ISyE 3025 W12 • Engineering Economy • Spring 2027

Instructor

- **Lead Instructor**: Doug Bodner, Ph.D., P.E.
- **TA:** TBD

Overview

1. **Course description**: This course addresses methods of economic analysis in engineering, including time value of money, equivalence, economic measures of worth, selection rules for alternatives, income taxes and equipment depreciation, inflation, and uncertainty. The material is divided into a set of learning modules.
2. **Pre-requisites**: None
3. **Delivery**: This is a "semi-flipped course" using Canvas. Background material for each topic will be posted to Canvas and should be reviewed before class sessions. This material consists of read-ahead slides and short view-ahead example problem videos from those slides. In-class lectures and activities will be used to reinforce topics from the slides, solve example problems, and answer questions. Otherwise, this is a residential course with class sessions held at the scheduled time and location.
4. **Learning environment**: This class is a learning environment, both inside and outside the classroom. Learning will occur through a mix of in-class lectures and activities, plus online read-ahead slides, example problem videos and discussion forums. During class-time, you should absolutely ask questions if you are unclear about something. While in-class lecture slides will be posted on Canvas, you should take notes from the class session presentations rather than just rely on reading the slides later, since the slides will not contain all material from lectures, and since note-taking aids in your comprehension.
5. **Course outcomes**: Upon successful completion of this course, you will be able to:
    - Perform economic decision-making using a structured, rational, model-based process.
    - Estimate costs and benefits from a scenario description and properly structure the estimates into categories (e.g., variable versus fixed).
    - Construct a cash flow diagram from a verbal description of a series of transactions involving cash, loans, stocks, bonds, and projects.
    - Analyze complex cash flows and decompose them into a minimal set of constituent standard cash flows.
    - Use equivalence relationships based on time value of money to compute standard cash flows that are equivalent in value to given ones.
    - Differentiate between nominal and effective interest rates and use compounding frequency conversions to derive one from the other.
    - Compute the economic worth of an investment alternative (including loans) in terms of present worth, annual worth, rate of return, and benefit-cost ratio.

- Select from alternative investments (including loans) based on their economic worth, a decision rule, and the relationships among alternatives.
- Compute tax, depreciation, loan interest and principal repayment amounts per period; incorporate these amounts to determine cash flows after taxes, interest, and principal.
- Use inflation factors and price indices to incorporate the effect of inflation into economic worth calculations and selection from alternatives using constant dollars and actual dollars.
- Pass the engineering economy component of the Fundamentals of Engineering (FE) exam.

Course Materials and Resources

1. **Textbook**: There is no official textbook. However, the following text can serve as a reference if needed: *Engineering Economic Analysis (14th Edition)* by Newnan, Eschenbach, Lavelle & Lewis (Oxford University Press, 2020).
2. **Modules**: The course is arranged into weekly learning modules with material organized via Modules in Canvas. Each module will have a set of read-ahead slides that function as textbook material, plus several short videos that review examples. Each module will also feature an in-class session with slides and other supporting material posted on Canvas.
3. **Other material**: Reference material will also be posted to Modules io Canvas.
4. **Software**: Microsoft Excel®.

Assignments and Grading

1. **Grade component weights**: There will be a set of weekly quizzes during the semester plus a midterm exam and a final exam. Extra work to boost grades at the end of the semester will not be available. The course average will be computed using the following weighting – 60% (weekly quiz grade), 20% (midterm exam grade), and 20% (final exam grade).
2. **Overall course grade**: The course will be graded based on a straight scale – A (100% to 90%), B (89% to 80%), C (79% to 70%), D (69% to 60%), and F (below 60%).
3. **Weekly quiz procedures**: Weekly quizzes are intended to assess your on-going knowledge of course material and keep you from falling behind in the class. There is a quiz for each module except the first, for a total of 12 quizzes. All quizzes will be taken online and submitted via Canvas. Quizzes are open book, open notes.
    a. Each quiz will open on the Sunday before the Wednesday class session at which the week's module will be covered. It will close on the Tuesday after the class session.
    b. Each quiz will have between 2 and 8 multiple choice questions.
    c. You will have two attempts for each quiz with the highest score being the one recorded. Attempts will not be timed.

d. The overall quiz average will be the percentage of correct answers from all quizzes out of all available questions.
e. You are strongly advised not to wait until the last minute to take quizzes.

