Course guide
270603 - TMIRI - Techniques and Methodology of Innovation and Research in Informatics

Last modified: 29/07/2025

Unit in charge: Barcelona School of Informatics
Teaching unit: 723 - CS - Department of Computer Science.

Degree: MASTER'S DEGREE IN INNOVATION AND RESEARCH IN INFORMATICS (Syllabus 2012). (Compulsory subject).
MASTER'S DEGREE IN DATA SCIENCE (Syllabus 2021). (Optional subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: FRANCISCO JAVIER LARROSA BONDIA

Others: Primer quadrimestre:
FRANCISCO JAVIER LARROSA BONDIA - 10

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:
CG1. Capability to apply the scientific method to study and analyse of phenomena and systems in any area of Computer Science, and in the conception, design and implementation of innovative and original solutions.
CG2. Capability to lead, plan and supervise multidisciplinary teams.
CG4. Capacity for general and technical management of research, development and innovation projects, in companies and technology centers in the field of Informatics Engineering.

Transversal:
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT : Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.
CTR4. INFORMATION LITERACY: Capability to manage the acquisition, structuring, analysis and visualization of data and information in the area of informatics engineering, and critically assess the results of this effort.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

TEACHING METHODOLOGY

Different types of activities, such as attending lessons, reading and studying additional material (articles and book chapters) to acquire complementary knowledge, and oral presentations, will be distributed within a total of 6 ECTS (180 work hours).

LEARNING OBJECTIVES OF THE SUBJECT

1.Learn about the Scientific Method, develop critical thinking, learn the process of writing a scientific paper, learn tools to help in the scientific process. Learn to analyze ethical aspects of the world of research and innovation

STUDY LOAD

Type	Hours	Percentage
Self study	96,0	64.00
Hours large group	54,0	36.00

Total learning time: 150 h

CONTENTS

Critical Thinking

Description:
Cognitive biases and irrationality. Arguments, types of inference, fallacies, argumentative spheres,

Scientific Method

Description:
Philosophical problems of knowledge (epistemology), the scientific method, types of research, common types of research in computer science

Science World

Description:
Magazines and conferences. Impact measures. Open access, repositories, predatory journals.

Scientific papers

Description:
The peer review system. How to write a scientific paper: structure, style, language of mathematics. Oral presentation of the articles

Integry and ethics

Description:
What is ethics? Main ethical theories (utilitarianism, Kant, Aristotle). Ethics in research (deontology, research with living beings). Professional ethics (codes of ethics, analysis of ethical responsibility, whistleblowers, the ethical cycle). Ethical aspects of design.

ACTIVITIES

The Scientific Method

Specific objectives:
1

Related competencies :
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Full-or-part-time: 24h
Self study: 16h
Theory classes: 8h

Critical Thinking

Specific objectives:
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Scientific world

Specific objectives:
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Full-or-part-time: 48h
Self study: 32h
Theory classes: 16h

Papers

Specific objectives:
1

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Full-or-part-time: 48h
Self study: 32h
Theory classes: 16h

Integrity

Specific objectives:
1

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Full-or-part-time: 18h
Self study: 12h
Theory classes: 6h

GRADING SYSTEM

The avaluation will be based on: essays, tests and public presentations

BIBLIOGRAPHY

Basic:
- Kahneman, D. Thinking, fast and slow. London: Penguin Books, 2012. ISBN 9780141033570.
- Poel, Ibo van de / Royakkers, Lamber. Ethics, Technology and Engineering. Oxford: Wiley-Blackwell, 2011. ISBN 9781444330946.
- Zobel, J. Writing for computer science [on line]. 3rd ed. London: Springer London, 2014 [Consultation: 05/03/2025]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=1974126. ISBN 9781447166399.