**COURSE OUTLINE**

**GENERAL**

| | | | |
|---|---|---|---|
| **SCHOOL** | School of Science | | |
| **ACADEMIC UNIT** | Department of Mathematics | | |
| **LEVEL OF STUDIES** | Postgraduate | | |
| **COURSE CODE** | **ΑΛ1** | **SEMESTER** | **1st Semester** |
| **COURSE TITLE** | Algebra I | | |

| **INDEPENDENT TEACHING ACTIVITIES** *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits* | **WEEKLY TEACHING HOURS** | **CREDITS** |
|---|---|---|
| | 3 | 7,5 |
| | | |
| | | |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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|---|---|
| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | Special Background |
| **PREREQUISITE COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes |
| **COURSE WEBSITE (URL)** | |

**LEARNING OUTCOMES**

**Learning outcomes**

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

*Consult Appendix A*

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aims of the course are:

The postgraduate student to reach a good level of theoretical background on topics related to the theory of group actions, the Sylow theorems and the general theory of modules over

associative rings.

**General Competences**

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

*Search for, analysis and synthesis of data and information, with the use of the necessary technology*
*Adapting to new situations*
*Decision-making*
*Working independently*
*Team work*
*Working in an international environment*
*Working in an interdisciplinary environment*
*Production of new research ideas*
*Project planning and management*
*Respect for difference and multiculturalism*
*Respect for the natural environment*
*Showing social, professional and ethical responsibility and sensitivity to gender issues*
*Criticism and self-criticism*
*Production of free, creative and inductive thinking*
*Others*

The aim of the course is to enpower the postgraduate student to analyse and compose basic notions of advanced Algebra. This will allow him to work in an international interdisciplinary environment.

**SYLLABUS**

Group actions on a set, Sylow theorems and applications, Direct and semidirect products, Finitely generated abelian groups, Free groups, Amalgamated free product of groups, Jordan-Hoelder theorem, Modules and homomorphisms between modules, Free modules, Direct sum and product of modules, Exact sequences and functors, Noetherian rings and modules, Semisimple rings and modules, Elements of multilinear and tensor algebra

**TEACHING and LEARNING METHODS - EVALUATION**

<table>
<tr><td>DELIVERY<br>Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY<br>Use of ICT in teaching, laboratory education, communication with students</td><td></td></tr>
<tr><td>TEACHING METHODS<br>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.<br><br>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39 hours</td></tr>
<tr><td>Study of theory and solving of exercises</td><td>39 hours</td></tr>
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<tr><td>Course total</td><td>78 hours</td></tr>
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</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION<br>Description of the evaluation procedure<br><br>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other<br><br>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Written exam at the end of semester (obligatory) , problem solving or/and intermediate exams (optional)</td></tr>
</table>

**ATTACHED BIBLIOGRAPHY**

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|---|
| *- Suggested bibliography:*<br>*- Related academic journals:* |

Μαρμαρίδης Νίκος, Εισαγωγή στην Θεωρία Ομάδων, Λειψοί, 2013

(translation: Marmaridis Nikos, Introduction to Group Theory (Greek), Leipsoi 2013)

Dummit, David, Foote, Richard M., Abstract algebra.
Third edition. John Wiley & Sons, Inc., Hoboken, NJ, 2004