



EASTERN MEDITERRANEAN UNIVERSITY
Faculty of Engineering
Department of Industrial Engineering
IENG323/MANE323 - Engineering Economy
COURSE OUTLINE



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|----------------------|---------------------|--------------------------|--------------------|
| COURSE CODE | IENG323 / MANE323 | COURSE LEVEL | Third year |
| COURSE TITLE | Engineering Economy | COURSE TYPE | Department Core |
| CREDIT VALUE | (4, 1, 0) 4 | ECTS VALUE | 6 |
| PREREQUISITES | Junior Standing | SEMESTER and YEAR | Spring 2024 - 2025 |

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|---------------------|--|-----------------------------|---------------|------------------|
| WEB LINK | http://ie.emu.edu.tr (click on the Instructors & Courses link) | | | |
| | Name (group) | e-mail | Office | Telephone |
| Instructor | Gökhan İZBIRAK, Prof. Dr. | gokhan.izbirak@emu.edu.tr | C107 | 1589 |
| Assistant(s) | Negar Akbarzadeh | negar.akbarzadeh@emu.edu.tr | B107 | 3246 |

COURSE DESCRIPTION

The purpose of this course is to give an introduction to economic analysis for decision making in engineering design, manufacturing equipment, and industrial projects. Subjects covered include interest, economic equivalence, time-value of money, project cash-flow analysis, decision making among alternatives, present worth, capitalized cost, equivalent-uniform, rate-of-return, benefit-cost ratio methods, replacement analysis, breakeven analysis, sensitivity analysis, capital budgeting, inflation, elements of cost and cost estimation, payback analysis, methods of depreciation, after tax economic analysis, and computer applications in engineering economics.

AIMS & OBJECTIVES

The purpose of this course is to supplement engineering student's technical training with the knowledge and capability to perform financial analysis especially in the area of capital investment.

Course objectives (CO):

1. Cash flows, derivation and use of Engineering Economy Factors (P/F, P/A, F/A, P/G etc.)
2. Nominal and Effective interest rates
3. Evaluation of Alternatives (PW, Capitalized Cost, Payback Period, AW, Rate of Return, B/C Analysis)
4. Performing Replacement Study, Breakeven and Sensitivity Analysis
5. Considering Inflation in economic analysis
6. Use of basic Depreciation methods and basic Taxation calculations
7. Computer applications in Engineering Economy (MS Excel)
8. Preparing a Term Project (Working effectively in multidisciplinary teams, making an independent research, applying related techniques in real life environment, and writing and presenting a technical report on the results)

GENERAL LEARNING OUTCOMES (COMPETENCES)

On successful completion of this course, all students will have developed **knowledge** and **understanding** of:

- The fundamental concepts of engineering economy
- How to use engineering economy factors to account for the time value of money
- Service, revenue, mutually exclusive and independent alternatives
- How to consider inflation in an engineering economy analysis
- Depreciation and after tax economic analysis
- The assumptions that form the basis of methods applied

On successful completion of this course, all students will have developed **their skills in**:

- Economic analyses of alternatives using present worth, annual worth, future worth and rate of return methods
- Selecting and applying a suitable technique for the comparison of mutually exclusive alternatives
- Selecting and applying a suitable technique for the evaluation of independent alternatives
- Identifying relevant data to successfully perform an engineering economy study
- Evaluation of public projects using the benefit/cost ratio method
- Performing replacement study among an existing asset or system and its possible alternatives
- Determining the level of activity necessary or the value of a parameter to breakeven
- Using computer software for engineering economy analysis

On successful completion of this course, all students will have developed their **appreciation** of, and respect for **values and attitudes** to:

- The role of engineering economy in the decision making process
- The importance of accuracy in estimating costs and revenue and sensitivity analysis to these values
- Consider limitations of the analyses by taking into account the realistic constraints such as environmental, social, political and ethical
- Understand the impact of engineering solutions in global, environmental and societal context
- Professional and ethical responsibility

LEARNING TEACHING METHODS

The function of teaching is to enable students to learn. Therefore students are required to read the chapters of the textbook before coming to class.

