UNIVERSITÀ DI PISA

ALGEBRAIC TOPOLOGY

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Anno accademico	2019/20
CdS	MATHEMATICS
Codice	226AA
CFU	6

Moduli	Settore/i	Tipo	Ore	Docente/i
TOPOLOGIA ALGEBRICA	MAT/03	LEZIONI	42	FILIPPO GIANLUCA CALLEGARO MARIO SALVETTI

Learning outcomes

Knowledge

The student who successfully completes the course will be able to demonstrate a solid knowledge of: - methods from Combinatorial Algebraic Topology (as Discrete Morse functions, CW-Morse Theory) - higher homotopy theory (Whithead and Hurewicz theorems, K(pi,1)-spaces) - locally trivial bundles (classifying spaces, obstruction theory, spectral sequences).

Assessment criteria of knowledge

During the oral exam, or seminar presentation, the student must be able to demonstrate his/her knowledge of the course material, having uderstood the main methods and, in case of seminar presentation, being able to understand similar situations where the main tools are used.
Methods:

- Final oral exam
- Final essay

Further information:
The evaluation is usually based on a seminar presentation about a subject which is strictly related to the course contents.

Skills

By the end of the course, students will be able to understand most of the research papers related to the subject; those who will begin a research career will be able to apply the main tools to the problems which will be presented to them.

Assessment criteria of skills

Some exercises will be given during the course, in order to verify the learning of the proposed techniques. Some seminar talks by students on precise topics will be possible.

Behaviors

Students will acquire an awareness of a wide range of problems in modern Mathematics, as well as of particular applications of Algebraic Topology.

Assessment criteria of behaviors

I don't see any real difference between this question and the one on "assessment criteria for skills".

Prerequisites

Even if it is not necessary, it is much better if students had already followed the course Elementi di Topologia Algebrica which is included in the curriculum.

Teaching methods

Delivery: face to face

Attendance: Advised
Learning activities:

- attending lectures
- participation in seminar

Teaching methods:

- Lectures
- Seminar

Syllabus

Discrete Morse Theory, discrete Morse functions, algebraic Morse theory, applications. Higher homotopy groups, CW-approximations, Whithead theorem, Hurewicz theorem, Postnikov towers, Omega spectra and homotopy construction of the cohomology. Fibering and locally trivial bundles, exact sequences of a fibering, principal bundles, classifying spaces and classifyng maps, universal bundles; obstruction theory. Spectral sequences, Leray-Serre spectral sequence; applications.

Bibliography

A Hatcher, "Algebraic Topology", homepage of the author; N, Steenrod, "The Topology of Fibre bundles", Princeton Landmarks in Mathematics; D. Kozlov, "Combinatorial Algebraic Topology", Springer, 2008.

Assessment methods

The exam is made up with one oral test, which can address either a direct verification of topics and tools presented in the course, or a seminar talk regarding some topic which is connected to the material of the course.

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