Study programme(s): Mathematics (M), Integrated Mathematics Studies (M5), Applied Mathematics (MAP)

Course title: MATHEMATICAL MOSAIC (M135)

Lecturer(s): Dora Seleši

Course status: elective

ECTS points: 5

Requirements:

Learning Objectives

The course combines three scientific and professional fields: 1st history of mathematics, 2nd contemporary mathematical problems and applications, 3rd academic writing and research. The aim of this synthesis of three subject fields is that students gain experience in independent research, writing of scientific texts and their presentation, through selected topics in history of mathematics, contemporary mathematics and other mathematical topics.

Learning Outcomes

Acquiring autonomy in research and problem processing, critical thinking, academic writing. Upon completing this course, students are able to systematically, professionally and stylishly expose the matter of a given mathematical topic in writing, as well as to effectively present and communicate with the audience. Developing mathematical maturity, understanding mathematics as a global whole and the emergence of modern mathematics as a process of abstraction and interaction of mathematics and other sciences.

Syllabus

History of mathematics:

History and development of various mathematical disciplines from ancient times to the modern age through various civilizations: mathematics in Egypt and Mesopotamia, development of Greek and Hellenic mathematics, mathematics in China, India and the Arab world, Byzantine and Western European medieval mathematics, mathematical renaissance, the emergence of abstract mathematics. Main contributions, work, and philosophy of several famous mathematicians throughout history.

Modern mathematics:

Mathematical problems of the modern age: dynamic processes, uncertainty quantification, chaos and fractals, complexity of algorithms, etc. Significant applications of mathematics in various natural and social sciences: cryptography, seismology, crime investigation, economy, medicine and pharmacology, engineering and architecture, etc. Life and work of famous mathematicians of the 20th and 21st centuries.

Academic writing and research:

Methods and research strategies; academic internet resources, searching online libraries and journals. Data access, analysis, and correct quoting of references. Thesis set-up, creative and inventive conception, reflection and revision. Analytical and critical writing, text editing, language and writing style specific to mathematical and scientific texts, formal and objective academic style. *LaTeX* software for typesetting mathematical texts.

<table>
<tr><td colspan="4">Literature
1. C. B. Boyer, U. C. Merzbach, A History of Mathematics, John Wiley & Sons,1991.
2. N. J.Abrams Higham, Handbook of Writing for the Mathematical Sciences, SIAM, 1998.
3. Mr. Grätzer, More Math in LaTeX, Springer Verlag, 2016.</td></tr>
<tr><td>Number of active classes</td><td>Lectures: 1</td><td colspan="2">Exercises: 3</td></tr>
<tr><td colspan="4">Teaching methods
Plenary lectures on a given topic followed by individual or team research work by students with interactive guidance of the teacher; workshop form. Presentation of students' works and discussion.</td></tr>
<tr><td colspan="4">Grading (maximum number of points 100)</td></tr>
<tr><td>Pre-exam obligations</td><td>Points</td><td>Final exam</td><td>Points</td></tr>
<tr><td>study research work</td><td>70</td><td>project presentation</td><td>30</td></tr>
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