GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

Differential Equations (I700208)

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

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	Dutch	Gent	lecture
			seminar

Lecturers in academic year 2024-2025

Van de Walle, Elien	LA26	staff member
Vanhaelewyn, Gauthier	LA26	staff member
Stock, Michiel	LA26	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Bachelor of Science in Bioscience Engineering Technology	4	A

Teaching languages

Dutch

Keywords

Ordinary differential equations, analytical methods, numerical methods, equilibrium, stability, modelling, systems of differential equations, Python, modelling

Position of the course

This course unit provides a basis for engineering courses in which mathematical models are developed and used since such models are often based on differential equations. The students gets acquainted with systems of (non)linear differential equations and becomes skilled in solving differential equations both analytically and numerically. In addition, the student gains insight into how differential equations can be used to describe biological and natural processes.

Contents

Mathematical modelling, qualitative analysis and methods of solution for first-order differential equations, methods of solution for higher-order differential equations, qualitative analysis of and methods of solution for systems of first-order differential equations.

Initial competences

Calculus. Moreover, Differential Equations builds on certain learning outcomes of Linear Algebra, and Informatics; or the learning outcomes have been achieved differently

Final competences

1 Recognize various types of differential equations
2 Apply analytical solution techniques
3 Conduct qualitative analyses of (systems of) differential equations
4 Implement and apply numerical solution methods for differential equations using Python
5 Use Sympy to solve (systems of) differential equations analytically
6 Model a simple system using balance equations.

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

Seminar, Lecture, Independent work

Extra information on the teaching methods

During the lectures important concepts and properties are introduced, which form the starting point for solving problems during the seminars.

Study material

Type: Handbook

Name: Chapters from Kohler and Johnson
Indicative price: € 25
Optional: no

References

Trench, W.F., Elementary differential equations, Brooks/Cole Thomson Learning, 2001; Boyce, W.E., DiPrima, R.C., Meade, D.B., Elementary Differential Equations and Boundary Value Problems, Wiley, 2017.

Course content-related study coaching

The lecturer answers questions concerning the theory upon appointment and before and after the lectures, the teaching assistants are available for questions related to the exercises andpractical sessions, interactive support via Ufora.

Assessment moments

end-of-term assessment

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

The exam consists of exercises and questions of a more theoretical nature.

Calculation of the examination mark