Universidad Zaragoza

Academic Year/course: 2022/23

27008 - General Topology

Syllabus Information

Academic Year: 2022/23
Subject: 27008 - General Topology
Faculty / School: 100 - Facultad de Ciencias
Degree: 453 - Degree in Mathematics
ECTS: 9.0
Year: 2
Semester: Annual
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

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 learning outcomes of the module provides training and competence to contribute to some extent to their achievement: (4) Quality education, (5) Gender equality, (8) Decent work and economic growth, (9) Industry, innovation and infrastructure, (10) Reducing inequality, (17) Partnerships for the goals.

1.2. Context and importance of this course in the degree

The course belongs on the module of foundations of geometry and topology. Its knowledge is necessary for a better understanding of later courses in analysis and geometry.

It is recommended to have previous knowledge of set theory and mathematical analysis.

1.3. Recommendations to take this course

It is recommended to assist to the lectures, an active participation, and to try to solve the proposed exercises and assignments. It is also recommended to make use of the instructor's office hours.

2. Learning goals

2.1. Competences

Manage to handle the described learning goals. Among other general competences that are aquired by the students in the mathematics degree, we highlight the following:

- CT1. Be able to clearly express, both in writen ans spoken form, reasonings, problems, reports...
- CT3. To distinguish the essential aspects of a problem from the accesory ones. To formulate conjectures and to reason in order to confirm or refute them. Toidentify erroneous reasonings...
- CE1. To use and understand themathematical language and methods. To know rigourous proofs of basic theorems in different areas of mathematics.
- CE3. To solve mathematical problems through basic computation skills and other techiques.

2.2. Learning goals

To know the concept of topology and which properties of metric spaces don't depend on the metric. To abstract this concept defining topologies in asbtract spaces. To relate topological spaces through continuous maps, and create new spaces from previous ones (subspaces, products, quotients...)

To know the basic topological spaces (that is, properties about separation, compactness, connectedness, invariants under topological equivalences or homeomorphisms) and their characterizations. To know whether they are hereditary or not, and if they are conserved by products or quotients.

To apply that knowledge to metric spaces -in particular euclidean spaces- knowing the topological properties of the most usual spaces in geometry (homogenous spaces, linear groups, manifolds...)

2.3. Importance of learning goals

They provide a basic training inside the degree (see the context section). It is a fundamental course, because it nourishes the foundations of analysis, algebra, geometry and more advanced topology.

3. Assessment (1st and 2nd call)

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

The final grading will be obtained by a weighted average between the evaluation along the academic year, and a final exam. In this weighted average, the weight of the evaluation along the course will ve a 20%. The student can take a partial exam at the end of the first term.

Regardless of the previous paragraph, according to the current university rules, the student has the right to pass the course with a global exam.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, problem-solving sessions and autonomous work and study, and team work.

4.2. Learning tasks

This course is organized as follows:

- **Lectures.**
- **Problem-solving sessions.** Participatory problem-solving sessions.
- **Autonomous work and study.**

4.3. Syllabus

- Topic 1. Metric spaces.
- Topic 2. Topological spaces.
- Topic 3. Position of a point relative to a subset.
- Topic 4. Bases.
- Topic 5. Countable axioms.
- Topic 6. Separation axioms.
- Topic 7. Products and quotients.
- Topic 8. Compact spaces.
- Topic 9. Connectivity.

4.4. Course planning and calendar

See the academic calendar of the University of Zaragoza, and the timeplan stablished by the Facultad de Ciencias. Concrete dates for assignments will be anounced in the classroom. The date and location of the final exam, will be anounced once stablished by the Facultad de Ciencias.

Other relevant anouncements will be given in classroom and/or published in the area bulletin board.

4.5. Bibliography and recommended resources

- Dugundji, James. Topology / James Dugundji Boston : Allyn and Bacon, 1966.
- Higgins, P. J.. Introduction to topological groups / P. J. Higgins Cambridge : University Press, 1974.
- Munkres, James R. Topología / James R. Munkres; traducción, Ángel Ferrández Izquierdo ... [et al.] . - 2ª ed. Madrid : Prentice Hall, D.L. 2001.

- Willard, Stephen. General topology / Stephen Willard . - [1st. ed.] Reading, Massachusetts [etc.] : Addison-Wesley, cop. 1970.

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27008