Marshall University Syllabus
College of Engineering and Computer Science

Course

ENGR 222-201 – Engineering Cost Analysis and Economy

Class location

Weisberg Applied Engr Complex (WAEC) 1103

Class Period

TR 9:30 AM - 10:45 AM

Course Description

Economic analysis of engineering proposals; time value of money; evaluation and selection of projects; replacement and retention decisions; uncertainty and risk; inflation; cost estimation; depreciation; and benefit cost analysis.

Credits

3 credits; undergraduate

Prerequisites

MTH 229

Term/Year

Fall 2024

Format

This course format is taught on a face-to-face basis, with occasional pre-recorded lectures by the instructor if needed. Pre-recorded lectures will be posted on Blackboard. This course should be completed in one Fall term.

Instructor

Sudipta Chowdhury, Ph.D., Assistant Professor, Department of Mechanical and Industrial Engineering

Contact Information

- Office: WAEC 1213
- Office Hours: TR 11.00 AM- 12.30 PM
- Marshall Email: chowdhurys@marshall.edu

Preferred Communication Method

The preferred communication method outside of office hours is e-mail.

Academic Calendar

For beginning, ending, and add/drop dates, see the Marshall University Academic Calendar (URL: https://www.marshall.edu/academic-calendar/spring-2023-semester/).

Health and Safety Information

All members of the Marshall University community are expected to always observe health and safety protocols. This includes general health and safety protocols as well as specific protocols that might emerge in response to community and campus health conditions.

Campus Carry Policy

University Policy, UPGA-12 (Campus Carry Policy) derives its authority from West Virginia State law, including the Campus Self-defense Act (W. Va. Code § 18B-4-5b). It pertains to the exercise of Concealed Carry on Marshall University's campus, except in designated areas, by individuals with a valid permit to Conceal Carry.

Individuals who choose to Conceal Carry are responsible for knowing and understanding all applicable federal, state, and local laws and Marshall University Board of Governors Rules, University Policies, and Administrative Procedures. University Policy, UPGA-12 applies to areas of campus and buildings that are directly under the possession or control of Marshall University.

Concealed Handguns are not observable to others and must be holstered and concealed on the body of the permit holder or in a personal carrier, such as a backpack, purse, or other bag that remains under the exclusive and uninterrupted control of the permit holder. This includes wearing the personal carrier with a strap, carrying or holding the personal carrier, or setting the personal carrier next to or within your immediate reach at all times. If your participation in class activities impedes your ability to maintain constant control of your Handgun, please make alternate arrangements prior to coming to class.

Faculty Office

NOTICE: University Policy, UPGA-12 (Campus Carry Policy) defines Sole Occupancy Offices as areas that may restrict Concealed Carry. Please be aware that my office is a Sole Occupancy Office and this statement serves as notice that concealed weapons or handguns are not permitted in my office. If you plan to attend a meeting in my office or to drop by my office, secure your weapon or handgun appropriately before you arrive.

Required and/or Recommended Texts and Materials

Recommended Texts and Materials

Engineering Economy, 8th Edition. Blank and Tarquin, McGraw Hill, 2018. ISBN: 978-0073523439

Technology and Technical Skill Requirements

- Students must be proficient in the use of computers, the Internet, browsers, Microsoft Office Word, Microsoft Excel, and other common applications.
- Students will be requested to submit homework assignments as PDF files, and thus must be able to generate PDF files.
- Students must be able to use Marshall e-mail, as well as the following tools in Blackboard: assignments and gradebook.
- Adobe Acrobat Reader or other similar pdf readers are needed to read some files.
- Students may be required to submit assignments as Microsoft Word documents (.docx) or Microsoft Excel files (.xlsx), using the most recent Microsoft Office suite. Office 365 is available at no extra charge to students enrolled at MU. For information visit Marshall IT: Office 365 (URL: http://www.marshall.edu/it/office365/).

Technology Assistance

If you have technical problems, please contact one or more of the following:

- Blackboard Support (URL: www.marshall.edu/design-center/support-ticket/)
- Marshall Information Technology (IT) Service Desk (Help Desk) (URL: http://www.marshall.edu/it/departments/it-service-desk/)
    - Huntington: (304) 696-3200
    - South Charleston: (304) 746-1969
    - Email the IT Service Desk (itservicedesk@marshall.edu)

Course Purpose

The purpose of this course is to familiarize students with methods of economic

analysis that are useful in the evaluation and selection of engineering alternatives.

