

Course number and name	END 312 / Engineering Economics
Credits, contact hours, categorization of credits	3 credits / 42 hours / Engineering topic
Instructor or course coordinator	Cengiz KAHRAMAN, İrem UÇAL SARI
Text book and other supplemental materials	<ul style="list-style-type: none"> • Sullivan, W. G., Wicks, E. M., & Luxhoj, J. T. (2003). <i>Engineering economy</i>, 12th Edition. Upper Saddle River, NJ: Prentice Hall. • Leland T. Blank, Anthony Tarquin, <i>Engineering Economy</i>, 6th Edition, McGraw-Hill, 2009. • Riggs, J.L., <i>Engineering Economics</i>, McGraw Hill, 1982. • Park, C.S., Sharp-Bette, G.P. <i>Advanced Engineering Economics</i>, John Wiley and Sons, Inc., 1990 • Kurtz, M., <i>Calculations for Engineering Economic Analysis</i>, McGraw Hill, Inc., 1995. • Bierman, H., Smidt, S., <i>The Capital Budgeting Decision</i>, Maxwell Macmillan, 1990. • Steiner, H.M., <i>Engineering Economic Principles</i>, McGraw Hill, 1996. • Jan Williams, Sue Haka, Mark Bettner, Joseph Carcello, 2009, <i>Financial and Managerial Accounting</i> (15th edition), McGraw Hill

Course information	
Content	Cost and accounting terms. Terminology and cash flow diagrams. Interest factors and their use. Nominal and effective interest rates. Continuous compounding. Present worth and capitalized cost analysis. Uniform annual cash flow analysis. Rate of return analysis. Internal and external rates of return. Benefit / cost ratio analysis. Payback period analysis. Replacement analysis. Inflation-interest relations. Depreciation. Depletion. After-tax economic analysis. Breakeven analysis. Capital budgeting under budget constraints. Sensitivity analysis and decision trees. Investment analyses under risk.
Prerequisites	None
Type	Required

Course learning outcomes
<p>Students who pass the course will:</p> <ol style="list-style-type: none"> I. To determine and analyze life cycle costs, to be able to use cost estimation techniques II. Convert nominal and effective interest rates. III. To calculate the equivalents of cash flows by considering the time value of money IV. To apply discounted cash flow techniques such as net present worth, equivalent uniform annual worth, internal rate of return and benefit cost ratio. V. Compare alternatives with differing life-cycles and Compare infinite-life projects using capitalized costs VI. To apply payback period analysis VII. To apply replacement analysis VIII. Apply fundamental income taxation, inflation, and depreciation to their analysis. IX. To be able to model capital budgeting and allocation problems X. Apply economic analysis under risk and uncertainty and multiple criteria

Student outcomes	Level of contribution
SO1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	High
SO2. 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.	Little
SO3. An ability to communicate effectively with a range of audiences.	Not applicable
SO4. 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.	Partial
SO5. 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.	Little
SO6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	Partial
SO7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Partial

Week	Topics	Learning outcome(s)
1	Introduction to Engineering Economics	I
2	Cost Concepts and Design Economics	I
3	Cost Estimation Techniques	I
4	The Time Value of Money	I, II, III
5	Evaluating a Single Project	III, IV, VI
6	Comparison and Selection among Alternatives	III, IV, V, VI
7	Depreciation and Income Taxes	VIII
8	Price Changes and Exchange Rates	II, III, IV
9	Replacement Analysis	III, IV, V, VII, VIII
10	Evaluating Projects with the Benefit Cost Ratio Method	III, IV, V
11	Breakeven and Sensitivity Analysis	III, IV, V, IX
12	Probabilistic Risk Analysis	III, IV, V, X
13	The Capital Budgeting Process	IX
14	Decision Making Considering Multi-attributes	V, IX, X