

## Calculus I (I700266)

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

**Credits 6.0**

**Study time 180 h**

**Course offerings and teaching methods in academic year 2024-2025**

A (semester 1)

Dutch

Gent

seminar

lecture

independent work

**Lecturers in academic year 2024-2025**

Schelfaut, An

LA26

staff member

Van de Walle, Elien

LA26

staff member

Baetens, Jan

LA26

lecturer-in-charge

Mattheijssens, Joris

LA26

co-lecturer

**Offered in the following programmes in 2024-2025**

[Bachelor of Science in Bioscience Engineering Technology](#)

6

A

[Linking Course Master of Science in Bioscience Engineering Technology: Agriculture and Horticulture \(main subject Horticulture\)](#)

6

A

[Linking Course Master of Science in Bioscience Engineering Technology: Agriculture and Horticulture \(main subject Plant and Animal Production\)](#)

6

A

[Linking Course Master of Science in Biochemical Engineering Technology](#)

6

A

[Linking Course Master of Science in Bioscience Engineering Technology: Food Industry](#)

6

A

**Teaching languages**

Dutch

**Keywords**

Sets, vectors, functions, continuity and limits, differentiation, integration, Taylor series, single variable calculus, Python

**Position of the course**

This course provides the students with the tools and techniques that are needed to approach and solve engineering problems and to understand, analyse and describe biological, natural and productions processes. Such a solid mathematical background is needed in engineering disciplines, and is surely pervaded by differential and integral calculus. The focus of this course will be on problem solving from a practical point of view, though a theoretical underpinning of the presented techniques, concepts and methods will be provided. Given the growing complexity of engineering problems and the omnipresence of computers, the students will also be introduced to numerical and symbolical calculations in Python. Theorems will be stated, but proofs will be omitted. In this way, emphasis lies on the practical use of the discussed methods.

**Contents**

**Precalculus**

1 Sets and numbers

2 Functions

3 Algebraic functions

4 Transcendental functions (exponential, logarithmic and (inverse) trigonometric)

5 Vectors

6 Analytical geometry

**Single variable calculus**

1 Limits and continuity

2 Differentiation

- 3 Parametric and polar curves
- 4 Graphical behavior of functions
- 5 Integration
- 6 Applications of integration

### Initial competences

Final competences of secondary school or equivalent.

**Advise:** required subjects in the curricula 'Mathematics' of the officially recognized educational networks in Flanders for programmes with at least 4 hours of mathematics training per week in the last two years of general secondary education (ASO) or at least 6 hours of mathematics training per week in the last two years of technical secondary education (TSO) are recommended.

### Final competences

- 1 Have insight into the mathematical, geometric and physical meaning of functions of one variable.
- 2 Have insight into the mathematical, geometric and physical meaning of vectors, Taylor series, polar coordinates, limits, derivatives, integrals and parametric curves.
- 3 Use vectors, functions of one variable, polar coordinates, limits, derivatives, integrals and parametric curves.
- 4 Follow a reasoning regarding functions of one variable and act accordingly.
- 5 Work correctly and with mathematical precision with functions of one variable.

### 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: Syllabus

Name: Calculus I and II

Indicative price: € 30

Optional: no

Language : Dutch

Oldest Usable Edition : 2023-2024

Available on Ufora : Yes

Online Available : No

Available in the Library : Yes

Available through Student Association : Yes

### References

Hartman, G., Siemers, T., Heinold, B., Chalishajar, D., Bowen, J., APEX Calculus;  
R. Adams and C. Essex, Calculus, a complete course

### 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 and practical sessions, interactive support via the electronic learning platform.

### Assessment moments

end-of-term and continuous 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

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

**Possibilities of retake in case of permanent assessment**

examination during the second examination period is not possible

**Extra information on the examination methods**

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

The first continuous evaluation will take place at the end of weeks 6 or 7 and covers the following chapters: sets and numbers, functions, algebraic functions, transcendental functions, vectors and analytical geometry.

**Calculation of the examination mark****June session**

The final mark is calculated as a weighted average of the marks obtained through the period aligned (PE1) and non-period aligned (NPE) evaluations, with weighting coefficients of 5/6 and 1/6, respectively, unless the mark for PE1 is higher than the one for NPE, so

Final mark =  $\frac{5}{6} PE1 + \frac{1}{6} NPE$ , if  $PE1 \leq NPE$ ,

and

Final mark =  $\frac{5}{5} PE1$ , if  $PE1 > NPE$

**August session**

The final mark is computed in the same way as for the June session, so

Final mark =  $\frac{5}{6} PE2 + \frac{1}{6} NPE$ , if  $PE2 \leq NPE$ ,

and

Final mark =  $\frac{5}{5} PE2$ , if  $PE2 > NPE$

Students who eschew the non-period aligned evaluation for this course unit gets a 0 for the NPE score. Students who eschew the period aligned evaluation for this course unit will be failed