

Engineering Economics – ENGR 350, Section 01

Abilene Christian University

Spring 2016

Course Description

This course will equip students to analyze and compare engineering projects or other types of investments using basic economic analysis techniques. Topics covered include principles of economic equivalence, time value of money, analysis of investments, comparison of alternatives, equipment depreciation and income taxes, inflation, and uncertainty.

Prerequisites: *Credit for MATH 185 or placement into MATH 186 or 286, or credit for MATH 131 or placement into MATH 132. Credit hours: 3.*

Class Meeting Times and Location

This class meets Monday, Wednesday, and Friday from 10:00 a.m. to 10:50 a.m. in Foster Science Building 350.

Required Text

The required text for this course is *Fundamentals of Engineering Economics*, 3rd edition, by Chan Park, Pearson Education, Inc, 2013, ISBN 978-0-13-277542-7.

Resources

Students are expected to be comfortable using the computational features of Excel. Tutorials are available through the ACU library at <http://www.lynda.com/portal/acu>. A good starting point is the set of tutorials titled "Excel 2013 Essential Training."

Intended Audience

This is a required course for Engineering majors and intended to be completed during the sophomore or junior year. This course is appropriate for any student interested in developing their quantitative analysis skills, particularly students interested in business applications.

Catalog Description

Application of economic analysis techniques to analyze and compare engineering projects or other types of investments. Topics covered include principles of economic equivalence, time value of money, analysis of investments, comparison of alternatives, equipment depreciation and income taxes, inflation, and uncertainty.

Contact Information

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The mission of ACU

To educate students for Christian service and leadership throughout the world.

The mission of the College of Arts and Sciences

The College of Arts and Sciences engages students with humanity's greatest ideas to create understanding, apply insights, and serve the world as Christian thinkers and problem solvers.

The mission of the Engineering and Physics Department

The ACU engineering program strongly supports the university's mission of educating students for Christian service and leadership throughout the world. In support of this mission, ACU engineering graduates will attain:

- A deep and broad understanding of engineering principles and practices as evidenced by professional employment, continued professional development, and graduate study in engineering or other professional fields.
- An extensive knowledge of the innovative design processes unique to engineering professionals as demonstrated by using critical thinking skills to contribute to the scientific and technical literature, patents and intellectual property, professional societies, and creative designs.
- A thorough understanding of Christian service and leadership as shown in their commitments to professionalism, ethics, and service and leadership within the engineering profession, the church, and society.

Teaching Philosophy

Engineering and physics are well respected professions. The public places great trust in these professionals being honest, competent, and ethical. Many codes of ethics for these fields indicate that the commitment to protecting the health, safety, and welfare of the public is of paramount importance. These values are in harmony with Christian principles and ideals. Christian engineers should be honest (Matthew 5:37), work hard to ensure competency (Colossians 3:23), and put the public's interest ahead of his or her own (Luke 6:31). In light of these principles, this course will be taught such that you will gain an appreciation for the professional nature of engineering and physics. It will be taught so as to give you every opportunity to begin to develop competency in these fields. This will require reading assignments, homework, quizzes, tests, and group discussion. The instructor especially encourages the discussion of topics that would bear on integrating faith and professional responsibilities (cheating on licensure exams, weapons design and manufacture, environmental laws and employment opportunities in developing nations, etc.).

Learning Objectives

The activities of the course support the assessment of the following ABET Outcomes:

Criterion 3

3(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

3(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

ABET Learning Objectives	Competencies	Measurement
3 (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	Be able to conduct analysis in order to justify or reject projects/alternatives on an economic basis. Specifically, students will be able to: • compute and evaluate present worth, future worth,	Homework, quizzes, and exams

	and annual worth • compute and evaluate rates of return • compute and evaluate benefit-cost analysis • conduct sensitivity, break-even, and scenario analysis to understand project risk	
3(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Students will be able to create, analyze, and interpret effective spreadsheet models in Excel.	Homework, quizzes, and exams

Course Policies

Academic Integrity

Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Violations of academic integrity and other forms of cheating involve the intention to deceive, mislead, or misrepresent and therefore, are a form of lying. Such actions are contrary to behavioral norms that flow from the nature of God. Academic misconduct includes, but is not limited to, the following: 1) Failing to give credit to sources used in a work in an attempt to present the work as one's own, 2) Submitting papers or projects obtained from another source (e.g., research service or club paper file) as one's own, 3) Falsifying information orally or in writing, and 4) Receiving, giving, or using unauthorized aid on an examination or quiz. Academic misconduct may result in, but is not limited to, a zero on the assignment and/or an F in the course. Additionally, the department chair, Dean of the College of Arts and Sciences, and the Dean of Student Life will be notified. See the full university policy, including how to appeal a decision, by following this link: <http://www.acu.edu/academics/provost/policies/index.html>.

Attendance and participation

Students are responsible for anything covered in class (which may include material not in the textbook). My commitment is to make our class time meaningful; I expect each student to come prepared to think and to engage, and to be on time. If a student is absent from class, it is his or her responsibility to get the notes and class assignments before the next class meeting. Note that being tardy or absent will negatively impact a student's grade on homework and quizzes. Students are required to attend at least 80% of class meetings in order to receive credit for the course.

