Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
IND 511	Advanced Engineering Economy	1	3	0	0	3	6

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Compulsory
Course Level	Masters Degree
Objective	The objectives of this course are to enable the student to understand the basics of engineering economy decisions, to review economic decision making techniques including methods for risk and uncertainty, and to develop overall economic cost awareness which will prove useful in personal investment decision making as well as in many types of engineering and management decisions.
Content	- Introduction and organization - Review of discrete cash flow models - Uniform and gradient series - Nominal versus effective interest rates - Continuous compounding and continuous cash flows - Mid-period convention - Time-dependent interest rates - Loans - Equivalent methods for comparing alternatives (single project) - Present worth, future worth and annual worth methods - Benefit-cost ratio method - Rate of return method and variations - Internal rate of return method - External rate of return method - Decision rules for selecting among multiple alternatives - Present worth, future worth and annual worth methods - Benefit-cost ratio method - Internal rate of return method - Approximate and supplementary methods - Payback method - Profitability index - Depreciation methods - After-tax economy studies - Index numbers - Incorporating inflation into economic analysis - Replacement models - Retirement with identical replacement - Generalized replacement model - Dynamic programming formulations - Mathematical programming formulations for capital budgeting - Risk analysis - Statistical moments of random variables - Random cash flows - Random project life - Decision criteria and methods for risk and uncertainty - Portfolio optimization - Introduction to real options approach - Project presentations
References	- Park, C.S., Sharp-Bette, G.P., Advanced Engineering Economics, John Wiley & Sons, 1990. - Fleischer, G.A., Introduction to Engineering Economy, PWS Publishing Company, Boston, 1994.

Theory Topics

Week	Weekly Contents

Week	Weekly Contents
1	Introduction and organization, Review of discrete cash flow models, Uniform and gradient series, Nominal versus effective interest rates.
2	Continuous compounding and continuous cash flows, Mid-period convention, Time-dependent interest rates, Loans.
3	Equivalent methods for comparing alternatives (single project): Present worth, future worth and annual worth methods, Benefit-cost ratio method, Rate of return method and variations, Internal rate of return method, External rate of return method.
4	Decision rules for selecting among multiple alternatives: Present worth, future worth and annual worth methods, Benefit-cost ratio method, Internal rate of return method. Approximate and supplementary methods: Payback method, Profitability index.
5	Depreciation methods, After-tax economy studies.
6	Index numbers, Incorporating inflation into economic analysis.
7	Replacement models: Retirement with identical replacement, Generalized replacement model, Dynamic programming formulations.
8	Mathematical programming formulations for capital budgeting.
9	Midterm
10	Risk analysis, Statistical moments of random variables, Random cash flows, Random project life.
11	Decision criteria and methods for risk and uncertainty.
12	Portfolio optimization.
13	Introduction to real options approach.
14	Project presentations.