TERM PROJECT

Students will be given a Term Project; Project Reports should be prepared according to the project guidelines. Each report must contain at least Title Page, Table of Contents, List of Tables, List of Figures, List of Symbols/Abbreviations, Main Body of the Text, References, and Appendices. The project reports must be handed in (together with its softcopy) latest on **June 2, 2025 Monday** before 5:00 pm to the course instructor, or department secretary. Project **Presentations** will take place starting from June 3 Tuesday, until June 5 Thursday. Detailed schedule on presentations will be announced. Late submissions will be penalized by 50 percent per day.

METHOD OF ASSESSMENT

All Examinations will be based on lectures, discussions, textbook and assigned work.

Quizzes: There will be **four** quizzes designed to test familiarity and basic understanding of various topics. There will be no quiz make-ups.

Midterm Exam: The midterm exam will be held in the week designated by the university administration. It will cover all of the material up to the date of examination.

Final Exam: The final exam will cover the whole course material.

Make-up Exams: Make-up examinations will only be offered to students who provided adequate documentation for the reason of their absence within **four** working days at the latest after the examination date. University regulations apply for Graduation Make-Up exam.

Any objection to the grade or mark should be made latest within a week following its announcement.

Grading Policy:

| | |
|--------------|------------------------------|
| Lab | 5 % |
| Quizzes | 20 % (4 Quizzes – announced) |
| Midterm Exam | 20 % |
| Term Project | 25 % |
| Final Exam | 30 % |

Note that the instructor reserves the right to modify these percentages in case it is found necessary. You will be informed from the changes, if any.

ATTENDANCE & NG Grade

Attendance will be taken every lecture but will not be included in the letter grade calculations. Note that university regulations allow instructors to give a grade of **NG** (Nil Grade) to a student whose absenteeism is more than 30% of the lecture/lab hours and/or who do not complete sufficient work that are included in the assessment of the course.

TEXTBOOK/S

Leland T. Blank, Anthony J. Tarquin “*Engineering Economy*” 8th edition, McGraw-Hill International Edition, 2017.

References:

William G.Sullivan, Elin M. Wicks and James T. Luxhoj “*Engineering Economy*” 14th edn, Prentice Hall, 2009

Chan S. Park, “*Fundamentals of Engineering Economy*” 2nd edn, Prentice Hall, 2009

Joseph C. Hartman, “*Engineering Economy and the Decision Making Process*” Prentice Hall, 2007

| Class Schedule | Tutorial Schedule | Laboratory Schedule | Presentation |
|---|--|---|--|
| 4 hours of lecture per week by the instructor | 1 hour of tutorial every week by the course assistant(s) | At least 2 sessions of lab + Quiz (lab dates will be announced) | Term project presentations (as a group) at the end of the semester |

COURSE CONTENT

| Week | Topics |
|----------------|---|
| 1 | Foundations of engineering economy; Factors: how time and interest affect money |
| 2 – 3 | Combining factors; Nominal and effective interest rates |
| 4 | Present-worth and capitalized cost evaluations |
| 5 | Equivalent-annual worth analysis / Lab applications |
| 6 | Rate of return analysis of single alternative |
| 7 | Rate of return evaluations for multiple alternatives / Lab applications |
| 8 - 9 | MIDTERM Exam |
| 10 | Benefit cost analysis and public sector economics |
| 11 | Replacement analysis |
| 12 | Replacement analysis / Breakeven analysis / Sensitivity analysis |
| 13 | Effects of inflation |
| 14 | Methods of depreciation & Basic taxation and after tax economic analysis |
| 15 - 17 | Final Exams |

Contribution of the Course to meeting the requirements of Criterion 5

Mathematics & Basic Sciences : 0
 Engineering Topic : 4
 Other : 0

Relationship of Course to Student Outcomes

| Student Outcomes | Level of Contribution | | |
|--|--------------------------|-------------------------------------|-------------------------------------|
| | No | Moderate | High |
| (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| (2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| (3) an ability to communicate effectively with a range of audiences | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| (4) 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 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| (5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| (6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| (7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACADEMIC HONESTY - PLAGIARISM

Cheating is copying from others or providing information, written or oral, to others. Plagiarism is copying without acknowledgement from other people's work. According to university by laws cheating and plagiarism are serious offences punishable with disciplinary action ranging from simple failure from the exam or project, to more serious action (letter of official warning suspension from the university for up to one semester). Disciplinary action is written in student records and may appear in student transcripts.

PLEASE KEEP THIS COURSE OUTLINE FOR FUTURE REFERENCE AS IT CONTAINS IMPORTANT INFORMATION