

POLITEHNICA University of Bucharest (**UPB**)  
 Faculty of Engineering and Management of Technological Systems (**IMST**)  
 Study Programme: Industrial Engineering (**IE**)  
 Form of study: Licence (Bachelor)

## COURSE SPECIFICATION

<b>Course title</b>	Engineering Economics	<b>Semester</b>	6
<b>Course code</b>	UPB.06.S.06.O.005	<b>Credits (ECTS)</b>	4

<b>Course structure</b>	Lecture	Seminar	Laboratory	Project	Total hours
<i>Number of hours per week</i>	2		2		4
<i>Number of hours per semester</i>	28		28		56

<b>Lecturer</b>	Lecture	Seminar / Laboratory / Project
<i>Name, academic degree</i>	DOICIN Cristian, Prof., PhD	ULMEANU Mihaela, Lecturer, PhD
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<b>Course description</b>
<p>The Engineering Economics course introduces students to the monetary side of engineering. Thus, the curricula of this class must cross several fields of knowledge and it serves to integrate these subjects with a common economic thread in support of the design process.</p> <p>For an engineering design to be successful, it must be technically sound and produce benefits. These benefits must exceed the costs associated with the design in order for it to enhance its net value. The Engineering economics course is concerned with the systematic evaluation of the benefits and costs of the projects involving engineering design, and analysis. In other words, Engineering economics quantifies the benefits and costs associated to the engineering projects to determine if they make or save enough money to warrant their capital investments. Engineering economics requires the application of engineering design and analysis principles to provide goods and services that satisfy the consumer at an affordable cost. Furthermore, Engineering economics is as relevant to the designer engineer who considers material selection as it is to the chief executive officer who approves capital expenditures for new ventures.</p> <p>The course has two main purposes: (1) to provide students with a sound understanding of the principles, basic concepts, and methodology of engineering economics and (2) to help them to develop proficiency with these methods and with the process of making rational decisions regarding situations they are likely to encounter in professional practice.</p> <p>Course chapters:</p> <ol style="list-style-type: none"> <li>1. General considerations (concepts and terminology, principles of economic analysis in engineering, examples of present economy etc.);</li> <li>2. Cost analysis (concepts and terminology, breakeven analysis, cost estimation etc.);</li> <li>3. Economic analysis of process plan variants (operations' costs, process plan costs, product cost);</li> <li>4. Time value of money (cash-flow diagrams, simple and compound interest, cash-flow series etc.);</li> <li>5. Reality issues and practical applications (inflation, interest rate changing, loans etc.);</li> <li>6. Measuring the worth of investments (NPV, IRR, ERR, Payback period methods etc.);</li> <li>7. Comparing alternatives (basic concepts, defining investment alternatives, defining planning</li> </ol>

- horizon, developing cash-flow profiles, specifying the MARR etc.);
8. Uncertainty and probabilistic risk analysis (sensitivity analysis, the distribution of random variables, evaluation of projects with discrete random variables, Monte Carlo simulation etc.)

### ***Laboratory description***

The activities undertaken within the Lab will follow the chapters developed at the course. The labs will include practical developments of this topics, starting with examples of present economy and ending with some advanced methods for calculating the worth of investments. Some details will be also emphasized on probabilistic economic analysis.

Most of the labs are developed in Microsoft Excel. The greatest advantage is that it is no longer necessary to enter the spreadsheets by hand. The templates are available on the PCs in the Lab. Users can modify the basic templates for the specific problem at hand.

By attending the labs the students will be able to:

- calculate the manufacturing cost for a raw part or for a finite part, with and without influence of the inflation;
- select of the optimal process plan from an initial set of possible technical alternatives;
- compare the engineering alternatives based on economic criteria;
- calculate the worth of an investment through different methods;

### ***Intended learning outcomes***

By attending this course you'll be able to:

- Define, formulate and analyse a problem of present economy;
- Solve independently specific problems requiring economic calculus;

By graduating this course you'll have:

- The ability to use economic tools in analysing engineering problems;
- Expert knowledge regarding the time value of money and measuring the worth of investments;
- Ability to conduct an analysis in uncertainty conditions.

The course contributes to the definition of the following competences (selection from the competences of the entire study programme):

- The ability to make calculations, demonstrations and applications for solving specific tasks of industrial engineering based on knowledge of the fundamental sciences.
- The design and management of the production processes.
- The use of software and information technologies for solving specific tasks of industrial engineering.

<b><i>Assessment method</i></b>	<b>% of the final grade</b>	<b>Minimal requirements for award of credits</b>
Written exam	20	50% of the subjects solved.
Written paper	15	Handing in the project and solving at least 50% of the chapters within.
Homework	15	50% of the homework solved.
Laboratory	50	Performing the lab sessions, handing in the obtained results and obtaining at least 50% of the points allocated for the laboratory.
Other	-	-

### ***References***

- [1] Doicin C.V., Engineering Economic Analysis, Ed. Bren, București, 2013;
- [2] Sullivan W., Bontadelli J., Wicks E., Engineering Economy, Prentice hall, Upper Saddle River, New

Jersey, 2000; [3] White J., ş. a., Principles of Engineering Economic Analysis, Ed. John Wiley & Sons, Inc., New York, 1998;	
<b><i>Prerequisites</i></b>	<b><i>Co-requisites</i></b>
Probability and Statistics, Economy, Mechanical Systems Design, System and Project Management, Manufacturing Processes 1.	-
<b><i>Additional relevant information</i></b>	
The final grade is calculated by rounding the score accumulated by the student at the evaluated activities.	

Date: 15.07.2016

Professional degree, Surname, Name: Prof. Doicin Cristian/ Lect. Ulmeanu Mihaela