Course Objectives/Outcomes

The student will be able to:

1. Compute economic equivalency values for cash flows, including uniform and non-uniform expenses and revenues, deferred annuities, gradients, lump sum payments or receipts, and salvage values.
2. Use software tools and standard interest tables for determining present, annual, and future worth values of cash flows, in addition to calculating rates of returns and determination of the number of payment periods.
3. Perform alternative evaluation utilizing incremental rate of return analysis and replacement/retention analysis.
4. Evaluate projects according to benefit/cost analysis, cost effectiveness analysis, and alternative selection with budget limitations.
5. Incorporate uncertainty analysis into simulations that address random project variabilities, including cost, inflation, and revenue.
6. Calculate the effect of taxes on project rates of return and incorporate various depreciation models into project planning models.

Desired Learner Outcomes

Course Outcomes – student will:	**How students will practice each outcome**	**How achievement outcome will be assessed**
1. Compute economic equivalency values for cash flows, including uniform and non-uniform expenses and revenues, deferred annuities, gradients, lump sum payments or receipts, and salvage values.	Conceptual discussion/Practice problems/ Homework assignments	Quizzes/Exams/ In-class group exercises
2. Use software tools and or standard interest tables for determining present, annual, and future worth values of cash flows, in addition to calculating rates of returns and determination of the number of payment periods.	Conceptual discussion/Practice problems/ Homework assignments	Quizzes/Exams/ In-class group exercises
3. Perform alternative evaluation utilizing incremental rate of return analysis and replacement/retention analysis.	Conceptual discussion/Practice problems/ Homework assignments	Quizzes/Exams/ In-class group exercises

4. Evaluate projects according to benefit/cost analysis, cost effectiveness analysis, and alternative selection with budget limitations.	Conceptual discussion/Practice problems/ Homework assignments	Quizzes/Exams/ In-class group exercises
5. Incorporate uncertainty analysis into simulations that address random project variabilities, including cost, inflation, and revenue.	Conceptual discussion/Practice problems/ Homework assignments	Quizzes/Exams/ In-class group exercises
6. Calculate the effect of taxes on project rates of return and incorporate depreciation models into project planning models.	Conceptual discussion/Practice problems/ Homework assignments	Quizzes/Exams/ In-class group exercises

Course Structure

The course has homework assignments, in-class group exercises, quizzes, and exams.

Course Requirements/Due Dates

Please refer to the "Course Schedule" for a detailed timeline for covering the course contents and quiz/exam scheduling.

Course Policies

By enrolling in this course, you agree to the following course policies:

Attendance/Participation Policy

Students are expected to attend each class meeting and actively participate in the discussion and assigned in-class learning activities.

Online Communication Expectations

If you send me an email, please use correct grammar, spelling, and punctuation.

If you have a question about a homework problem, it is helpful if you attach a photo of the problem statement; that way I can respond if I'm out of the office and don't have my notes and textbook available.

Use of mobile phones is not allowed in the class.

Grading Policy

PLEASE DO NOT ASK FOR AN EXCEPTION TO THE FOLLOWING POLICIES.

Grading Scale

Course grades will be calculated using the weighting basis and letter-grade breakdowns shown below.

- **Total homework assignments: 8 (18%)**
  - The due date for each homework assignment is declared in the syllabus.
  - You can drop the grade for one of the homework assignments.
  - If you are late, you can submit within the next 24 hours. However, you will receive an automatic 25% reduction on your points. After 24 hours, you will receive 0. **No exception will be permitted.**
  - In homework problems, you must show calculation steps to receive full credit.

- **Total quizzes: 2 (20%)**
  - Each quiz will be 25-30 minutes long and will be conducted at the end of the class.
  - Dates for each quiz will be announced in advance.
  - Each quiz will count towards your grade

- **In-class group problems: 6-10 (20%)**
  - You will be divided into groups and will be asked to solve a problem based on the lecture you just attended.
  - Dates for in-class group problems will be announced in advance.
  - All in-class group problems will count towards your final grade.

- **Exams: 3 (16%, 16%, 10%)**
  - The duration of exams 1 and 2 will cover the entire class time. Exam 3 duration will be longer as it may cover the entire syllabus.
  - Exams 1 and 2 will have a higher weightage towards your final grade compared to exam 3

Letter-grade

A	100 – 90
B	89.99 – 80
C	79.99 – 70
D	69.99 – 60
F	59.99 – 0

Late Work Policy

- **Homework/in-class exercises/Quiz/Exams not submitted/completed due to unexcused factors cannot be made up**.