Classroom time will be a mix of lecture, discussion, and individual and small group activities. Participation in these (and all classroom activities) is expected, and will make for a much better class experience.

Homework: will be assigned approximately weekly, and will be due in class at the start of the class period. Late homework will not be accepted. Often, only a subset of questions will be graded for each homework assignment; a complete solution will be made available for study purposes. It is each student's responsibility to check his or her work for errors.

Homework is intended to be a learning tool. Students are encouraged to attempt each homework assignment on their own, and then get together with other students to compare approaches. Because the purpose of homework is to help students learn, students are permitted to work together and come up with a group answer, as long as everyone understands the answers they submit. In order to encourage individual accountability for understanding the material, it is not permitted for students to simply copy another student's work, even if they work together. *Every student must turn in his/her own written solutions.*

Professionalism: Engineers are expected to behave in a professional manner. For the purposes of this course, professionalism means that students show up, are prepared, are engaged, treat peers and the instructor with respect (both verbally and in written communication), and do not engage in disruptive classroom activities (including but not limited to inappropriate use of phones, computers, tablets, etc.)

Calculators: When calculators are allowed to be used on in-class quizzes and exams, only NCEES approved calculators will be permitted. This is to help you begin preparing for the FE exam. The approved calculators include the following:

- Hewlett Packard – HP 33s, HP 35s, and no other
- Casio – All FX-115 models. Any Casio calculator must contain FX-115 in its model name.
- Texas Instruments – All TI-30X and TI 36X models. Any TI calculator must contain either TI-30X or TI-36X in its model name.
- If a student is unsure about his or her calculator, it is his or her responsibility to check with the instructor for approval.

Course Grading

Quizzes: There will be a number (at least 8) of short in-class quizzes, roughly corresponding to homework due dates. These quizzes will be closed book and closed notes, will take place at the beginning of the class period, and **no make-ups will be allowed**. While a quiz won't necessarily take place following each assignment, students should expect a quiz at this time.

Exams: There will be three in-class exams and a cumulative final exam. Students will be permitted to use limited resources (i.e. notes and/or provided reference material) during in-class exams; further instructions will be provided well in advance of each exam. Make-up exams will not be given. If a student must miss an exam for a University-approved reason, the instructor should be notified as far in advance as possible. The best in-class exam grade will count for 20% of the course grade; the remaining two scores will each count for 15%.

Grading: Course grades will be calculated according to the following formula:

Homework	15% (lowest homework grade will be dropped)
Quizzes	10% (lowest quiz grade will be dropped)
Exam 1	15%
Exam 2	15%
Exam 3	15%
Best exam score	5% (Highest score from Exam 1, Exam 2, and Exam 3)

Calculation of Final Course Grade*

The grading scale will be as follows:

90% and above	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
59% and below	F

*Instructor reserves the right to decrease the lower bound of the grade cut-offs.

ADA Compliance Statement

"Abilene Christian University is dedicated to removing barriers and opening access for students with disabilities in compliance with ADA and Section 504 of the Rehabilitation Act. The Alpha Scholars Program facilitates disability accommodations in cooperation with instructors. In order to receive accommodations, you must be registered with Alpha Scholars Program, and you must complete a specific request for each class in which you need accommodations. If you have a documented disability and wish to discuss academic accommodations, please call our office directly at 325-674-2667."

Tentative Course Schedule

While every effort will be made to closely follow this schedule, the instructor reserves the right to alter this schedule to best achieve the objectives of the class.

Date (assuming Spring '16)	Week	Sections	Topics and Events
January 11,13,15	1	Ch. 1, 2	Introduction, time value of money
January 20,22 (Jan 18th - no class)	2	Ch. 2	Economic equivalence, cash flows
Jan 25, 27, 29	3	Ch. 3	Interest rates
Feb 1, 3, 5	4	Ch.4	Inflation and equivalence calculations Exam 1 (Chapters 1-4)
Feb 8, 10, 12	5	Ch. 5	Present worth analysis
Feb 15, 17, 19	6	Ch. 6&7	Annual worth analysis, Rate of return
Feb 22, 24, 26	7	Ch. 7, 7A	Rate of return analysis
Feb 29, Mar 2, 4	8	Ch. 8	Benefit-Cost analysis
Mar 7, 9, 11	9		Exam 2 (Chapters 5-8) , Catch-up/special topics
Mar 14-18			Spring Break
Mar 21, 23 (Mar 25 - no class)	10	Ch. 9	Depreciation
Mar 28, 30, Apr 1	11	Ch. 9, 10	Taxes, cash flow analysis
Apr 4, 6, 8	12	Ch. 11	Project uncertainty
Apr 11, 13, 15	13	Ch. 11	Project uncertainty extended topics, Exam 3
Apr 18, 20, 22	14	Ch. 13	Financial Statements
April 25, 27, 29	15	Ch. 13	Replacement decisions, review
April ?	16		Final Exam