ENGR-155: Engineering Economic Analysis Fall 2021

Tuesdays and Thursday's 9:00 am – 10:15 am @ CLSSRM 105

Final Exam Tuesday December 14, 2021. 3:00 pm – 6:00 pm@ CLSSRM 105

Instructor	Siddaiah Yarra, Ph.D. Email: syarra@ucmerced.edu Office Location: SE2-205 Office Hours: Tuesdays and Thursdays 12:00 am -1:00 pm
Lecture	Tuesdays and Thursdays @ 9:00 am – 10:15 am
Course Description	Course explores the application of economic principles to engineering decisions. During the semester, student will be introduced to the mathematical and conceptual basis on which project analysis is built. The techniques and tools necessary for making informed financial decisions in engineering practice will be discussed. Topics such as time value of money, interest, equivalence, cost-benefit analysis, depreciation, taxes, cash flow, and financial risk will be covered.
Course Topics	This course is made of modules covering the following topics. • Introduction, Costs and Benefits • Time Value of Money • Cash Flow Series • Present Worth and Annual Cash Flows • Internal Rate of Return • Selection of Best Alternatives • Uncertainty Analysis • Depreciation and Taxes • Economic Life and Replacement Analysis • Inflation and Price Change • Cost Benefit Analysis in the Public Sector • Accounting
Course Objectives and Student Learning Outcomes	By the conclusion of this course, students will be able to: • Apply the basic theory and concepts of engineering economics to analyze engineering projects. • Systematically make informed, practical, and consistent decisions when evaluating engineeringprojects. • Demonstrate critical thinking when evaluating the economic aspects of different alternatives inengineering projects. • Effectively communicate their thought process and final decisions in the economic analysis ofengineering projects. • Employ the mathematical tools available within MS Excel or similar software to conducteconomic analyses of engineering projects.
Program Learning Outcomes	• An ability to identify, formulate, and solve complex engineering problems

by applying principlesof engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs withconsideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global,economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create acollaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze, and interpret data, anduse engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Course requirements

Textbook: Engineering Economic Analysis 14 edition by Newman, Eschenbach, Lavelle, and Lewis. Oxford University Press, 2020 with Dashboard access. ISBN 9780190063467(or loose leaf with Dashboard access ISBN 9780190063474)

Computational Requirements: A personal computer with Zoom to join the lectures (may be needed if COVID outbreaks again) and displayslides, with the MS Office Suite installed (including MS Excel) is required for the class.

Course Structure

Lectures. Prepare for each lecture by reading the assigned chapters and come to online/in class prepared to participate in the discussion and in-class exercises. All class presentations will be posted on the CatCourses site.

Group Case Study. There will be a group case study as part of the course, and the details will be posted on CatCourses. Due dates will not be extended for any reason as this will be assigned early and due date will be weeks later into the semester. Please, remember that academic integrity rules apply so you may work with other groups to discuss, but the product that you hand in should be the result of your own group work.

Quizzes. Each class module will have an online or in-class quiz with a time limit. Surprising quizzes are normal, so I urge you to attend class and study the discussed material. Quizzes can be either multiple choice, or fill-in-the-blank, or problem-solving questions.

Exams. There will be a midterm exam and a final exam. Final is cumulative. These exams could be a combination of multiple choice, fill-in-the-blank, and problem-solving questions.

Self-Learning Exercise. Self -learning exercises are do-it-all or nothing. No partial credits. Showing your work in professional way is important and work that is not numbered in order will not be considered as complete and will receive zero credit.

Grading

The final grade will be the result of a weighted average of exams, group case study, quizzes, and self-learning exercises:

Item	% Of grade	Remarks
Quizzes	30%	
Group Case Study	15%	
Excel – Self-Learning Exercise	3%	Do-it-ALL (or) Nothing
Problem Solving - Self-Learning Exercise	7%	Do-it-ALL (or) Nothing
Midterm Exam	20%	
Final Exam	25%	

The final grade will be based on the following total point score for the class:

A	≥ 90%
B	80-89%
C	70-79%
D	60-69%
F	< 60%

Class Expectations and Policies

- Be on time. Attendance is mandatory. Participate, ask and/or answer questions and engage in discussions.
- **This course will be in-person at UC Merced.** If COVID outbreaks again, as needed, this course may be taught over Zoom. Please find a quiet place and silence your phones during zoom class or get on mute.
- Quizzes, Exams may not be missed for any reason except for a medical emergency, in which case, a doctor's note or medical release **must** be provided.
- Instructors can be reached out via CatCourses messaging, email, or during office hours.
- The syllabus may change, so please be aware of announcements in CatCourses.

Academic Integrity

- Every student in this course is expected to abide by the University of California Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work.
- Plagiarism is a type of academic misconduct. Please review the U.C. Merced Library webpage to learn more about what plagiarism is and how to avoid it. http://libguides.ucmerced.edu/citing_sources/citing-sources_avoiding-plagiarism
- The U.C. Merced Library link above also contains information on citations.
- Here is information on common types of plagiarism: https://www.bowdoin.edu/studentaffairs/academic-honesty/common-types.shtml
- References, also referred to as citations, are ways to document where you obtained content used in your work. This course will use the APA Style for references. You can locate more informationon how to create references using the APA format using the Purdue Owl (Online Writing Lab). https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_style_introduction.html
- You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. **Please make sure to follow the COVID-19 guidelines.** You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an email attachment file, a diskette, or a hard copy.

Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.

- During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam and may lead to failure of the course and University disciplinary action.

Diversity and Equity

This class is conducted in accordance with the UC Merced Principles of Community[1], which include recognition and celebration of all identities, values, and beliefs. Discrimination on the basis of race, religion, sex, sexual orientation, gender identity, national origin, citizenship documented status, or any other social identity will not be tolerated. All class members including students, teaching assistants, observers and instructors are welcomed to discuss any situation they perceive as harmful or threatening with the instructor in the class, during office hours or by appointment.

Accommodation of Students with Disabilities

The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design, and diversity. Siddaiah Yarra is available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

TENTATIVE SCHEDULE

	Day, Date	Time		Topic	Reading from Textbook
Week #					
1	Thursday, August 26, 2021	9:00 am - 10:15 am	Lecture	Syllabus Review and Introduction	Ch1
2	Tuesday, August 31, 2021	9:00 am - 10:15 am	Lecture	Estimating Costs and Benefits	Ch2
2	Thursday, September 2, 2021	9:00 am - 10:15 am	Lecture	Estimating Costs and Benefits	Ch2
3	Tuesday, September 7, 2021	9:00 am - 10:15 am	Lecture	Time Value of Money	Ch3
3	Thursday, September 9, 2021	9:00 am - 10:15 am	Lecture	Time Value of Money	Ch3
4	Tuesday, September 14, 2021	9:00 am - 10:15 am	Lecture	Cash Flow Series	Ch4
4	Thursday, September 16, 2021	9:00 am - 10:15 am	Lecture	Cash Flow Series	Ch4
5	Tuesday, September 21, 2021	9:00 am - 10:15 am	Lecture	Present Worth Analysis	Ch5
5	Thursday, September 23, 2021	9:00 am - 10:15 am	Lecture	Present Worth Analysis	Ch5
6	Tuesday, September 28, 2021	9:00 am - 10:15 am	Lecture	AnnualCash Flow Analysis	Ch6
6	Thursday, September 30, 2021	9:00 am - 10:15 am	Lecture	AnnualCash Flow Analysis	Ch6
7	Tuesday, October 5, 2021	9:00 am - 10:15 am	Lecture	Rate of Return Analysis	Ch7
7	Thursday, October 7, 2021	9:00 am - 10:15 am	Lecture	**Exam - I**	
8	Tuesday, October 12, 2021	9:00 am - 10:15 am	Lecture	Selection of Alternatives/Other	Ch 8 & Ch 9
8	Thursday, October 14, 2021	9:00 am - 10:15 am	Lecture	Selection of Alternatives/Other	Ch 8 & Ch 9
9	Tuesday, October 19, 2021	9:00 am - 10:15 am	Lecture	Uncertainty Analysis	Ch 10
9	Thursday, October 21, 2021	9:00 am - 10:15 am	Lecture	Uncertainty Analysis	Ch 10
10	Tuesday, October 26, 2021	9:00 am - 10:15 am	Lecture	Depreciation and Taxes	Ch 11 & Ch 12
10	Thursday, October 28, 2021	9:00 am - 10:15 am	Lecture	Depreciation and Taxes	Ch 11 & Ch 12
11	Tuesday, November 2, 2021	9:00 am - 10:15 am	Lecture	Economic Life and Replacement	Ch 12
11	Thursday, November 4, 2021	9:00 am - 10:15 am	Lecture	Inflation and Price Change	Ch 13
12	Tuesday, November 9, 2021	9:00 am - 10:15 am	Lecture	Inflation and Price Change	Ch 13
12	Thursday, November 11, 2021	9:00 am - 10:15 am	**Veterans Day Holiday**		
13	Tuesday, November 16, 2021	9:00 am - 10:15 am	Lecture	Minimum Rate of Return Selection	Ch 14
13	Thursday, November 18, 2021	9:00 am - 10:15 am	Lecture	Minimum Rate of Return Selection	Ch 14
14	Tuesday, November 23, 2021	9:00 am - 10:15 am	Lecture	Benefit Cost Analysis Public Projects	Ch 10
14	Thursday, November 25, 2021	9:00 am - 10:15 am	**Thanksgiving Holiday**		
15	Tuesday, November 30, 2021	9:00 am - 10:15 am	Lecture	Accounting	Ch 17
15	Thursday, December 2, 2021	9:00 am - 10:15 am	Lecture	Accounting	Ch 17
16	Tuesday, December 7, 2021	9:00 am - 10:15 am	Lecture		
16	Thursday, December 9, 2021	9:00 am - 10:15 am	Lecture		
	Tuesday, December 14, 2021	**3:00 pm - 6:00 pm**		**Final Exam Day @ CLSSRM 105**	