# Course guide
# 220081 - C1 - Calculus I

**Last modified:** 11/04/2025

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering
**Teaching unit:** 749 - MAT - Department of Mathematics.

**Degree:** BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

**Academic year:** 2025 **ECTS Credits:** 6.0 **Languages:** Catalan

## LECTURER

**Coordinating lecturer:** JAUME HARO CASES

**Others:**

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Specific:**
CE01-INDUS. Ability to solve mathematical problems that may arise in engineering. Aptitude to apply knowledge of linear algebra; geometry; differential geometry; differential and integral calculus; differential and partial differential equations; numerical methods; numerical algorithms; statistics and optimization. (Basic training module)

**Generical:**
08 CAS N1. THE ABILITY TO ANALYSE AND SYNTHESISE: The ability to think abstractly about the fundamental concepts of a text or exposition and to intelligibly present the result of one's work.

## TEACHING METHODOLOGY

· Presencial sessions of exhibition of the contents.
· Presencial sessions of practical work (exercises).
· Autonomous work of study and realization of exercises
The concepts and fundamental results of each topic, as well as examples and exercises will be introduced into the theoretical sessions. In the practical sessions, the students will have to solve exercises and problems that will help them to understand the concepts studied and to acquire the skill of expressing correctly, using the notions and tools of the course.
On the other hand, the students will have to solve a collection of exercises and problems. These exercises will be solved during the classes of problems and also with non-presence work. Besides the partial and final examinations, during the course it will make a follow-up of the learning of the students.
For the resolution of the exercises, they will have a collection of solved problems which has to serve as reference book and guide for the resolution of the exercises.
Moreover, each teacher has fixed some consultation hours where students can go to solve doubts concerning classes of theory and problems.

## LEARNING OBJECTIVES OF THE SUBJECT

On to finish the subject of calculation I, the student has to be capable of: understanding and knowing how to apply
· Numerical series,
· Properties of the real functions of real variable,
· Concepts of limit and continuity,
· Calculation of derivatives, integrals and related concepts.

## STUDY LOAD

| Type | Hours | Percentage |
|---|---|---|
| Hours large group | 32,0 | 21.33 |
| Hours medium group | 28,0 | 18.67 |
| Self study | 90,0 | 60.00 |

**Total learning time:** 150 h

## CONTENTS

### 1. Real numbers and real functions of real variable

**Full-or-part-time:** 18h 45m
Theory classes: 4h
Practical classes: 3h 30m
Self study : 11h 15m

### 2. Derivation

**Description:**
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**Related competencies :**
CE01-INDUS. Ability to solve mathematical problems that may arise in engineering. Aptitude to apply knowledge of linear algebra; geometry; differential geometry; differential and integral calculus; differential and partial differential equations; numerical methods; numerical algorithms; statistics and optimization. (Basic training module)

**Full-or-part-time:** 37h 30m
Theory classes: 8h
Practical classes: 7h
Self study : 22h 30m

### 4. Successions and series.

**Full-or-part-time:** 18h 45m
Theory classes: 4h
Practical classes: 3h 30m
Self study : 11h 15m

### 3. Integration

**Description:**
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**Related competencies :**
CE01-INDUS. Ability to solve mathematical problems that may arise in engineering. Aptitude to apply knowledge of linear algebra; geometry; differential geometry; differential and integral calculus; differential and partial differential equations; numerical methods; numerical algorithms; statistics and optimization. (Basic training module)

**Full-or-part-time:** 37h 30m
Theory classes: 8h
Practical classes: 7h
Self study : 22h 30m

## ACTIVITIES

### ACTIVITY 1. THEORY SESSIONS

**Full-or-part-time:** 57h
Self study: 31h
Theory classes: 26h

### ACTIVITY 2. PRACTICAL SESSIONS

**Full-or-part-time:** 87h
Self study: 59h
Practical classes: 28h

### ACTIVITY 3. FIRST CONTROL

**Full-or-part-time:** 1h
Theory classes: 1h

### ACTIVITY 4. PARTIAL EXAM

**Full-or-part-time:** 2h
Theory classes: 2h

### ACTIVITY 5. SECOND CONTROL

**Full-or-part-time:** 1h
Theory classes: 1h

### ACTIVITY 6. FINAL EXAM

**Full-or-part-time:** 2h
Theory classes: 2h

## GRADING SYSTEM

The final mark of the subject will be obtained from the following ponderation:
Class mark: 25%
Partial exam: 30%
Final exam: 50%
Partial and final examinations will contain questions and exercises about concepts associated with the objectives of the subject.
In case of Partial exam is failed but the Final exam is passed, Partial Examination will be considered passed with a mark of 5.

## EXAMINATION RULES.

In the exams are not allowed to use any kind of calculator. The teacher can request the identification of the students.

## BIBLIOGRAPHY

**Basic:**
- Leseduarte, M.C.; Llongueras, M.D.; Magaña, A. Càlcul I: teoria i exercicis [on line]. Barcelona: Iniciativa Digital Politècnica, 2011 [Consultation: 14/05/2020]. Available on: http://hdl.handle.net/2099.3/36651. ISBN 9788476537312.
- Leseduarte, M.C.; Llongueras, M.D.; Magaña, A. Càlcul I: problemes. [Barcelona]: OmniaScience, 2016. ISBN 9788494560361.

**Complementary:**
- Fàbrega Enfedaque, Albert [et al.]. Exàmens de càlcul resolts. Terrassa: Cardellach Còpies, 1998.
- Salas, Saturnino L. [et al.]. Calculus : una y varias variables [on line]. 4a ed. Barcelona: Reverté, 2002 [Consultation: 14/06/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5635414. ISBN 8429151567.