

Programming

Academic Year: (2023 / 2024)

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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

LEARNING OUTCOMES

RA1: Acquire knowledge and understanding of the basic general fundamentals of engineering and biomedical sciences.

RA2: Be able to solve basic engineering and biomedical science problems through a process of analysis, identifying the problem, establishing different methods of resolution, selecting the most appropriate one and its correct implementation.

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.

CG1: Adequate knowledge and skills to analyse and synthesise basic problems related to engineering and biomedical sciences, solve them and communicate them efficiently.

CG3: Knowledge of basic scientific and technical subjects that enables them to learn new methods and technologies, as well as providing them with great versatility to adapt to new situations.

CG4: Ability to solve problems with initiative, decision-making, creativity, and to communicate and transmit knowledge, skills and abilities, understanding the ethical, social and professional responsibility of the biomedical engineer's activity. Capacity for leadership, innovation and entrepreneurial spirit.

CG8: Ability to solve mathematical, physical, chemical and biochemical problems that may arise in biomedical engineering.

ECRT4: Ability to implement algorithms in modern programming languages. Special application to MATLAB language.

CT1: Ability to communicate knowledge orally and in writing to both specialised and non-specialised audiences.

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

The teaching methodology includes:

Lectures. Teachers will present the theoretic concepts. It is expected that students participate actively in the lectures. Basic documentation (lecture notes, bibliography, and complementary documentation) will be accessible to students through the web-based learning platform. Students have to read and study the basic documentation (student work).

Laboratory. Students will learn to develop basic programs using the Matlab programming environment. Before attending the session, students will prepare the program solution as much as possible (student work).

Problem solving. Students, guided by teachers, will solve a set of representative problems during problem sessions in order to apply the theoretic concepts. Before attending the session, students will prepare the problem solutions as much as possible (student work). This allows the session is focused on concepts or specific problems that are more difficult for the student. Students will be asking to present their solutions in public.

Forum. Students may ask doubts and make comments or suggestions to teachers and other students of their group regarding lectures, laboratory assignments and problem solving, using the web platform.

Besides, students may consult forum and participate actively by answering other students' questions or complementing other students' comments.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	40
% of continuous assessment (assignments, laboratory, practicals...):	60

Assessment will consider:

1. Laboratory assessment (mandatory) 60%

3. Final exam (mandatory) 35% - 40%

4. Participation and Personal Work (optional) 5%

Application of theoretical-practical knowledge to simple problems during the exercise classes will be assessed: personal work and active participation during the class and the problem-solving on blackboard

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>