National University of Engineering (UNI)
School of Artificial Intelligence
Syllabus 2027-I

1. COURSE

AI403. Research Workshop (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AI403. Research Workshop
2.2 Semester	:	10th Semester.
2.3 Credits	:	4
2.4 Hours	:	1 HT; 5 HP;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	CS402. Capstone Project I. (8th Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

This course aims to enable students to develop their research proposal and execute formal experiments, producing the core chapters of their thesis under the supervision of their faculty advisor.

5. GOALS

- Formalize the thesis plan in the institutional format with objectives, schedule, and feasibility analysis.
- Write the theoretical framework and related works chapter with critical synthesis of the literature.
- Design the original methodology and implement a functional prototype of the research proposal.
- Execute preliminary comparative experiments with statistical rigor and well-grounded interpretation of results.
- Present and defend the thesis progress before the evaluation committee incorporating their feedback.
- The deliverables for this course are:

  Midterm Progress: Thesis plan in institutional format, theoretical framework chapter and related works in LaTeX.

  Final: Methodology, proposal, and preliminary experiments chapters approved by the advisor.

6. COMPETENCES

AG-C02) Ethics: Applies ethical principles and commits to professional ethics and the standards of professional computing practice. (Assessment)

AG-C04) Communication: Communicates effectively in complex computing activities. (Assessment)

AG-C05) Project Management: Applies management principles in computing to manage projects. (Assessment)

AG-C08) Problem Analysis: Identifies, formulates, and analyzes complex computing problems. (Assessment)

AG-C09) Design and Development of Solutions: Designs, implements, and evaluates solutions for complex computing problems. (Assessment)

7. TOPICS

Unit 1: Thesis Plan Formalization (10 hours)	
Competences Expected: AG-C05,AG-C08,AG-C09	
Topics	**Learning Outcomes**
• Structure of the thesis plan following the institutional format. • Precise definition of the research problem and central thesis question. • Formulation of hypothesis, general and specific verifiable objectives. • Activity schedule with milestones through the final thesis defense. • Feasibility analysis: resources, timeline, risks, and contingencies of the project.	• Produce the thesis plan in the format required by the academic institution. [Evaluar] • Define an original research problem with verifiable hypothesis and objectives. [Evaluar] • Develop a detailed schedule with milestones and risk analysis through the thesis defense. [Evaluar]
Readings : [**ieee**], [**acm**]	

Unit 2: Theoretical Framework and Advanced State of the Art (10 hours)	
Competences Expected: AG-C04,AG-C08,AG-C09	
Topics	**Learning Outcomes**
• Thematic organization and critical synthesis of the literature in the thesis area. • Writing the theoretical framework chapter in LaTeXwith coherent structure. • Identification and justification of research gaps specific to the problem. • Comparative analysis of approaches: classification tables and diagrams of the literature. • Reference integration with BibTeX and version control with Git.	• Write the theoretical framework chapter with structured and critical synthesis of the literature. [Evaluar] • Justify the originality of the problem in relation to the state of the art. [Evaluar] • Build comparative tables that evidence the research gaps of the area. [Evaluar]
Readings : [**ieee**], [**acm**], [**citeseer**]	

Unit 3: Original Methodology Design (10 hours)	
Competences Expected: AG-C05,AG-C08,AG-C09	
Topics	**Learning Outcomes**
• Definition of the methodological approach: experimental, analytical, or constructive. • Specification of the original contribution: algorithm, system, model, or methodology. • Experimental protocol design: variables, metrics, datasets, and benchmarks. • Validation criteria and generalization of the proposal's results. • Alignment of methodology with the objectives and hypothesis of the thesis plan.	• Design the research methodology aligned with the hypothesis and objectives. [Evaluar] • Specify the original contribution of the thesis project with verifiable criteria. [Evaluar] • Define the complete experimental protocol with variables, metrics, and benchmarks. [Evaluar]
Readings : [**ieee**], [**acm**]	

Unit 4: Implementation and Preliminary Experiments (12 hours)	
Competences Expected: AG-C05,AG-C08,AG-C09	
Topics	**Learning Outcomes**
• Implementation of the original proposal: prototype, algorithm, or thesis model. • Reproduction of relevant baselines from the state of the art for comparison. • Execution of preliminary experiments with basic statistical analysis. • Recording and documentation of configurations, versions, and results. • Identification of limitations and iterative refinement of the proposal.	• Implement a functional prototype of the original thesis proposal. [Usar] • Execute preliminary comparative experiments with defined baselines. [Usar] • Analyze and interpret results with appropriate statistical rigor. [Evaluar]
Readings : [**ieee**], [**acm**]	

Unit 5: Writing the Core Thesis Chapters (10 hours)	
Competences Expected: AG-C02,AG-C04,AG-C09	
Topics	**Learning Outcomes**
• Writing the methodology and experimental design chapter in LaTeX. • Writing the related works chapter with critical comparative analysis. • Presentation of preliminary results: tables, figures, and comparative analysis. • Revision cycles with the advisor: structured incorporation of feedback. • Narrative coherence and consistency across thesis chapters.	• Write the methodology and related works chapters with academic rigor. [Evaluar] • Present preliminary results with clear visualizations and comparative analysis. [Usar] • Apply revision cycles with the advisor to improve document quality and coherence. [Evaluar]
Readings : [**ieee**], [**acm**]	

Unit 6: Progress Presentation and Final Planning (8 hours)	
Competences Expected: AG-C02,AG-C04,AG-C05	
Topics	**Learning Outcomes**
• Oral presentation of thesis progress before the evaluation committee. • Defense of methodology and preliminary results before committee questions. • Incorporation of committee feedback into the document revision. • Planning of remaining activities toward the final thesis defense. • Research ethics management: authorship, academic integrity, and data confidentiality.	• Present and orally defend the thesis progress before an academic committee. [Evaluar] • Incorporate committee feedback into a well-grounded revision of the document. [Evaluar] • Plan the remaining activities with clear objectives toward the final defense. [Usar]
Readings : [**ieee**], [**acm**]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

********* EVALUATION MISSING ********

10. BASIC BIBLIOGRAPHY