Programming

Academic Year: (2023 / 2024) **Review date: 09-02-2024**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: ZARRAONANDIA AYO, TELMO AGUSTIN

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Engineering and Architecture

SKILLS AND LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.
CG1. Students are able to demonstrate knowledge and understanding of concepts in mathematics, statistics and computation and to apply them to solve problems in science and engineering with an ability for analysis and synthesis.
CG3. Students can solve computationally with the help of the most advanced computing tools mathematical models coming from applications in science, engineering, economy and other social sciences.
CG4. Students are able to show that they can analyze and interpret, with help of computer science, the solutions obtained from problems associated to real world mathematical models, discriminating the most relevant behaviours for each application.
CG6. Students can search and use bibliographic resources, in physical or digital support, as they are needed to state and solve mathematically and computationally applied problems arising in new or unknown environments or with insufficient information.
CE10. Students have shown that they know and understand the algorithmic procedures to design and build programs that solve mathematical problems paying special attention to performance.

RA3. Students must have the capacity to gather and interpret data and information on which they base their conclusions, including where relevant and necessary, reflections on matters of a social, scientific, and ethical nature in their field of study.
RA5. Students must know how to communication with all types of audiences (specialized or not) their knowledge, methodology, ideas, problems and solutions in the area of their field of study in a clear and precise way.

OBJECTIVES

The objective of this course is to introduce basic programming techniques.
The programming language used during the course is MATLAB. The techniques covered in the course are generic, and students will be able to make use of them for programming in other languages.

During the course students will acquire knowledge on:
- Fundamentals of the imperative programming
- Fundamentals of structured programming
- Language data types
- Matlab computing language syntax
- Program testing and debugging

Related to specific skills, students will be able to:

- Analyze and understand MATLAB programs
- Localize and fix syntax and functional errors
- Design and develop simple algorithms based on given prerequisites
- Develop simple Matlab programs from functional descriptions
- Design, develop and execute program test plans

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction
- Computer architecture
- Programming languages
- Program compilation and execution

2. Programming fundamentals
- Programming paradigms
- Program elements: data and algorithms
- Basic programming tools: algorithms, flow diagrams and pseudocode

3. Programming using MATLAB
- Matlab language characteristics
- Working with matrices
- Expressions
- Operators

4. Flow Control Statements
- Decision-Making Statements
- Looping Statements

5. Scripts and Funcions
- Functions
- Scripts

6. Data Structures
- Characters and Text
- Multidimensional Arrays
- Cell Arrays
- Structures

7. Input / Output Files
- Import / Export data
- ASCII and Binary Files

8. Advanced Techniques
- Debug, testing and error control
- Recursivity

LEARNING ACTIVITIES AND METHODOLOGY

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THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.67 ECTS]
Knowledge and concepts students must acquire. Student receive course notes and will have basic reference texts to facilitate following the classes and carrying out follow up work. Students partake in exercises to resolve practical problems and participate in workshops and evaluation tests, all geared towards acquiring the necessary capabilities.

TUTORING SESSIONS. [4 hours of tutoring with 100% on-site attendance, 0.15 ECTS]
Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher.

STUDENT INDIVIDUAL WORK OR GROUP WORK [98 hours with 0 % on-site, 3.72 ECTS]

WORKSHOPS AND LABORATORY SESSIONS [8 hours with 100% on site, 0.3 ECTS]

FINAL EXAM. [4 hours with 100% on site, 0.15 ECTS]
Global assessment of knowledge, skills and capacities acquired throughout the course.

METHODOLOGIES

THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject's main concepts are developed, while providing material and bibliography to complement student learning.

PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group.

TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with a teacher as tutor.

LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in workshops and laboratories under the tutor's supervision.

ASSESSMENT SYSTEM

SE1 - FINAL EXAM. [40 %]
Global assessment of knowledge, skills and capacities acquired throughout the course.

SE2 - CONTINUOUS EVALUATION. [60 %]
Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course.

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

BASIC BIBLIOGRAPHY

- MathWorks Getting Started with MATLAB, MATLAB.

ADDITIONAL BIBLIOGRAPHY

- García de Sola, Juan Francisco Informática Básica, Alhambra Longman.

- Ureña López, L. Alfonso Fundamentos de informática, RA-MA, 1997

BASIC ELECTRONIC RESOURCES

- Mathworks . MATLAB R2018a Documentation: https://es.mathworks.com/help/matlab/getting-started-with-matlab.html