Unconventional Computation

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

Department assigned to the subject:

Coordinating teacher: LEDEZMA ESPINO, AGAPITO ISMAEL

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

None

OBJECTIVES

The course introduces advanced nonconventional computing techniques. The students will learn the theoretical fundations of these techniques, how they can be applied to solve problems, and in which cases they are more useful or efficient than other techniques.
Nonconventional techniques are based in paradigms like DNA computing, quantum computing and artificial immune systems. These paradigms will be studied, their relationship and their joint application.

DESCRIPTION OF CONTENTS: PROGRAMME

- Introduction
- DNA Computing
- Quantum Computing
- Biological Approach to Computing:
  -- Algorithms based on Artificial Immune System
  -- Biocomputing

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures
- Practice about Artificial Immune Systems.
- Activities directed by the teacher (glossaries, work evaluation, and so on)
- Practical assignment - Final Project (Oral presentation of the student work, report)
- Individual tutorials

ASSESSMENT SYSTEM

- Preparation and presentation of a work related to the subject. 40%
- SIA Practices /SIA Practical assignment: 15%
- Other activities directed by the teacher: 10%

- Final Exam: 35%

Extraordinary evaluation: 100% project

% end-of-term-examination:	35
% of continuous assessment (assigments, laboratory, practicals…):	65

BASIC BIBLIOGRAPHY

- Andrew Adamatzky Advances in Unconventional Computing : Volume 2: Prototypes, Models and Algorithms, Springer, 2016
- Andrew Adamatzky Advances in Unconventional Computing: Volume 1: Theory, Springer, 2016

- Anirban Pathak Elements of quantum computation and quantum communication, CRC Press , 2013

- Martyn Amos Theoretical and experimental DNA computation, Springer, 2005

- Oliver Morsch Quantum bits and quantum secrets : how quantum physics is revolutionizing codes and computers, Weinheim : Wiley-VCH, 2008

- Riley T. Perry The Temple of Quantum Computing , Riley Perry, 2010

ADDITIONAL BIBLIOGRAPHY

- Dionisios N. Sotiropoulos, George A. Tsihrintzis Machine Learning Paradigms: Artificial Immune Systems and their Applications in Software Personalization, Springer, 2017
- Leandro Castro Jonathan Timmis Artificial immune systems : a new computational intelligence approach, Springer, 2002