step; and in fact I have found great Advantage from this kind of Equation, in what may be called Moral or Prudential Algebra.

Wishing sincerely that you may determine for the best, I am ever, my dear Friend,

Yours most affectionately

B. Franklin