Course Title	Master Thesis
Course Code	AI695
Course Type	Compulsory
Level	Master (2nd cycle)
Year / Semester	2nd Year/3rd Semester
Teacher's Name	TBA

ECTS	30	Lectures /week	Up to 6 Teleconferences	Laboratories/ week	None
Course Purpose and Objectives	The course's purpose is to provide guidance on how to write a successful Master's Thesis. It aims to provide skills in research methods in the subdiscipline of Artificial Intelligence. Students will be able to demonstrate the ability to identify and formulate issues critically, independently and creatively as well as to plan and use appropriate methods, undertake advanced tasks within predetermined timeframes, and to contribute to the formation of knowledge in the field. Other skills will be related to participation in research and development work in the field of Artificial Intelligence, which is considered the main part of the thesis. The course also aims to equip the student with the tools required to manage a project as large as a Master's Thesis, through providing project management techniques. The Master's Thesis course includes research methods stages of reviewing related work, extending existing or developing new ideas, software implementation and testing, analysis and evaluation, and finally writing a Master's Thesis. Finally, it aims to prepare the student for independent work as a recipient of a Master's degree.				
Learning Outcomes	Upon successful completion of this course students should be able to: • Understand the basic concepts of probability, random variables, statistical inference, hypothesis testing and regression. • Be aware of their responsibilities as research students, including scientific ethics, and data and code management requirements. • Communicate research results, including building a scientific argument orally and in writing in the subdiscipline of Artificial Intelligence. • Data exploration and statistical analysis of data with the use of statistical tools and probability calculations. • Select and justify a research topic and use various resources to carry out a literature search and review in the subdiscipline of Artificial Intelligence. • Design, execute, interpret and report results from empirical research projects in the subdiscipline of Artificial Intelligence.				

	• Manage a project in the subdiscipline of Artificial Intelligence and explain the relevant techniques and tools needed in order to complete it successfully on time and within budgeted resources. • Identify real-world problems in the subdiscipline of Artificial Intelligence to which academic concepts and methods can be realistically applied to improve or resolve the problem situation. • Select and use effectively the methods and techniques appropriate for particular cases in the subdiscipline of Artificial Intelligence, and plan and manage their work. • Critically evaluate their research project and the proposed solution, as well as recognize and describe legal, social or ethical obligations stemming from the project.

Prerequisites	The student needs to have completed all core courses of the programme.	Co-requisites	None

Course Content	Part A: Research Methods:
	The nature of research: Definitions and types of research; research process; topic selection and scope; feasibility and value. Ethics and responsible research.
	The literature search: Sources of information; differentiating between types of sources; primary, secondary and tertiary sources; using the library and digital databases to conduct efficient literature reviews; searching the Internet; role of the supervisor.
	Project management: Methods, techniques and tools for research design, and data collection in the subdiscipline of Artificial Intelligence.
	Analysis and synthesis: Statistical and qualitative techniques for data analysis; use of appropriate software. Reliability and validity of research projects.
	Presentation of research findings: Project structure; conventions on citation and quotations; style of writing a research report in the subdiscipline of Artificial Intelligence.
	Part B: Thesis:
	The student selects a topic in the subdiscipline of Artificial Intelligence from the M.Sc. Thesis topics catalogue which is provided to them by the course's instructor and is consolidated from the previous semester, so that when the semester begins the student starts right away to have enough time to complete it. Once the students receive the topics, they have a deadline to choose a topic. Topics are assigned, given that the students have passed all the pre-requisite courses for a specific topic. At this point, the Department of Computer Science and Engineering mandates that the academic supervisor and student agree upon the topic as well as the expected output from the M.Sc. Thesis, with specific milestones and deliverables. Once a topic is selected and agreed upon with the academic supervisor, the course follows the weekly breakdown structure as that is provided in the Master Thesis Guide. If

	the topic is jointly set with the industry, then when the student progresses and reaches the field study/development phase, a second (industrial) supervisor is appointed. However, the main supervisory role lies to the academic supervisor. The specific deliverables for each individual student's project must be discussed and decided upon in consultation with the student's supervisor/s. The written thesis is defended orally during a public defense. An Evaluation Committee including the supervisor/s and one external examiner from another university with an expertise on the thesis topic assess the written thesis.
Teaching Methodology	For Part A: Research Methods there will be distance learning research lectures and seminars, as well as a number of distance learning sessions with the instructor. For Part B: Face-to-face and/or online meetings with the supervisor/s.
Bibliography	Any material suitable for the subdiscipline in which the student is undertaking the thesis will be specified by the instructor/s. Cohen, P. R. (2017). Empirical Methods for Artificial Intelligence, Cambridge, MA: The MIT Press. Howard, K. & Sharp, J.A. (2019). The Management of a Student Research Project, Gower. J. Zobel. (2014). Writing for Computer Science, Springer. W. Navidi (2019). Statistics for Engineers and Scientists, McGraw-Hill Science/Engineering/Math; Latest Edition. Statistical Methods for Engineers (2010). Geoffrey Vining and Scott M. Kowalski, Thomson, Brooks/Cole, Latest Edition. Edgar, T. W. and Manz, D. O. (2017). Research Methods for Cyber Security. Cambridge, MA: Syngress. Argyrous, G. (2011). Statistics for Research: with a guide to SPSS. Los Angeles, CA: Sage. King, R. S. (2012). Research Methods for Information Systems, Dallas, TX: Mercury Learning & Information

Assessment	Written Thesis: 80% Oral Presentation: 20% Assessment Strategy: Each project must involve deliverables falling into the following general categories: (a) A proposed solution to a real-world problem in the subdiscipline of Artificial Intelligence. (b) A proof of concept, which demonstrates the validity of the proposed solution. (c) Clear indication of knowledge of relevant work by others in the subdiscipline of Artificial Intelligence. (d) The selection and application of appropriate theoretical concepts and methods. (e) A project thesis of between 12,000 to 16,000 words. Projects will be marked in two ways. Firstly, according to the following scheme:

1. Project justification including its relationship to the current state of the art in Artificial Intelligence	10%	20 marks
2. Ability to select and use appropriate methods and techniques	10%	20 marks
3. The clarity, coherence and succinctness with which the solution is developed	20%	40 marks
4. Novelty. Does the work improve significantly the current state of the art in Artificial Intelligence?	20%	40 marks
5. Ability to critically review the project and assess its implications for future work in Artificial Intelligence in view of the project recommendations and conclusions	10%	20 marks
6. Project Management: Ability to plan and control the project	10%	20 marks
7. Oral presentation :	20%	40 marks
Total	100%	200 marks

In addition, students are reminded about presentation issues:
- Is the document/project format (including spelling) of good quality?
- Is it well organized into appropriate sections?
- Is the style of language used appropriate for an academic report?

Language	English