

THESIS PREPARATION - ADVANCED INTEGRATIVE PROJECT (EMaCS-03-09)				
DEGREE PROGRAM:		Master in Computer Science for the Human-Centric and Sustainable Industry		
SEMESTER: Third	TYPE: Basic	CREDITS: 15 ECTS	WORKLOAD: 375 hours	MENTORING: 1 hours/week
LANGUAGE: English				

OBJECTIVES	
General	In this advanced course, students will embark on a structured journey towards crafting a comprehensive dissertation proposal, a fundamental step in their academic pursuit.
Specific	<ul style="list-style-type: none"> Develop the skill of conducting a meticulous literature review, honing the ability to extract meaningful insights from existing research. This involves exploring seminal works in big data analysis, understanding its evolution, and identifying gaps where students can make meaningful contributions. Cultivate the capacity to critically evaluate academic papers, identifying gaps in current knowledge and paving the way for original contributions. This extends beyond a mere understanding of existing literature to actively questioning methodologies, exploring alternative approaches, and proposing innovative solutions. Expand the abilities need to correctly plan an extended research project, including temporal, technical and economic constraints. This will enable the student to organize the development and quality control procedures needed to design, deploy and test big data solutions that will later constitute the body of their final project, but which clearly mirror the innovation projects that they will implement on their future working career.
SUSTAINABILITY	
This course inherently integrates sustainability considerations into the fabric of research, fostering an awareness of how technological advancements align with ecological and societal sustainability. Within big data analysis, students are encouraged to explore sustainable practices such as energy-efficient algorithms, responsible data usage, and the societal impacts of their analytical models.	
RESILIENCE AND HUMAN-CENTRIC DEVELOPMENT	
Emphasizes the significance of technology in human-centric development, underlining the importance of robust, adaptable systems that contribute positively to society's well-being. In the context of big data, resilience is explored through the lens of developing algorithms that can adapt to evolving datasets and changing user needs, ensuring the technology remains human-centred.	
SUBJECT MATTER	
Students engage in a self-directed research journey, applying acquired knowledge to formulate a research work proposal under expert guidance. The subject matter spans various facets of big data analysis: <ul style="list-style-type: none"> Foundational Concepts: Delving into core principles of big data, ensuring a solid understanding of distributed computing, data storage, and processing. Advanced Analytics Techniques: Exploring machine learning algorithms, data mining methodologies, and statistical models applied in big data scenarios. Ethical Considerations: Addressing the ethical dimensions of big data analysis, including privacy preservation, unbiased algorithm development, and responsible data handling practices. Industry Applications: Investigating real-world applications of big data analysis across industries, ranging from healthcare to finance, to bridge theoretical knowledge with practical implications. 	
COMPETENCES	
C6 USING MACHINE LEARNING AND AI TECHNIQUES C7 PROTECTING PERSONAL DATA AND PRIVACY C9 REFLECTING ON ETHICAL OUTCOMES C10 EXPLORATORY AND CRITICAL THINKING	

C11 PROBLEM FRAMING	
LEARNING OUTCOMES	
Knowledge	<ul style="list-style-type: none"> Acquire knowledge about cyber-physical systems, big data analytics, and cloud & cybersecurity systems, fostering interdisciplinary perspectives. Beyond theoretical knowledge, students should demonstrate a nuanced understanding of how big data analysis intersects with other domains, contributing to a holistic view of their research area.
Skills	<ul style="list-style-type: none"> Develop the ability to conduct quality peer reviews, a vital skill for contributing to the academic community. Students should exhibit proficiency in critically evaluating the work of their peers, providing constructive feedback, and incorporating feedback received into their own research proposal. Obtain experience on planning for applied research and innovation projects, considering practical limitations and requirements of real-world applications, including integrative aspects such as technical results, but also communicative and organization abilities, economical and ethical implications, etc.
Attitudes/values	<ul style="list-style-type: none"> Instill a deep-seated awareness of the necessity to defend human-centered values, promoting sustainable industry practices. In the context of big data analysis, this involves a commitment to developing algorithms that prioritize fairness, transparency, and societal benefit.
TEACHING METHODS	
<ul style="list-style-type: none"> Interactive Learning: Engage in presentations and discussions to delve deeper into the intricacies of research methodologies. In big data analysis, hands-on sessions with relevant tools and platforms should complement theoretical discussions. Workshop Attendance: Active participation in workshops enhances practical skills, enriching the research process. Workshops specific to big data tools, techniques, and ethical considerations should be integral to the learning experience. 	
EVALUATION	
<p>The mark will be based on the final version of a research proposal and will include:</p> <ul style="list-style-type: none"> Written Report (50%): Assessing the ability to articulate research goals, methodology, and expected contributions coherently. In the context of big data analysis, this includes the application of relevant analytical techniques, ethical considerations, and alignment with sustainability principles. Oral Defense (50%): Evaluating the capacity to communicate and defend research choices effectively. Students should demonstrate a deep understanding of big data concepts, critically respond to queries related to their research, and articulate the broader implications of their proposed work. 	
PRECONDITIONS	
None	
DEPARTMENT	Department of Informatics Engineering and Systems
LECTURERS	<ul style="list-style-type: none"> Carlos Pereira Mateus Mendes Fernanda Correia Ana Borges José Nunes Acácio Amaral
LITERATURE	Online research methods literature.