GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

System Dynamics (F000124)

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

Credits 5.0 **Study time 150 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	seminar
			lecture

Lecturers in academic year 2024-2025

Loccufier, Mia	TW08	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Master of Science in Business Engineering(main subject Data Analytics)	5	A
Master of Science in Business Engineering (Double Degree)(main subject Data Analytics)	5	A
Master of Science in Business Engineering (Double Degree)(main subject Finance)	5	A
Master of Science in Business Engineering(main subject Finance)	5	A
Master of Science in Business Engineering (Double Degree)(main subject Operations Management)	5	A
Master of Science in Business Engineering(main subject Operations Management)	5	A
Exchange programme in Economics and Business Administration	5	A

Teaching languages

English

Keywords

Dynamical Analysis, Modelling, Control Theory

Position of the course

The dynamic behaviour of technical and economic systems is analysed.
The approach typical of engineers to understand the dynamics of simple technical systems is explained. The universal character of system dynamics is stressed by focussing on the underlying mechanism which causes a time evolution in systems of highly different disciplines: technology, economics, biology. The systems are analysed via a mathematical model which interacts with its environment. The concept of control will be introduced as a designed feedback loop: the undesirable behaviour (due to disturbances) of a system is adjusted based on some control technique which uses system's observations. A feedback loop can be a technical realization with sensors and actuators, a feedback loop can be a policy in a economic system. The Laplace transform is generally used as a modelling and analysis tool.

Contents

- basic concepts : dynamical system; linear versus nonlinear system, stability, steady state behaviour, transfer function, transient response, impulse response, harmonic analysis.
- Control concepts : feedback loop, process, measurement, actuator, transducer, controller, disturbance, set point, policy in a economic system as a feedback loop
- modelling : complexity versus accuracy, modeling of linear systems
- System analysis : different types of systems (first order; second order; non-linear) with corresponding mathematical tools.

Initial competences

Mathematics II

Final competences

1 Derive a mathematical model of simple technical and economic systems and analyse the dynamic behavior based on this model.
2 Determine the most important physical parameters which cause the dynamic behaviour.
3 Control unwanted dynamic behaviour with simple feedback loops.
4 Calculate free and forced responses of general dynamic models under general inputs based on transfer functions via the Laplace transform
5 Identify the explained general dynamics in new systems

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

Group work, Seminar, Lecture

Extra information on the teaching methods

Lectures, classroom exercises and solving a case study

Study material

Type: Syllabus

Name: System Dynamics
Indicative price: € 6
Optional: no
Language : English
Number of Pages : 120
Available on Ufora : Yes
Online Available : Yes

References

Course content-related study coaching

The syllabus contains all the basic information to be able to achieve the final objectives. The lectures are organised such that there is enough time to repeat topics and allow discussions. Examples are worked out in group. The lecturer can be contacted for extra explanation.

Assessment moments

end-of-term and continuous assessment

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

Oral assessment

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

Oral assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

Permanent evaluation
The permanent evaluation concerns the solving of casestudies. The results are handed in as a report.
Exam
The oral exam is a questioning based on a beforehand prepared casestudy.

Calculation of the examination mark

exam 14 of 20
permanent evaluation 6 of 20
The result of the permanent evaluation can be transferred to the second examination period.

Facilities for Working Students

Possibility to make an appointment for feedback during and after office hours