Universidad Zaragoza

Academic Year/course: 2022/23

39803 - Mathematics I

Syllabus Information

Academic Year: 2022/23
Subject: 39803 - Mathematics I
Faculty / School: 326 - Escuela Universitaria Politécnica de Teruel
Degree: 634 - Joint Programme in Computer Engineering - Business Administration
ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Basic Education
Module:

1. General information

1.1. Aims of the course

Throughout the subject of Mathematics I, work is done on topics related to:

- Basic concepts about numbers (real and complex) and elementary functions.

- Study of functions of a real variable: limit, continuity, differentiability and integrability.

- Concept of numerical and functions approximation through the study of sequences, numerical series and functions.

- Numerical analysis: interpolation, derivation and numerical integration.

The objective of the course is that the student acquires a solid formation in the Calculus of one variable. In addition, by introducing it in the numerical treatment of problems, it is intended that he/she selectes the most appropriate methods for the data available and analyzes the results obtained in each case. Through the proposed activities, the aim is to increase the ability to know how to communicate and transmit knowledge, skills and abilities related to mathematics.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the results of subject learning provides training and competence to contribute to some extent to its achievement.

The 17 SDGs are: (1) No Poverty, (2) Zero Hunger, (3) Good Health and Well-being, (4) Quality Education, (5) Gender Equality, (6) Clean Water and Sanitation, (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation and Infrastructure, (10) Reducing Inequality, (11) Sustainable Cities and Communities, (12) Responsible Consumption and Production, (13) Climate Action, (14) Life Below Water, (15) Life On Land, (16) Peace, Justice, and Strong Institutions, (17) Partnerships for the Goals. https://sdgs.un.org/goals

1.2. Context and importance of this course in the degree

Mathematics I is a 6 ECTS credit subject that is taught in the first semester of the first year of the Bachelor's Degree in Informatics Engineering. In it, basic mathematical training subjects are taught for this Degree. Apart from providing them with essential mathematical tools for Informatics Engineering studies, their correct understanding contributes to training the student so that they are capable of learning and developing new study and work methods, as well as providing them with versatility to adapt to new technologies.

For this, the concepts must be assimilated so that they are applied appropriately in each situation and not repetitively and without criteria.

1.3. Recommendations to take this course

To adequately follow this subject, it is convenient that the student has clear and learned the knowledge of the subject of Mathematics of 1st and 2nd course in the High School. In case they have not taken these subjects, it is recommended that they seek help to face the subject of Mathematics I in adequate conditions.

Continuous work and the search for the necessary information is also recommended, asking the teacher whenever he deems it appropriate.

2. Learning goals

2.1. Competences

By passing the subject, the student will be more competent to ...

Solve problems and make decisions with initiative, creativity, critical reasoning.

Learn continuously and develop autonomous learning strategies.

Solve the mathematical problems that may arise in Engineering.

Ability to apply knowledge about: differential and integral calculus, approximation and numerical methods.

2.2. Learning goals

The student, to pass this subject, must demonstrate the following results ...

Apply the concepts of pass to the limit, continuity, derivability and integrability of functions.

Know and understand the basic concepts of sequences and numerical series.

Calculate limits of numerical sequences and apply different methods to calculate the exact and approximate sum of numerical series.

Understand and use the series expansions of functions: apply the Taylor expansions in the problem of the approximation of functions.

Know function interpolation. Understand the concepts of exact, approximate value and error estimation.

Apply formulas of derivation and numerical integration.

2.3. Importance of learning goals

Once the indicated learning results have been achieved, the student has not only acquired the mathematical knowledge developed in each topic but can also analyze the problems and choose, between several options in solving them, the one that is most appropriate. The rigor of mathematical language is essential in communication and when transmitting knowledge and explaining results.

On the other hand, several of the general concepts that arise throughout the course (variation, approximation, error, ...) are part of the basis that must remain throughout the degree studies.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

With the aim of motivate the ongoing work of students thoughout the semester, each student can choose a **CONTINUOUS ASSESSMENT** modality which will account for 100% of the final grade (F) of the subject. It will consist of:

1) A written test for the first half of the contents of the course (35%)

The test will consist of theoretico-practical questions and problems. The assessment will be based not merely on the correctness of the answers but also on the skills shown by the student for the use of the appropriate methodology.

It will be marked between 0 and 10 (P) and will account for a maximum of 35% of the final grade of the subject (F).

2) Assignments (15%)

During the term, the student will be required to hand in several assignments that will consist of theoretico-practical problems related to the contents seen in class.

It will be marked between 0 and 10 (A) and will account for a maximum of 15% of the final grade of the subject (F).

3) Lab (15%)

The students will be required to do some assignments in the math lab during the term. They will involve the use of computer tools for the resolutions of the problems considered in class. These assignments will be assessed together with an optional final exam about the basic concepts of the softward involved if the professor finds it necessary.

It will be marked between 0 and 10 (L) and will account for a maximum of 15% of the final grade of the subject (F).

4) Final Exam (35%)

A written test for both the first and the second half of the course will take place at a date fixed by the Center. It will consist of theoretico-practical problems and questions related to the contents of the course with a similar level of difficulty as the ones seen in class.

It will be marked between 0 and 10 (E) and will account for a maximum of 35% of the final grade of the subject (F).

The final grade will be calculated as F = 0,35*E+0,35*P+0,15*A+0,15*L.

In order to pass the subject, the student will need to have an average grade 0,5*E+0,5*P over 5 and to have obtained a mark higher than 4,5 in the final exam.

All tests above-mentioned could be modified to adapt to the safety health meassures required, if so.

FINAL EXAM: 100% The student who does not follow continuous evaluation will take a ONLY global exam in the official calls. It consists of an exam with theoretical-practical questions, problems and exercises corresponding to the topics developed in the lectures, practices and works of the subject.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process that has been designed for this subject is based on the following:

The teaching methodology will include:

- Lectures (theory and problems) (42 hours).
- Resolution of exercises.
- Computer sessions (6 sessions of 2 hours).
- Tutorial sessions.
- Partial exam (3 hours).
- Final exam (3 hours).

4.2. Learning tasks

The course includes the following learning tasks:

- Lectures in large groups where the knowledge that the students must acquire will be presented.
- Resolution of exercises by the student that will serve as self-evaluation and to acquire the necessary skills.
- Computer sessions oriented to practical knowledge related to the fields of the course.
- Tutorial sessions, individual and voluntary, in which students will have the possibility to consult their doubts and questions on the subject to the teacher. The time and place of these sessions will be set by the teacher at the beginning of the course.

4.3. Syllabus

The course will address the following topics:

- 1. Real numbers, complex numbers and elementary functions.
- 2. Numerical series.
- 3. Limits and continuity of functions in one variable.
- 4. Differential and integral calculus of functions in one variable.
- 5. The approach of functions, series of functions; numerical derivation and integration.

Each computer practices correspond with regard to each of the chapters aforementioned

4.4. Course planning and calendar

Computer lessons take place in the two hours per two weeks for every student.

Exams and other personal evaluation will communicate with enough time in advance.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=30202&Identificador=12488