

UNIVERSITY OF CRAIOVA
Faculty of Mathematics and Natural Sciences
Department of mathematics
Fundamental domain : Mathematics
Specialization: Master-Applied mathematics
Education form: full time
Duration of studies : 2 years
Academic year : 2013-2014

Subject : *Research methodology*

Code: D4MMAM105

Instructor : Lect.dr. Monica Roşiu

Number of credits : 6

Year/Semester : Year I, Semester 1

Number of hours/week : 2 Classes + 2 Seminar classes

Number of weeks : 14

Type discipline: Fundamental

Objectives: To present the key concepts and basic principles of the research process. To help students to understand how to write, to read and to present a research paper, term paper, thesis or similar academic papers. To develop a critical but positive attitude towards quantitative research.

Content :

C₁: The scientific method. Definition. Example. Aims of research: observe and describe, predict, determine causes, explain

C₂: Elements of research: characterization, hypothesis and theory, prediction, observation or experimentation, evaluation and improvement. Socratic method vs. Scientific method

C₃: Critical thinking. Logical argument. Models of scientific inquiry: classical model; pragmatic model: deduction, empirical induction, mathematical induction; computational approaches

C₄: Induction vs. deduction, hypothetico-deductive method. Repetitions and patterns. Identity

C₅: Causality and determinism

C₆: Axiomatic systems. Paradoxes in Set Theory. Gödel's theorems. Implications

C₇: Formal fallacies. Informal fallacies. Proof techniques

C₈: Language and communication

C₉: Ethics in research. Basic principles

C₁₀-C₁₁: Scientific articles. Types of scientific papers. Author's goals. How to write scientific papers? Structure of a research paper. Present a scientific paper at a mini workshop

C₁₂-C₁₄: Review a scientific paper and write a short report. Read a scientific report, analyse and discuss the used method

Bibliography :

1. Collins H., Pinch T.. *The Golem, What You Should Know about Science*, Cambridge University Press, 2000; *Real and Abstract Analysis*, Springer, Berlin , 1969.
2. Dodig-Crnkovic G., *Lecture CDT403 Research Methodology in Natural Sciences and Engineering*, School of Innovation, Design and Engineering, Mälardalen University.
3. Higham N., *Handbook of writing for the mathematical sciences*, SIAM, 1998.
4. Huckin T., Olsen L., *Technical Writing and Professional Communication for Nonnative Speakers of English*. McGraw-Hill, New York, 1991.

Working language : Romanian

Evaluation : Colloquy

Evaluation mode : Present a scientific paper at a mini workshop