Knowledge Engineering

Academic Year: (2019 / 2020) **Review date: 29-04-2019**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: FERNANDEZ ARREGUI, SUSANA

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Algorithms and Data Structures, Artificial Intelligence, Logic

OBJECTIVES

ABET competences:

- Problem solving, both stand-alone and working in teams (PO c, e)
- To work in a team both for the analysis and design of computer solutions based on knowledge engineering (PO d)
- Ability to analyze and synthesize (PO b)
- Organization and planning (PO d)
- Information management (both acquiring and analyzing information) (PO b)
- Decision making (PO k)
- Encouragement for improving quality (PO e, i)
- Spoken and written communication (PO g)
- Critical reasoning (PO b, c, e, k)
- Basic and fundamental knowledge of Artificial Intelligence and Knowledge Engineering (PO i, k)
- Ability to interpret and understand functional specifications for the development of knowledge engineering systems (PO c)
- To analyze and design computer applications based on Knowledge Engineering (PO c)

EUR-ACE competences:

- Ability to learn the basics, paradigms and techniques of intelligent systems and analyze, design and build systems, services and applications that use these techniques in any scope (CECC4): 2 ECTS
- Ability to acquire, obtain, formalize and represent human knowledge in a computable way to solve problems through a computer system at any scope, particularly those related to aspects of computing, perception and action in intelligent environments (CECC5): 4 ECTS

EUR-ACE learning results:

- Understanding of the different methods and the ability to use them (RA3.2)
- The ability to combine theory and practice to solve engineering problems (RA5.2)

The students practice the following soft-skills:

- Communication : written, listening
- Flexibility : willing to change, accepts new things
- Responsibility: gets the job done, self-disciplined
- Teamwork : cooperative, gets along with others, collaborative

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Knowledge Engineering
   1.1. Goals of Knowledge Engineering
   1.2. Types of Knowledge Engineering systems
2. Development stages
   2.1. Knowledge acquisition
   2.2. Conceptualization
   2.3. Formalization

2.4. Development, implementation and validation
3. Knowledge based systems
3.2. Production systems
3.1. Planning-based systems
4. Analysis, design and implementation processes of computer systems based on knowledge management
4.1 Resolution of specific problems using knowledge based systems

LEARNING ACTIVITIES AND METHODOLOGY

ABET:

Theoretical lectures (1 credit ECTS)
- Mainly oriented to the acquisition of the basic underlying concepts, their relationships, the available techniques and to discuss how to analyze and
synthesize knowledge (PO b, e, k)

Practices in groups (2 credits ECTS)
- Mainly oriented to those competences related to strength the ability to work in a team, problem solving, work decomposition and organization, and public oral
presentations and written communications (PO d, g)

Individual work (3 credits ECTS)
- Mainly oriented to those competences related to planning, analyzing, synthesizing, critical reasoning and familiarization with the various concepts (PO b, c, e, k)

EUR-ACE:

- Theoretical lectures: - Mainly oriented to the acquisition of the theoretical knowledge of the competences CECC4 and CECC5
- Practices in groups - Mainly oriented to the acquisition of the practical skills related to the competences CECC4 and CECC5
- Individual work to study and complete the practices

Students have to perform the following work in pairs to acquire the EUR-ACE learning results RA3.2 and RA5.2:

- Two mandatory practices consisting in solving the same problem using two different techniques of Artificial Intelligence: Production Systems and Automated Planning. It includes the design of the programs, the knowledge acquisition, the implementation and testing. Deliverables are the source code and the documentation explaining the programs

ASSESSMENT SYSTEM

ABET:

The final score results from combining the scores obtained by the students both in their individual activities and when working in a team and always taking into account the effort invested by each student in the aforementioned activities (PO b, c, d, e, k)

Students will be always informed of the progress of their scores so that it becomes easier for them to keep track of their score and what they are expected to be able to do (PO b, c, e, i, k)

The final score assigns different weights to different activities: 70% to the individual work and 30% to the team activities. Within the individual activities, 60% of the score is computed from the different scores obtained during the course and 40% of the score will be computed from the scores obtained in an exam (PO b, c, d, e, g, i, k)

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The final score results from combining the scores obtained by the students both in their individual activities and when working in a team and always taking into account the effort invested by each student in the aforementioned activities

Students will be always informed of the progress of their scores so that it becomes easier for them to keep track of their score and what they are expected to be able to do

The final score assigns different weights to different activities: 70% to the individual work and 30% to

the team activities. Within the individual activities, 60% of the score is computed from the different scores obtained during the course and 40% of the score will be computed from the scores obtained in an exam

The evaluation evidence for each of the competencies described above will:

- CECC4 (2 ECTS):
  Short lectures Questions (optional)
  Lab (required): source code and documentation
  Final exam (required)

- CECC5 (4 ECTS):
  Short lectures Questions (optional)
  Lab (required): source code and documentation
  Final exam (required)

Minimal grade in the final exam to pass de subject: 4

% end-of-term-examination:	30
% of continuous assessment (assigments, laboratory, practicals…):	70

BASIC BIBLIOGRAPHY

- Nils J. Nilsson Artificial Intelligence: A New Synthesis, Morgan Kaufmann.
- Schreiber, Guus Knowledge engineering and management : the commonKADS methodology, MIT Press.
- Stuart Russell, Peter Norvig Artificial Intelligence: A Modern Approach, Pearson / Prentice-Hall.