Fundamentals of Algebra

Academic Year: (2023 / 2024) **Review date: 09/02/2024 14:31:06**

Department assigned to the subject: Mathematics Department

Coordinating teacher: GONZALEZ VASCO, MARIA ISABEL

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)

None

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.
CG2. Students are able to formulate in mathematical language problems that arise in science, engineering, economy and other social sciences.
CG5. Students can synthesize conclusions obtained from analysis of mathematical models coming from real world applications and they can communicate in verbal and written form in English language, in an clear and convincing way and with a language that is accessible to the general public.
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.
CE1. Students have shown that they know and understand the mathematical language and abstract-rigorous reasoning as well as to apply them to state and prove precise results in several areas in mathematics.
CE3. Students have shown that they understand the fundamental results from linear algebra, linear geometry and discrete mathematics.
CE6. Students have shown that they know the fundamental mathematical results supporting the theory and the development of programming languages and intelligent systems.

RA1. Students must have acquired advanced cutting-edge knowledge and demonstrated indepth understanding of the theoretical and practical aspects of working methodology in the area of applied mathematics and computing"
RA2. Through sustained and well prepared argument and procedures, students will be able
to apply their knowledge, their understanding and the capabilities to resolve problems in complex specialized professional and work areas requiring the use of creative and innovative ideas"
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.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Logic and mathematical proofs
2. Elementary set theory and functions
3. Integer numbers and modular arithmetic
4. Groups

LEARNING ACTIVITIES AND METHODOLOGY

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THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.76 ECTS]
Knowledge and concepts students must acquire. Students 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, 0.16 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, 3.92 ECTS]

FINAL EXAM. [4 hours with 100% on-site, 0.16 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 problems, 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 a tutor.

ASSESSMENT SYSTEM

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

SE1 - FINAL EXAM. [60 %]
Global assessment of knowledge, skills, and capacities acquired throughout the course.

SE2 - CONTINUOUS EVALUATION. [40 %]
Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course.
It consists of two mid-term exams held along the course to assess the student's progression. The continuous evaluation also allows students themselves to modify their learning strategies, in case it is necessary. In addition, short tests, of no more than 10 minutes, will be given in each week.

BASIC BIBLIOGRAPHY

- Joseph A. Gallian Contemporary Abstract Algebra, Chapman and Hall/CRC (10ed), 2020

- Kenneth H Rosen Discrete Mathematics and Its Applications, McGraw-Hill Education, 2011 (7ed)

- Martin Liebeck A concise Introduction to Pure Mathematics, CRC Press, 2016 (4ed)

- Thomas W. Judson Abstract Algebra: theory and applications, orthogonal publishing, 2019

ADDITIONAL BIBLIOGRAPHY

- Bruce N. Cooperstein An Introduction to Groups, Rings, and Fields, Worldwide Center of Mathematics, 2012

- Fernando Q. Gouvêa A Guide to Groups, Rings, and Fields, Mathematical Association of America, 2012

- Susanna S. Epp Discrete Mathematics with Applications, Cenage Learning, 2011

BASIC ELECTRONIC RESOURCES

- Tom Judson . Abstract Algebra: Theory and Applications: http://abstract.ups.edu/