Logic

Academic Year: (2020 / 2021) **Review date: 02-03-2021**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: QUINTANA MONTERO, DAVID

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Engineering and Architecture

OBJECTIVES

GENERIC AND TRANSVERSAL COMPETENCES:

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

PROGRAMME-SPECIFIC SKILLS:

- Cognitive

1. To know first-order logic, derive logical proofs and deductions, understand the basics of its application to computing and being able to use automated deduction systems

- Procedural/Instrumental

2. Students will evaluate different resolution methods as well as their advantages and disadvantages
3. Students will apply the right technique to every problem introduced

- Attitude

4. Students will work in teams
5. Students will use computational logic tools
6. Students will have a written final exam

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

The course will consist of lectures, where the theory will be introduced, and practical sessions. The aim of the lectures is providing the student with the theoretical background on Logic, its implications, and its usefulness in the context of Computer Science.

The practical sessions will consist of Logic exercises related to the concepts presented in the lectures. They will cover modeling and representation aspects as well as practical use of deduction and proof methods. Additionally, there will be some sessions devoted to the introduction of logic programming (PROLOG) and automatic deduction.

The exercises will be published in aula global and will be solved in class. There will also be activities that will require students to work at home and submit the results in groups.

During the semester, there will be two assessments focused on the theoretical contents of the course.

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 take the two tests.

There will be a final exam that will be used to make a global assessment of all the competences: knowledge, understanding, practical use, and skills. (CGB3)

% 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