



Dr JL (Joshua) Gray, Professor in the Practice
Leading Engineering Economics

RCEL 505: Leading Engineering Economics

Campus CRN# 13728 | Fall 2024 | Online CRN# 14410

Section 001 | Campus: Monday 6:30 – 8:30pm CT | Location: Razor Hall 205

Section 901 | Online: Tuesday 8:00 – 9:30pm CT | Location: ZOOM

Instructor Information: Dr JL (Joshua) Gray | DrJLGray@Rice.edu | 346.341.9563 (Urgent Issue Only)

Office Hours: Tuesday, 7:00 – 8:00pm CT and [appointments can also be scheduled](#) at other times.

Reading Materials

1. Newnan, Donald G., Eschenbach, Ted G. and Lavelle, Jerome P. Engineering Economic Analysis (Eleventh Edition). Oxford University Press: Oxford. 2014.
2. Case studies and other readings will be available through our course website on Canvas.

Important Dates

- Monday - Tuesday, September 2 - 3, 2024: LABOR DAY (HOLIDAY - NO SCHEDULED CLASSES)
- Monday - Tuesday, October 14 - 15, 2024: MIDTERM RECESS (NO SCHEDULED CLASSES)

Course Overview

RCEL505 will explore economic analysis of capital expenditure decisions, financial mathematics, microeconomics, and decision-making under risk and uncertainty. Topics covered in this course include:

- Time Value of Money
- Analysis of Alternatives
- Internal Rate of Return
- Depreciation & Taxes
- Inflation & Uncertainty

Computational approaches, such as probabilistic design in engineering designs, which connect randomly varying design parameters to economic impact, will sometimes be considered based on course composition. Engineering ethics case studies that involve engineering economics will also be explored.

Course Format

Our class is designed around multiple learning methods, including lectures, discussions, group learning, case studies, videos presentations, guest speakers, and other experiential learning activities. The readings for the class include a combination of book chapters, videos, case studies, and other materials. Most of these readings review theories or practical actions that pertain to engineering economic topics.

Impact Goals

Holistically this Leading Engineering Economics course seeks to impact the following Global Sustainable Development Goals

- Decent Work & Economic Growth
- Industry, Innovation & Infrastructure
- Sustainable Cities & Communities

Course Objective

Equip students to apply key principles of engineering entrepreneurship to determine if a technical product or idea is valuable and economically viable by using the following techniques:

- Economic analysis of capital expenditure decisions
- Financial mathematics and microeconomics
- Decision-making under risk and uncertainty

Learning Outcomes

- Understand the time value of money and equivalence to define alternatives
- Apply taxes and depreciation principles when conducting economic analysis
- Analyze measures of worth and rate of return for alternative selection
- Evaluate the impact of inflation and uncertainty on engineering decisions
- Create engineering economic analysis models for financial predictions

These learning outcomes will be achieved using various cognitive process and knowledge dimensions:

THE KNOWLEDGE DIMENSION	THE COGNITIVE PROCESS DIMENSION					
	REMEMBER	UNDERSTAND	APPLY	ANALYZE	EVALUATE	CREATE
CONCEPTUAL KNOWLEDGE		Understand the time value of money and equivalence to determine alternatives				
FACTUAL KNOWLEDGE			Apply taxes and depreciation principles when conducting economic analysis			
PROCEDURAL KNOWLEDGE			Analyze measures of worth and rate of return for alternative selection			
META-COGNITIVE KNOWLEDGE				Evaluate the impact of inflation and uncertainty on engineering decisions		
					Create engineering economic analysis models for financial predictions	

Program Alignment

Leading Engineering Economics is a course primarily developed for the Master of Engineering Management & Leadership Program to fulfill the program outcomes listed at the top of the diagram below:

Course Outcomes / Program Outcomes	Employ ethical-technical decision making	Lead and manage engineering teams	Evaluate the economic viability of technology products and ideas	Solve advanced engineering problems
Understand the time value of money and equivalence to define alternatives			H	
Apply taxes and depreciation principles when conducting economic analysis	M			
Analyze measures of worth and rate of return for alternative selection			H	
Evaluate the impact of inflation and uncertainty on engineering decisions		L		
Create engineering economic analysis models for financial predictions				M

Course Structure

To fulfill these program and course outcomes this course will leverage the textbook chapter content in canvas modules as outlined in the timeline shown below. The course will be delivered in a flipped class structure using media on the course canvas site. Pre-class Module videos are to be previewed before sessions and In-Class Module content will be covered during sessions.

