Logic

Academic Year: (2023 / 2024) **Review date: 26-04-2023**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: QUINTANA MONTERO, DAVID

Type: Basic Core ECTS Credits : 6.0

Year : 2 Semester : 2

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

There are no course dependencies

OBJECTIVES

Learning outcomes:

R1. Knowledge and Understanding: knowledge and understanding of the mathematics and other basic sciences underlying Computer Science and Engineering, and specific knowledge of Computer Science, Computer Engineering, and Information Systems.

R3, Engineering Design: ability to develop and design complex products, processes, and systems to meet established requirements, that can include an awareness of non-technical ¿ societal, health and safety, environmental, economic and industrial¿ considerations; to select and apply relevant design methodologies.

R4. Investigations: ability to use the appropriate methods to pursue detailed investigations and research of technical issues in Computer Science and Engineering.

R5. Engineering Practice: Bachelor Degree graduates will be able to demonstrate understanding and knowledge to solve problems, carry out investigations, design devices or processes within the field of Computer Science and Engineering according to cost, quality, security, efficiency, respect for the environment and ethical considerations. These abilities include the knowledge, use and limitations of computer systems, process engineering, computer architectures, computational models, equipment, practical work, technical bibliography, and information sources.

Generic and transversal competences:

CGB3: Ability to understand the basics of logic and its application to solve engineering problems

DESCRIPTION OF CONTENTS: PROGRAMME

1- Introduction to formal systems

Calculus. Definition
Consideration on calculi

2- Representation and syntax in propositional calculus

Introduction to propositional calculus
Syntax

3- Proof theory in propositional calculus. Kleene¿s algebra

Introduction to Kleene's algebra
Proof and deduction
Proof with assumptions

4- Representation and syntax in predicate logic

Introduction to predicate calculus
Syntax

5- Proof theory in predicate calculus. Kleene¿s algebra

Introduction to Kleene¿s algebra
Proof and deduction

6- Semantic theory for propositional and predicate calculi

Semantic theory for propositional calculus
Semantic theory for predicate calculus (I)

7- Resolution method

Prenex normal form
Skolem normal form
Resolution method

8- Computational logic and applications

Horn clause and chaining methods
Introduction to Prolog

LEARNING ACTIVITIES AND METHODOLOGY

* Theory sessions: 1 ECTS. Sessions used to introduce the key concepts. Students will receive class notes and references to pursue independent work.

* Exercise sessions: 1 ECTS. Guided work sessions devoted mainly to solve Logic exercises related to the theoretical contents.

* Independent practical work: 2,5 ECTS. Independent work to be carried out either individually or in small groups focused on thematic sets of exercises provided by the professors.

* Continuous assessment tests: 1 ECTS. There are two midterms that evaluate progress during the term.

* Office hours: time outside of class scheduled by professors to meet with students either individually or in groups.

* Final exam: 0,5 ECTS. Global evaluation of the knowledge and skills developed over the term.

ASSESSMENT SYSTEM

The grading system has a component of continuous-assessment that will allow the students to secure a portion of their final mark. This will be assessed with two tests, with the same weight, that will represent 60% of the final grade.

The practical exercises will be assessed via submission of solution proposals and the mentioned tests. The these solutions will not be graded, but complete submission will be mandatory to secure the full mark of the two tests.

There will be a final exam with a weight of 40%.

% end-of-term-examination:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

BASIC BIBLIOGRAPHY

- Cuena, J Lógica Informática, Alianza Informática, 1996

ADDITIONAL BIBLIOGRAPHY

- Alfredo Deaño Lógica Computacional, Alianza, 1978

- D. van Dalen Logic and Structure, Springer, 2004

- M. Huth and M. Ryan Logic in Computer Science: Modelling and Reasoning about Systems, Cambridge University Press, 2004