INDUSTRIAL PROJECT (EMaCS-02-12)				
DEGREE PROGRAM:		Master in Computer Science for the Human-Centric and Sustainable Industry		
SEMESTER: Second	**TYPE:** Basic	**CREDITS:** 6 ECTS	**WORKLOAD:** 150 hours	**MENTORING:** 3 hours/week
LANGUAGE: English				

OBJECTIVES	
General	Integrate knowledge and skills on data processing, big data and cloud technologies, development of secure applications to solve real-world problems.
Specific	• Present the particularities of the main steps in the development of an industrial application: requirements analysis, solution design, implementation, testing, deployment. • Ensure the integration of knowledge and skills on problem solving, data processing and modelling techniques, computational infrastructures by applying them to solve problems specific to real-world scenarios. • Facilitate the collaborative working, through specific tools and digital technologies, as well as the contact with industry specific environments.

SUSTAINABILITY

- The students will be involved in solving real-world problems, most of them aiming to optimize the production process and to use efficiently the manufacturing components with a direct impact on promoting a sustainable industry.

RESILIENCE AND HUMAN-CENTRIC DEVELOPMENT

- The automated processes involved in some of the industry-related projects will address the "human into the loop" paradigm specific to Industry 5.0, allowing the students to get more familiar with this concept.

SUBJECT MATTER

Lab activity:

- Presentation of real-world projects collected from industrial partners. Selection of the teams and mentors from industry (weeks 1-2)
- Tutorials on analysis of requirements, solution design, implementation, testing and validation and deployment in the context of an industrial project (weeks 3-4)
- Team work on the selected project (weeks 5-7)
- Intermediate presentation of the project status (week 8)
- Team work on the selected project (weeks 9-11)
- Preparation of the final report (weeks 12-13)
- Mini-workshop for projects presentation (week 14)

COMPETENCES

C1: AQUIRING DATA, INFORMATION AND DIGITAL CONTENT
C3: MANAGING DATA, INFORMATION AND DIGITAL CONTENT
C4. INTEGRATING AND RE-ELABORATING INFORMATION and DIGITAL CONTENT
C5: PROGRAMMING
C6: USING MACHINE LEARNING AND A.I. TECHNIQUES
C7: PROTECTING PERSONAL DATA AND PRIVACY
C8. PROTECTING HEALTH AND WELL-BEING
C10: EXPLORATORY AND CRITICAL THINKING
C11: PROBLEM FRAMING
C12: IDENTIFYING NEEDS AND TECHNOLOGICAL RESPONSES
C14: SOLVING TECHNICAL PROBLEMS
C15: MANAGING SYSTEMS and/or PROJECTS
C16: WORKING WITH OTHERS
C18: COLLABORATING THROUGH DIGITAL TECHNOLOGIES

LEARNING OUTCOMES	
Knowledge	• Know that data collected and processed, for example by online systems, can be used to monitor the behaviour of industrial devices and can be used to recognise patterns, anomalies and predict future events. • Know how to select algorithms for a specific problem, how to implement them in a programming language and integrate into a software solution. • Know technical approaches that can improve the inclusiveness and accessibility of digital content and services. • Know that to identify fair and inclusive actions, it is necessary to look at sustainability problems from different stakeholder perspectives. • Know how to organize and manage the activities in a software/industry project.
Skills	• Ability to use software tools for project management. • Ability to use software tools for modelling. • Ability to use data tools (e.g. databases, data mining, analysis software) designed to manage and organise complex information, to support decision-making and solving problems. • Ability to work efficiently in a collaborative project, to plan and share tasks, to engage with others through digital technologies. • Ability to use tools and techniques (including IoT) to create accessible digital content. • Ability to check and understand the right to use and/or re-use digital content created by a third party. • Ability respond appropriately to a security breach (i.e. an incident that results in unauthorised access to digital data, applications, networks or devices, the leaking of personal data such as logins or passwords).
Attitudes/values	• Be willing to accept that algorithms, and hence programs, may not be perfect in solving the problem that they aim to address. • Consider transparency when manipulating and presenting data to ensure reliability, and spots data that are expressed with underlying motives (e.g. unethical, profit, manipulation) or in misleading ways. • Be willing to adapt an appropriate communication strategy depending on the situation and digital tool. • Watchful of accuracy when evaluating sophisticated representations of data.

TEACHING METHODS

Method	Class Workload	Individual Workload	Total
Theoretical Sessions	-	-	-
Laboratory Sessions	42	42	84
Research and writing of an applied project	6	60	66
Written Examinations	0	0	0
TOTAL	**48 hours**	**102 hours**	**150 hours**

EVALUATION

- Team work – continuous evaluation (50 %)
- Report (30%)
- Presentation (20%)

PRECONDITIONS

- Basic knowledge on Software Engineering
- Programming skills
- Problem solving skills, state of the art analysis abilities

DEPARTMENT	Computer Science
LECTURERS	Daniela Zaharie and mentors from the industrial partners

LITERATURE	• Wesley Clark, Agile Methodology: A Beginner's Guide to Agile Method and Principles, 2019, ISBN: 1702810208 • Jeff Sutherland, Ken Schwaber, The SCRUM Guide, https://scrumguides.org/index.html, 2020 • Mariot Tsitoara, Beginning Git and Github: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer, Apress, 2019