- In cases of a university-excused absence, students are responsible to contact the instructor and complete the make-up assignment within 2 weeks of the missed assignment. After 2 weeks, even if you have a university-excused absence, you will receive 0. **No exception will be permitted.**

Anticipated Response Time for Grading and Feedback

Homework assignments, quizzes, and exams will generally be graded within approximately two weeks of their submission. If you have any issue with the grade you receive, please contact me within one week after the grade has been posted. After this period, your grades are final.

Academic Integrity

Students are expected to adhere to the Marshall University academic dishonesty policy, found in the undergraduate catalog. Academic dishonesty will not be tolerated, and infractions of the university academic dishonesty requirements will lead to sanctions and reporting to the Office of Academic Affairs. Students are particularly encouraged to be careful to avoid cheating, plagiarism, and complicity as related to homework assignments.

University Policies

By enrolling in this course, you agree to the University Policies. Please read the full text of each policy (listed below) by going to MU Academic Affairs: University Policies. (URL: http://www.marshall.edu/academic-affairs/policies/)

- Academic Dishonesty Policy
- Academic Dismissal Policy
- Academic Forgiveness Policy
- Academic Probation and Suspension Policy
- Affirmative Action Policy
- Dead Week Policy
- D/F Repeat Rule
- Excused Absence Policy for Undergraduates
- Inclement Weather Policy
- Sexual Harassment Policy
- Students with Disabilities (Policies and Procedures)
- University Computing Services Acceptable Use Policy

Course Schedule

This schedule is tentative. The instructor may modify the contents based on the progress of the class. Students must check the course schedule regularly at the Blackboard to be updated on any change.

Week	Date	Topics	Homework assigned	Homework due	Quiz
1	08/20	Syllabus Overview	-	-	-
	08/22	Foundation of engineering economy	-	-	-
2	08/27	Single payment formulas	-	-	-
	08/29	Uniform series formulas	Homework 1	-	-
3	09/03	Arithmetic gradient/Geometric gradient series factors	-	Homework 1	-
	09/05	Shifted cash flow series	Homework 2	-	-
4	09/10	Present/Future Worth Analysis	-	Homework 2	
	09/12	Annual worth analysis and Life Cycle Cost Analysis	Homework 3	-	-
5	09/17	Rate of return (RoR) analysis using AW or PW relation: One project	-	Homework 3	Quiz 1
	09/19	Rate of return analysis: two alternatives (PW relation), Rate of return analysis: two alternatives (AW relation),	Homework 4	-	-
6	09/24	Nominal and effective interest rates Exam 1 review	-	Homework 4	-
	09/26	**Exam 1**			
7	10/01	Rate of return analysis : more than two alternatives	-	-	-
	10/03	Benefit/cost (B/C) Analysis for single project, incremental B/C	Homework 5	-	-
8	10/08	Incremental B/C multiple alternatives, Cost-effectiveness analysis	-	Homework 5	-
	10/10	October break (Class canceled)			
9	10/15	Independent projects with budget limitation: capital rationing, equal life projects, unequal life projects, linear programming, ranking options	Homework 6	-	-
	10/17	Breakeven point analysis-1	-	Homework 6	Quiz 2
10	10/22	Breakeven point analysis-2	-	-	-
	10/24	Payback analysis	-	-	-
11	10/29	Inflation Overview, Exam 2 Review	-	-	-
	10/31	**Exam 2**			
12	11/05	PW with inflation, AW with inflation, Capital recovery with inflation			

	11/07	Cost Estimation: Unit Method, Cost Index	Homework 7	-	-
13	11/12	Indirect Cost and Allocation Depreciation methods	-	Homework 7	-
	11/14	Depreciation Methods	Homework 8	-	-
14	11/19	Depreciation Methods	-	Homework 8	-
	11/21	After tax analysis, Sensitivity analysis and staged decisions			
15	11/26	Thanksgiving Break			
	11/28	Thanksgiving Break			
16	12/03	**Final exam review session**			
17	TBD	**Exam 3 (Final Exam)**			

Note: Dates for in-class group exercises are not fixed. The instructor will inform the class within at least 24-48 hours before the next in-class group exercise.