Linear Algebra

Academic Year: (2021 / 2022) **Review date: 04-06-2021**

Department assigned to the subject: Mathematics Department

Coordinating teacher: TORRENTE ORIHUELA, ESTER AURORA

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)

Sixth form level linear algebra.

OBJECTIVES

LEARNING AREAS:

R1. Knowledge and comprehension: Students have basic knowledge and comprehension on the scientific and technological grounds of Informatics Engineering, as well as specific knowledge on Computer Science, Computational Engineering, and Information Systems.

R4. Research and innovation: Students are able to use proper methods in research and attain innovative results in the context of Informatics Engineering.

R5. Applications in engineering: Students are able to use their knowledge and comprehension for problem solving, research leading, and device or process design in the context of Informatics Engineering, in good agreement with cost, quality, security, efficiency, ecological respect and ethical criteria. These skills include the knowledge, use and limitations of informatics systems, process engineering, computer architecture, computational models, teams, practical work, technical bibliography and information sources.

BASIC AND GENERAL COMPETENCES:

CGB1 - Students are able to solve mathematical problems relevant in engineering, as well as to apply their knowledge on: Linear Algebra; Differential and Integral Equations; Numerical Methods; Numerical Algorithmics; Statistics and Optimization.

CGB3 - Students are able to understand and master the basic concepts on Discrete Mathematics, Logic, Algorithmics, and Computational Complexity, as well as their use in engineering problems.

CGO12 - Students are knowledgeable in and are able to use basic tools from Economy, Human Resources Management, Project Management, as well as legislation, regulation, and standardization in the context of IT projects, in good agreement with the acquired knowledge.

CB1 - Students have demonstrated knowledge and understanding in study areas that belong to secondary-level education, and, although supported on advanced text books, also in areas that are in the forefront of the field of study.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Linear equation systems
2. Vectorial spaces
3. Matrices
4. Scalar product and normal form
5. eigenvectors and eigenvalues
6. Decomposition into singular values
7. Interpretation and applications

LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL-PRACTICAL CLASSES (2 ECTS). Concepts and knowledge to be acquired are presented in these sessions. Students are provided with lecture notes and can find basic reference bibliography to facilitate class understanding and posterior personal work. Exercises are solved by students for self-assessment and achievement of necessary skill. During the practical sessions, students are presented with exercises that are discussed and solved.

TUTORING SESSIONS. Sessions to clarify theoretical or practical issues encountered by students on an individual or in-group basis.

INDIVIDUAL AND GROUP WORK. 2.5 ECTS. Students' personal work.

CONTINUOUS ASSESSMENT. 1 ECTS. Knowledge, skills and abilities, gradually acquired, are globally assessed. They serve as self-assessment of progress to adapt learning strategies if necessary.

FINAL EXAM. 0.5 ECTS. Knowledge, skills and abilities acquired over the course of the academic semester are globally assessed.

ASSESSMENT SYSTEM

Activities and exams have a two-fold purpose: training and assessment. The evaluation system includes the assessment of these academic activities according to the following weighting:

Continuous assessment activities: 40%
Final exam: 60%

Minimum mark in the final exam: none.
Minimum mark in continuous assessment: none.

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

BASIC BIBLIOGRAPHY

- D. C. LAY "Linear algebra and its applications", Addison-Wesley - 4th ed. - 2009.
- D. POOLE "Linear algebra: a modern introduction", Thomson - 3rd ed. - 2010.

ADDITIONAL BIBLIOGRAPHY

- B. KOLMAN "Introductory linear algebra: an applied first course", Prentice Hall, Octava edición - 2006
- B. KOLMAN "Álgebra lineal", Prentice Hall - Octava edición - 2006.
- B. NOBLE, J. W. DANIEL "Álgebra lineal aplicada", Prentice Hall Hispanoamericana - Tercera edición - 1989.
- O. BRETSCHER "Linear algebra with applications", Prentice Hall 4th ed. - 2009..

BASIC ELECTRONIC RESOURCES

- J. Salas, A. Torrente y E.J.S. Villaseñor . Ejercicios de autoevaluación: http://euler.uc3m.es/algebralineal/