4. **Exam procedures**: Exams are intended to assess your mastery of course material. The course has a mid-term exam and a final exam.
    a. Exams are closed book and closed notes with reference material provided.
    b. Grading will address problem approach and concepts, data usage, table look-up, mathematical manipulation, and conclusions drawn from analysis.
    c. Practice exams will be posted on Canvas. They will have representative reference material that will be available on the actual exam (e.g., interest factor tables, etc.).
    d. You are responsible for bringing a calculator to all exams. Calculators must be computation-only devices with no internet capability. Cell phones may not be used as calculators. It is strongly recommended that you bring a calculator with power functions and storage registers.
    e. The midterm exam will be held during a regular class period. The final exam will be held during the assigned final exam period. It will be a 75-minute exam that focuses on the second half of the course material.
5. **Make-up exams and quizzes**: Individual make-up exams or quizzes will be offered only if you have a valid reason (severe illness, severe illness or death of an immediate family member, serious accident, important religious holiday, or Institute-approved activities with proper documentation). Due to the generous time windows offered for quizzes, the excuse must be extraordinary and affect your availability for most of the window.
6. **Grade appeals**: Grade appeals should be presented in writing within one week after the graded exams or quizzes are returned.

Topics and Tentative Schedule

1. The course covers the following topics.
    - Introduction
    - Making Economic Decisions
    - Engineering Costs and Estimating
    - Interest
    - Single Payments
    - Uniform and Gradient Series Payments
    - Complicating Factors
    - Present Worth Analysis
    - Annual Cash Flow Analysis
    - Rate of Return Analysis
    - Depreciation
    - Income Taxes
    - Inflation

The schedule of topics will be posted on Canvas prior to the first day of class.

Academic Integrity

1. **General**: The Honor Code is taken seriously in this class. You should familiarize yourself with its rules and procedures.
2. **Exams and quizzes**: Exams and quizzes are individual efforts. The instructional staff takes specific measures to protect against honor code violations on exams and quizzes.
3. **Collaboration**: You are encouraged to discuss course topics and example problems with your fellow students.
4. **Generative AI use**: Use of generative AI is not allowed on quizzes or exams.

Administrative Policies and Procedures

1. **General**: The Student-Faculty Expectations Agreement provides a framework for creating an atmosphere of mutual respect in the classroom. You are encouraged to review it.
2. **Attendance**: You are encouraged to attend class sessions so that you may ask questions and receive the benefit of answers to questions asked by others. You are responsible for all material presented in class, plus class discussions thereof.
3. **Synchronization**: Since this is a "semi-flipped class," it is important to view the online material corresponding to the in-class module topics prior to attending the in-class lectures. You will be in a better position to have any questions answered.
4. **Time zone**: Unless otherwise stated, all times are assumed to be expressed using Eastern Time (ET).
5. **Computers**: You should have your laptop at in-class sessions since we will sometimes review how to use Excel functions to do financial calculations.
6. **Classroom behavior**: Cell phone, tablet and/or computer use is permitted only if you are using the device to take notes.
7. **Communication forums**: Announcements will be posted on Canvas, and Piazza will be used to answer general questions outside of class. You are encouraged to post questions about class material on Piazza for class discussion. You are responsible for announcements on Canvas, as well as discussions on Piazza about course material.
8. **Email communications**: You should address all emails about the course to the instructor. Be sure to include the course number in the subject field (ISyE 3025). Many procedural questions are already answered in the syllabus, so please check the syllabus beforehand.
9. **Website outages**: You should be prepared for website outages so that they do not impede your ability to study or perform an assignment. OIT often does upgrades or service activities, and you do not want material or assignments to be unavailable if you need them.

10. **Class cancellations**: Campus closures or opening delays may occur due to inclement conditions. If class is cancelled, a digital learning day will be used to deliver scheduled material. If feasible, a synchronous class session will be broadcast online at the regular class time. If not, an asynchronous class session will be used. Either way, it will be recorded and posted for viewing later. Quiz windows and exam dates may be modified if, in the instructor's judgment, conditions impair successful performance of assignments.

Student Resources and Support

1. **Academic resources**: You are encouraged to use campus academic support resources (Academic Success & Advising) for tutoring and coaching if needed. In addition, ISyE's Center for Academics, Success, and Engagement provides free tutoring for ISyE courses.
2. **Non-academic resources**: Your well-being is important. If you find yourself with a serious non-academic issue, campus resources include the Center for Mental Health Care & Resources, Health Services and Student Life. Additionally, you are highly encouraged to be vaccinated against the flu and Covid-19.
3. **Accommodations for individuals with disabilities**: The Office of Disability Services assists with accommodation for individuals with disabilities. If you need accommodation, please contact the instructor as soon as possible to discuss your individual needs.