UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

History of Mathematics

2627-1-F4002Q030

Aims

At the end of the course, students will have achieved the following learning outcomes:

Knowledge and Understanding. Students will acquire knowledge of some fundamental phases in the historical development of mathematics, with particular attention to the evolution of mathematical concepts, methods, problems and forms of proof. They will become familiar with selected episodes in the history of mathematics, from ancient mathematics to modern and contemporary developments, and will understand how mathematical theories are shaped by internal problems, conceptual innovations, notational changes and cultural contexts.
Applying Knowledge and Understanding. Students will be able to apply historical and mathematical methods to the analysis of mathematical texts, problems and arguments from different periods. They will be able to compare different formulations of the same mathematical idea, recognize changes in terminology and notation, and reconstruct the mathematical content of historical sources using appropriate contemporary language when necessary.
Making Judgements. Students will develop the ability to critically assess historical narratives concerning mathematics, distinguishing between retrospective interpretations and historically situated meanings. They will be encouraged to evaluate the role of examples, problems, techniques, proofs and conceptual shifts in the development of mathematical knowledge, and to reflect on the relation between mathematical rigor and historical context.
Communication Skills. Students will acquire the ability to present, in a clear and rigorous manner, historical and mathematical arguments related to the development of mathematics. They will learn to discuss mathematical texts and historical reconstructions using appropriate terminology, both orally and in writing, and to explain the mathematical meaning of historical examples to an audience with a mathematical background.
Learning Skills. Students will develop the methodological tools and autonomy necessary to undertake further study in the history of mathematics and in related areas. They will learn how to use textbooks, historical studies and selected primary sources in order to deepen their understanding of mathematical concepts and of their historical development.

Contents

The course will introduce students to central themes and episodes in the history of mathematics, especially the ones with deep and persistent influence on the development of the discipline.

Detailed program

The course will introduce students to central themes and episodes in the history of mathematics.
Possible topics include:

The problem of space in Mathematics from Euclides to Riemann and Einstein
Determinism and indeterminism: Mathematical and epistemological aspects
The problem of the foundations of Mathematics, from Cantor to Gödel and beyond
Problems and methods of Ancient Mathematics

The precise selection of topics may vary from year to year and will be specified by the teacher at the beginning of the course.

Prerequisites

A basic knowledge of the main areas of undergraduate mathematics is required, in particular differential calculus (one and several variables), linear algebra, geometry of euclidian spaces and basic notions of algebra. No previous knowledge of the history of Mathematics is required.

Teaching form

Lecture-based teaching in slots of 2 hours, delivered in person.

The course will combine expository lectures with the discussion of selected mathematical texts and historical examples. The lectures will introduce the main historical developments, the relevant mathematical background and the methodological issues needed to interpret historical sources.

The teaching activity will therefore be delivery in character.

Textbook and teaching resource

Main text for a general orientation:
J. Dieudonné, Mathematics.,the Music of Reason. Springer

Other books:

A.Dahan Dalmedico et al, Chaos et Determinisme, Editions de Seuil
C.Bartocci, P.Odifreddi, Matematica, Problemi e Teoremi, UTET

V. J. Katz, A History of Mathematics: An Introduction, Addison-Wesley.
J. Stillwell, Mathematics and Its History, Springer.
I. Grattan-Guinness, The Rainbow of Mathematics: A History of the Mathematical Sciences, Norton.
Other material could be provided by the instructor

Semester

Second semester (spring term)

Assessment method

Oral exam, aimed at assessing the student's knowledge and understanding of the topics presented in the course, as well as the ability to critically discuss mathematical and historical arguments.

The oral exam will focus on the themes treated in the lectures and on the teaching material provided by the teacher. Students will be asked to present historical developments, explain the mathematical content of selected examples, compare different formulations or approaches, and discuss the role of problems, methods and conceptual changes in the evolution of mathematics.

The assessment will evaluate in particular:

knowledge of the main historical developments discussed in the course;
understanding of the mathematical content of the examples and texts considered;
ability to connect historical context and mathematical meaning;
ability to critically discuss historical interpretations;
clarity, coherence and rigor of the exposition;
appropriate use of mathematical and historical terminology.

The final mark will be expressed on a scale of 30.

Indicative grading criteria:

18-19: limited knowledge of the topics covered in the course; partial understanding of the mathematical and historical content; exposition often uncertain or not fully accurate.

20-23: sufficient knowledge of a significant part of the programme; ability to describe the main historical developments and examples, with some limitations in critical analysis and in the use of terminology.

24-27: good knowledge of the topics covered in the course; good understanding of the mathematical content and of the historical context; clear exposition and ability to make relevant connections between different themes.

28-30 cum laude: complete and thorough knowledge of the topics covered in the course; strong ability to discuss historical and mathematical arguments critically and independently; clear, rigorous and well-structured exposition; excellent command of the relevant terminology and ability to connect the course topics with broader mathematical and historical perspectives.

Office hours

By appointment

Sustainable Development Goals

QUALITY EDUCATION