Course Outcomes / Chapter Topics	Course Introduction	Making Economic Decisions	Estimating Eng Costs & Benefits	Interest & Equivalence	Equivalence For Repeated Cash Flows	Present Worth Analysis	Annual Cash Flow Analysis	Exam One	Rate Of Return Analysis	Choosing The Best Alternative	Uncertainty In Future Events	Depreciation	Income Taxes For Corporations	Inflation And Price Change	Exam Two
Course Schedule															
Text Chapters		1	2	3	4	5	6		7-8	8-9	10	11	12	14	
Course Module	0	1	2	3	4	5	6	1-6	7	8	9	10	11	12	7-12
Campus Session	8/26	9/9	9/16	9/23	9/30	10/7	10/21	-	10/28	11/4	11/11	11/18	11/25	12/2	-
Online Session	8/27	9/10	9/17	9/24	10/1	10/8	10/22	-	10/29	11/5	11/12	11/19	11/26	12/3	-
Module Assignment		Study		Milestone		Event			Study		Milestone		Event		
Course Outcomes															
Understand the time value of money and equivalence to define alternatives		X		X	X										
Apply taxes and depreciation principles when conducting economic analysis												X	X		
Analyze measures of worth and rate of return for alternative selection									X	X					
Evaluate the impact of inflation and uncertainty on engineering decisions											X			X	
Create engineering economic analysis models for financial predictions			X			X	X								

Grade Components

25%	Course Participation
25%	Module Quizzes
25%	Module Assignments
25%	Cumulative Exams

Course Participation (25%)

There will be an expectation for students to participate weekly through Canvas Discussion Boards, Module Practice Problems, and Virtual Live Sessions for a few reasons. First, the discussion boards provide social interaction to explore students' understanding of the concepts introduced at the beginning of modules. Second, the practice problems provide personal experiences to gauge the use of methodologies presented in the lectures within modules. Third, the live sessions provide professional exposure to the applications demonstrated at the end of the modules.

Module Quizzes (25%)

There will be weekly quizzes to quantitatively assess students' understanding of the content provided in the textbook slides and the lecture presentations for each module. Students will have a week for two attempts at completing the quizzes on canvas as outlined in the course schedule. Suggest that students complete the first attempt before live sessions on Tuesdays to assess their understanding of the lecture videos and the second attempt after live sessions to get clarification on what they missed on their first attempt. These untimed quizzes will be administered on Canvas in a multiple-choice format.

Module Assignments (25%)

There will be bi-weekly assignments, which consist of case studies, project milestones, and current events as outlined in the course schedule. Case Studies will provide an understanding of relevance, project milestones will provide experience with applications, and current events will provide exposure to the impact of the content covered in the modules. Assignments will address topics covered within two modules giving students two weeks to complete them. The instructor will discuss the assignment during the first live session of the two-week period and students will present their submissions during the second live session of the bi-weekly timeframe. Module assignments will be completed individually during the first half of the semester and in groups during the second half of the semester.

Cumulative Exams (25%)

There will be two exams for this course. The first exam will evaluate proficiency with Modules 1-6 content halfway through the semester and the second exam will evaluate proficiency with Modules 7-12 content at the end of the semester. Students will have at least a week to complete one attempt during the timeline provided in the course schedule. This timed exam will be administered on Canvas and will consist of multiple-choice, true/false and/or short-answer questions derived from the topics covered in the module content.

Note: Assignments and discussions will incur a 10% deduction for each week submitted after due date

Class Norms

- Participate in live sessions in environments with minimal distractions
- Turn off cellular phones or place them on vibrate before class begins
- Close distracting web browsers or applications during live sessions
- Raise your hand or wait for a pause in discussion before speaking
- Include RCEL 505 in the subject line when sending email queries

General Course Expectations

Preparation	Come to sessions having reviewed the canvas module pre-class content and prepare to contribute to live discussions
Proactivity	Be proactive in both planning as well as working and if you are experiencing or anticipate experiencing any difficulties or uncertainties, communicate it ASAP
Punctuality	Plan to come to class <i>on time</i> and complete all assignments <i>on time</i>
Personal Responsibility	Take responsibility for your learning, course obligations, and commitment to academic integrity

Rice Honor Code

Students are responsible for maintaining the highest standards of honesty and integrity in their work and conduct. Students should be familiar with what constitutes plagiarism and always cite proper references of outside materials. Students should abide by the honor pledge they made upon entering Rice and include the following statement on all submitted written assignments; “On my honor, I have neither given nor received any unauthorized aid on this (paper or exam)”. Discussing course materials with students who have taken the course is acceptable; however, students should use the course TA’s as their primary resource. The course undergoes frequent changes from semester to semester, and the TA’s will be more familiar with current course content. Receiving any form of assistance (coaching or use of previous exams) for the quizzes in this course is considered a violation of the Honor Code.

Special Needs

Let us know during the first few weeks of the semester if you have disability needs and we will do what we can to accommodate these needs. Students with disabilities should contact Rice Disability Support Services at 713.348.5841 or <http://dss.rice.edu>.

Mental Health

The wellbeing and mental health of students is important; if you are having trouble completing your coursework, please reach out to the Wellbeing and Counseling Center. Rice University provides cost-free mental health services through the Wellbeing and Counseling Center to help you manage personal challenges that threaten your personal or academic well-being. If you believe you are experiencing unusual amounts of stress, sadness, or anxiety, the Student Wellbeing Office or the Rice Counseling Center may be able to assist you. 713-348-3311 24/7.