ISE510-651 APPLIED ENGINEERING ECONOMY

SUMMER 2025

Course objectives/description

The course aims to provide the students with the advanced concepts of engineering economic analysis and various tools to solve capital investment problems. The course will address how to model and solve engineering economy problems in various practical situations. The topics cover cost/revenue estimating techniques, discounted cash flow analysis techniques, sensitivity and breakeven analysis, depreciation, and after-tax analysis.

Course Topics

- **Economic Decision Making, Cost Concepts and Cost Estimating Techniques**
- **Concepts of Interest and Monetary Equivalence for Cash Flows (**Interest factors**)**
- **Equivalent Worth Methods (**Present Worth, Future Worth, Annual Worth Analysis)
- **Rate of Return Analysis** (Internal Rate of Return, External Rate of Return)
- **Other Techniques (**Benefit/Cost Ratio Analysis, Payback period)
- **Sensitivity and Breakeven Analysis**
- **Depreciation and After-Tax Analysis**

Learning outcomes

By the end of this course, students will be able to:

1. Understand the important concepts of the engineering economy (time value of money, interest, etc.) and the engineering decision making process.
2. Apply cost/revenue estimating techniques to estimate the parameters for the engineering economy problems.
3. Derive and apply the various interest formulas to solve the cash flow problems in the most computationally efficient way.
4. Understand the capabilities and limitations of the various cash flow analysis techniques for evaluating capital investments.
5. Apply cash flow analysis using computer tools (Excel spreadsheet).
6. Recognize, formulate, and solve engineering economy problems in various practical situations.
7. Do an after-tax analysis of the investment alternatives. Understand the advantages and limitations of the different depreciation techniques considered for calculating taxes and recognize how they affect the after-tax rate of return of the investments.

Class Time: SUMMER 2025
Teaching mode: Online Asynchronous
Classroom: N/A

Instructor: Semra Sebnem AHISKA KING
Office Location: 4179, Fitts-Woolard Hall
Office hours: Online with Zoom by appointment only
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Teaching Assistants: N/A
Office Location: N/A
TA Office hours: N/A
Email: N/A

Prerequisites
An undergraduate course in math or statistics

Textbooks (optional, no purchase is required)

1. Capital Investment Analysis for Engineering and Management, John R. Canada, William G. Sullivan, Dennis J. Kulonda, John A. White, 3rd Edition, 2005, Pearson Prentice Hall, ISBN-13: 978-0131434080, ISBN-10: 013143408X
2. Engineering Economic Analysis, Donald G. Newnan, Jerome P. Lavelle, Ted G. Eschenbach, 12th Edition, ISBN-13: 978-0199339273, ISBN-10: 0199339279

Course requirements

Assignments	Percentage of Final Grade
Homework Assignments (ten)[a]	**20%**
Exam 1 (June 12-13, lectures 1-10, HW1-4)	**20%**[b]
Exam 2 (July 10-11, lectures 10-17, HW5-8)	**30%**
Exam 3, Final exam (July 28-29, lectures 18-24, HW9-10)	**30%**

[a] Students are required to submit at least **seven** HW assignments. The students' average HW grade will be computed considering their best seven HW grades.
[b] Among the three exams, the one with the lowest grade will be assigned 20%, and the other two exams will be assigned 30% weight.

Software requirement
Microsoft Excel

Lecture mode and Class attendance policy: The instruction mode is "online asynchronous". The students are expected to watch the lecture recording in a timely manner according to the weekly plan provided.

Course structure
The lectures will be delivered by the instructor. Many in-class examples will be provided to the students to learn the introduced concepts/techniques. The students will then have the opportunity to enhance their knowledge through challenging HW assignments.

Course Moodle page
The Moodle page will be used for posting all the course materials and for HW submissions.

Moodle page for the course is accessible at:
https://wolfware.ncsu.edu/courses/my-wolfware/

OTHER IMPORTANT NOTES ON HW SUBMISSIONS AND EXAMS:

- HW submissions will be done online using Moodle by midnight of the HW due date.
- All the homework assignments must be submitted by their due date. Late submissions will not be graded. In case you need more time to complete the hw, you should talk with the instructor at least 1 day before the due date, in which case you may be granted an extended deadline if you have an acceptable excuse such as medical.
- All three exams will be **in-person** exams**.** The exams must be **proctored** at an approved test center.
- Students are required to attend all the tests within the allowed exam window. No make-up for the tests will be provided unless the student has a medical emergency.

GRADING SCALE

The following is the standard NCSU grading scale. Based on the overall class performance, the minimum grade required for a particular letter grade may be decreased in favor of the students.

Grade range	Letter grade
97-100	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
63-68	D
60-62	D-
<60	F

ACADEMIC INTEGRITY POLICY

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at http://policies.ncsu.edu/policy/pol-11-35-01. The Code of Student Conduct (NCSU POL11.35.01) serves as the basis for student conduct at NC State. It contains information related to the university's jurisdiction over student behavior, academic and

non-academic violations, sanctions available when a violation occurs, and information regarding interim suspension. **Academic violations include cheating, plagiarism, or aiding another to cheat or plagiarize.** Non-academic violations include rules concerning alcohol, drugs, infliction or threat of bodily harm, vandalism, disorderly conduct, harassment, interpersonal violence, and more). All students are strongly encouraged to read and understand the Code of Student Conduct (https://studentconduct.dasa.ncsu.edu/code/).

Academic integrity is the cornerstone of education. Plagiarism and cheating are attacks on the very foundation of academic life and cannot be tolerated within universities. All students are strongly encouraged to review the university policies on academic integrity at https://studentconduct.dasa.ncsu.edu/academic-integrity-overview/.

A student who violates academic integrity in any graded assignment (HW, project, exams) will be reported to the Office of Student Conduct for academic misconduct. Violations of academic integrity will be handled in accordance with the Student Discipline Procedures (NCSU REG 11.35.02) (https://studentconduct.dasa.ncsu.edu/procedures/). A student who violates the academic integrity will fail the course and lose his/her good academic standing status, which may mean losing several opportunities including TA/RA positions, scholarships, CPT (working off-campus), etc. The student may also be suspended or even terminated from the program.

Examples for academic integrity violation includes but are not limited to the following:

- Copying somebody else's work partly or entirely in HW and exams
    - Reading and copying the solutions of the HW problems that were posted in previous years (the instructor's solution files or any former student's solution file)
    - Copying a classmate's work who is not in your HW group.
    - The **use of artificial intelligence** sources (such as ChatGPT) in HW assignments.
    - Any kind of communication (verbal/written) with a classmate during the exam.
    - Reading a classmate's work during the exam.
    - Letting a classmate see your solutions in HW and exam problems.
- Asking a classmate to sign the attendance sheet for the day you will be absent or signing the attendance sheet for a classmate who is absent.
- Posting class materials (lecture notes, hw solutions, exams, etc.) on internet websites