

## Engineering Economy (E076950)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

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 2020-2021

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

### Lecturers in academic year 2020-2021

Verbrugge, Sofie	TW05	lecturer-in-charge
Van der Wee, Marlies	TW05	co-lecturer
Vannieuwenborg, Frederic	TW05	co-lecturer

### Offered in the following programmes in 2020-2021

	crdts	offering
Bridging Programme Master of Science in Industrial Engineering and Operations Research	4	A
Bridging Programme Master of Science in Industrial Engineering and Operations Research	4	A
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
Exchange programme in Economics and Business Administration	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 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**

- Discussion of realistic cases
- Online exercises as independent student work
- Use of spreadsheet (Excel) support throughout the course

## 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

Cursus offered using blended learning principles. Slides, videos and additional learning material are offered via electronic learning platform. Online exercises are solved independently. Limited number of lectures in auditorium. Working sessions and assisted learning for the discussion of realistic cases.

#### Learning materials and price

- slides and handouts (in English, available on the electronic learning environment)
- 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

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

Written examination

#### Examination methods in case of permanent evaluation

Written examination with multiple choice questions, participation

#### 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 and participation in case sessions.

#### Calculation of the examination mark

Combination of continuous evaluation (online quizzes and participation in case sessions.) and periodic evaluation (exam).

Continuous evaluation amounts to 25% of the final examination mark. The exam for the remaining 75%. Participation in all course parts is required in order to be able to pass the course.

#### Facilities for Working Students

Case sessions can be replaced by an individual project.