

Programming

Academic Year: (2019 / 2020)

Review date: 22-06-2018

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: SESMERO LORENTE, MARIA PAZ

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

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OBJECTIVES

General Description

This course provides an overview of fundamental elements in computer Programming. Students will learn the basis programming, analysis of problems and algorithm development.

The use of Matlab in the lab sessions will provide to the students a high-level and interactive integrated development environment plus a a thecnical computing language for algorithm development, and its implementation and debugging in source code in Matlab programming language.

General Competences

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- Synthesis and analysis
 - Organization and planning
 - Application of theoretical knowledge to practical problems
 - Proactivity, creativity and reasoning for problem resolution

Specific Competences and Learning Objectives

* Cognitive:

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1. Identify and explain the fundamental topics in the field of Computer Programming, Structured Programming, that facilitate the capabilities to learn new methods and theories in the field of Aerospace Engineering.

* Procedural:

- Design Algorithms
- To learn how to use an integrated development environment (IDE) for program coding, and debugging the algorithm and the source code
- To acquire a good programming style, resulting in efficient, well-organized, and well-documented programs
- To acquire the ability to understand and use third-party programs
- Use the knowledge and abilities gained by personal exertion about computer programming (i.e. algorithm development) to solve problems, and to adapt to the changes that technology development will bring, in the field of Aeronautical Engineering.

DESCRIPTION OF CONTENTS: PROGRAMME

UNIT 1 INTRODUCTION TO PROGRAMMING

- 1.- Binary Code
- 2.- Basic elements of programming
 - 2.1.- Base instruction
 - 2.2.- Scalar data type
 - 2.3.- Arithmetic and logic expressions
- 3.- Structured Programming.
 - 3.1.- Theorem of Structured Programming
 - 3.2.- Flow Charts.
- 4.- Conditional Instructions
 - 4.1.- IF instruction
 - 4.1.- Switch instruction
- 5.- Loops
 - 5.1.- For
 - 5.2.- While
 - 5.3.- Nested Loops
- 6.- Debugging
- 7.- Arrays
 - 7.1 Vectors (one-dimensional array)
 - 7.2 Matrices and multi-dimensional arrays
- 8.- Functions
 - 8.1.- Definition and function call
 - 8.2.- Recursion
- 9.- Structures
 - 9.1 Definition.
 - 9.2 Arrays of structures
- 10.- Search, Sorting and Merge
 - 10.1 Linear and Binary Search
 - 10.2 Sorting Algorithms
 - 10.3 Merge
- 11.- Files
 - 11.1 Binary and plain text files
 - 11.2 Reading and writing files.

UNIT 2 INTRODUCTION TO COMPUTER SCIENCE

- 1.- Information Technology
- 2.- Software
- 3.- Data Structures (databases)
- 4.- Operating Systems
- 5.- Hardware
- 6.- Telecommunications

LEARNING ACTIVITIES AND METHODOLOGY

The learning activities in lectures and labs sessions are split into the following:

- lectures (50% of classroom learning activities): theoretical issues, and exercises
- lab sessions (50% of classroom learning activities): exercises, and problems

The student must aware that his/her work out of the classroom, study the theoretical concepts, exercises, and problems, is also part of his/her learning activities for the subject, and this work to be done out of the classroom is at least half of the work to do in the subject.

ASSESSMENT SYSTEM

We follow a continuous assessment system in which the students can obtain the 100% of their final grading as follows:

- 1) 50% comes from tests questions and problems to solve in more than one mid-term exams, and
- 2) 50% comes from a final exam.

NOTE: Students not following the continuous assessment can have access to a final exam with a maximum grade of 60%.

Additionally, students will also have the opportunity to take an extraordinary exam graded as follows:

A. If the student followed the continuous assessment, the extraordinary exam will have the same value

as the ordinary final exam (i.e., 50%), and the final grade will be the sum of the continuous assessment grade and the extraordinary exam.

B. If the student did not follow the continuous assessment she/he will have access to an extraordinary exam worth 100% of the total grade.

% end-of-term-examination:	50
% of continuous assessment (assignments, laboratory, practicals...):	50

BASIC BIBLIOGRAPHY

- Karl Beecher Computational Thinking - A beginner's guide to problem-solving and programming, BCS Learning & Development Limited.
- Ravi Sethi. Programming languages, concepts and constructs. , Addison-Wesley.
- Stormy Attaway Matlab: A Practical Introduction to Programming and Problem Solving, 2nd Edition, Butterworth-Heinemann.

ADDITIONAL BIBLIOGRAPHY

- Behrouz Forouzan and Firouz Mosharraf Foundations of Computer Science , Cengage.
- ITL Education Solutions Limited Introduction to Information Technology , Pearson Education India.
- V. Rajaraman Introduction To Information Technology, Prentice-Hall of India Pvt.Ltd.

BASIC ELECTRONIC RESOURCES

- Karl Beecher . Computational Thinking - A beginner's guide to problem-solving and programming BCS Learning & Development Limited: https://proquest.safaribooksonline.com/book/programming/9781780173641?bookview=overview
- Stormy Attaway . Matlab: A Practical Introduction to Programming and Problem Solving, 2nd Edition utterworth-Heinemann: <https://proquest.safaribooksonline.com/book/computer-aided-engineering/9780123850812>