

Engineering Economy (E076950)

Course size (nominal values; actual values may depend on programme)

Credits 4.0 Study time 120 h Contact hrs 30.0 h

Course offerings and teaching methods in academic year 2018-2019

| | | | |
|----------------|---------|-------------------------------|--------|
| A (semester 1) | English | seminar | 15.0 h |
| | | self-reliant study activities | 3.75 h |
| | | lecture | 20.0 h |
| | | guided self-study | 1.25 h |

Lecturers in academic year 2018-2019

Verbrugge, Sofie TW05 lecturer-in-charge

Offered in the following programmes in 2018-2019

| | crdts | offering |
|--|-------|----------|
| Master of Science in Electrical Engineering (main subject Communication and Information Technology) | 4 | A |
| Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation) | 4 | A |
| Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering) | 4 | A |
| Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems) | 4 | A |
| Master of Science in Electromechanical Engineering (main subject Maritime Engineering) | 4 | A |
| Master of Science in Electromechanical Engineering (main subject Mechanical Construction) | 4 | A |
| Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering) | 4 | A |
| Master of Science in Chemical Engineering | 4 | A |
| Master of Science in Civil Engineering | 4 | A |
| Master of Science in Computer Science Engineering | 4 | A |
| Master of Science in Computer Science Engineering | 4 | A |
| European Master of Science in Photonics | 4 | A |
| Master of Science in Industrial Engineering and Operations Research | 4 | A |
| Master of Science in Sustainable Materials Engineering | 4 | A |
| Master of Science in Chemical Engineering | 4 | A |

Teaching languages

English

Keywords

Decision making, management and cost accounting, time value of money, investment decisions, uncertainty, private and public sector investments

Position of the course

This course is an introductory course in the master's programme in engineering. The aim of the course is to provide students with basic terminology, methodology and practical skills in the domain of engineering economy. Eventually, students should be able to complement technological projects with an economic analysis in order to assess the techno-economic feasibility of these projects.

Contents

Theoretical part

PART 0 - Motivation

- The decision making process
- The role of engineering economic analysis

PART I - Cost terms and concepts

- Fixed and variable costs
- Direct and indirect costs
- Marginal costs

PART II - Management and cost accounting fundamentals

- Allocation of indirect costs
- Cost allocation keys
- Activity based costing

PART III - Accounting information for decision making

- Cost-volume-profit relationships
- Measuring relevant costs and revenues for decision making
- Pricing, target costing and customer profitability analysis

PART IV - Interest and equivalence

- Time value of money
 - Simple Interest and Compound Interest
 - Nominal and Effective Interest Rates
 - Equivalence for repeated cash flows
- #### PART V - Investment evaluation methods for a single project
- Minimum Attractive Rate of Return (MARR)
 - Present Worth, Future Worth, Annual Worth Method
 - The Internal Rate of Return Method
 - Payback Period

PART VI - Multiple projects

- Study period and useful life
- Comparison and Selection among Alternatives
- Comparing mutually exclusive alternatives
- Replacement Analysis
- Game theory basics

PART VII - Economic Analysis in the Public sector

- Perspective and Terminology for Analyzing Public Projects
- What Interest Rate Should Be Used for Public Projects?
- The Benefit–Cost Ratio Method

PART VIII - Analysis under uncertainty

- Breakeven and Sensitivity analysis
- Economic decision trees
- Risk versus return
- Simulation
- Real options

Practical part

- Spreadsheet exercises in order to illustrate the main concepts
- Case analysis for real-life situation, based on relevant articles

Initial competences

No formal requirements.

Final competences

- 1 Explain the main concepts related to estimating costs and benefits
- 2 Identify cost-volume-profit relationships for technological products or services
- 3 Substantiate an investment decision for a technological project, in the private as well as the public sector
- 4 Evaluate the impact of risk and uncertainty of economic parameters on a decision making process for technological projects
- 5 Develop a spreadsheet model in order to compare different engineering alternatives from an economic perspective
- 6 Have the attitude to read popularizing texts on economic and business topics

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Guided self-study, lecture, seminar, self-reliant study activities

Extra information on the teaching methods

Blended Learning using Blendify platform. Slide material, online exercises and additional readings are available online. Case sessions allow to get hands-on experience. During theory lectures main concepts are explained.

Learning materials and price

- slides (in English, available on Minerva platform)
- William G. Sullivan, Elin M. Wicks, C. Patrick Koelling, *Engineering Economy*, 16th Edition, 2014, ISBN: 978-0133439274

References

- Alnoor Bhimani, Charles T. Horngren, Srikant Datar, Madhav Rajan, *Management and Cost Accounting*, Pearson, 6th edition, 2015, ISBN: 978-1292063461.
- Colin Drury, *Management and Cost Accounting*, Cengage Learning EMEA, 9th edition, 2015, ISBN: 978-1408093931.
- Donald G Newman, Jerome P. Lavelle, Ted G. Eschenbach, *Engineering Economic Analysis*, Oxford University Press, International 12th edition, 2016, ISBN: 978-0199339280.
- Ronald A. Chadderton, *Purposeful Engineering Economics*, Springer, 2015, ISBN: 978-3319188478

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions

Examination methods in case of permanent evaluation

Oral examination, participation, peer assessment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

Examination methods in case of continuous evaluation: online quizzes, spreadsheet exercises and participation in case sessions.

Calculation of the examination mark

Combination of continuous evaluation (online quizzes, spreadsheet exercises and participation in case sessions.) and periodic evaluation (exam). Continuous evaluation amounts to 30% of the final examination mark. The exam for the remaining 70%. A minimum score of 10/20 is required for both course parts. If this is not reached, the minimum partial score is used as the final course score.

Facilities for Working Students

Case sessions can be replaced by an individual project.