COURSE NAME	Algebraic Structures					
Code	PMM111	Year of study	3rd year of undergraduate study and 2nd year of graduate study			
Course teacher	Saša Krešić Jurić	Credits (ECTS)	6,0			
Associate teachers		Type of instruction (number of hours)	L	S	E	
			30		30	
Status of the course	compulsory, elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The course objective is to introduce students to elements of group and ring theory, and to give a survey of some other algebraic structures (modules, associative algebras, Lie algebras) at the informative level. The emphasis is on understanding of theoretical results which will enable students to attend advanced courses in algebra or courses which require applications of algebraic structures.					
Course enrolment requirements and entry competences required for the course	Prerequisites: completed courses Introduction to Algebra with Analytic Geometry, Linear algebra (or Linear algebra and Matrix Calculus) Required competencies: knowledge of fundamentals of linear algebra and matrix calculus.					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	It is expected that the student will be able to: 1. Formulate the definitions of different algebraic structures (groups, rings, modules, algebras, Lie algebras), 2. analize and explain the structure of different types of groups (quotient groups, cyclic groups, permutation groups, dihedral groups, finitely generated abelian groups), 3. construct the permutation representation of a group, 4. classify finitely generated abelian groups, 5. analize and explain the structure of different types of rings (quotient rings, quaternions, polynomial rings, Euclidean domains, principal ideal domains, fields), 6. determine irreducibility of polynomials, 7. explain the connection between maxial ideals and fields. It is also expected that the student is able to prove the theorems used in the development of group and ring theory.					
Course content broken down in detail by weekly class schedule (syllabus)	**Groups (16 hours)** 1. Groups, subgroups and group homomorphisms: definitions and examples (2 hours) 2. Normal subgroups, quotient grups (2 hours) 3. The isomorphism theorems (2 hours) 4. Cyclic groups (2 hours) 5. Permutation groups (2 hours) 6. Dihedral groups, generators and relations (1 hour) 7. Group actions (2 hours)					

	8. Finitely generated abelian groups (2 hours) 9. Sylow theorems (1 hour) **Rings (12 hours)** 1. Rings and subrings: definitions and examples (1 hour) 2. Ring homomorphism, the fundamental isomorphism theorem (1 hour) 3. The ring of quaternions (1 hour) 4. The matrix ring, group algebra (1 hours) 5. Ring homomorphisms, ideals, quotient ring (2 hours) 6. Euclidean domain, principal ideal domain (2 hours) 7. The polynomial ring, Euclid's algorithm, irreducible polynomials (2 hours) 8. Maximal ideals, fields (2 hours) **A survey of some algebraic structures at the level of definitions and examples (2 hours)** 1. Modules, associative algebras, Lie algebras (2 hours)
Format of instruction	Lectures and tutorial sessions.
Student responsibilities	Class attendance and partial written exams.
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance: 1 ECTS Partial written exams: 2 ECTS Final exam: 3 ECTS
Grading and evaluating student work in class and at the final exam	Partial written exams and final written and oral exam. Positive grade of the written exam is required to take the oral exam.
Required literature (available in the library and via other media)	S. Krešić Jurić, *Algebarske strukture*, class notes, PMF, Split D.S. Dummit, R.M. Foote, *Abstract Algebra*, 3rd ed., John Wiley and Sons, 2004.
Optional literature (at the time of submission of study	B.P. Bhattacharya, S.K. Jain, S.R. Nagpaul, Basic Abstract Algebra, 2nd ed., Cambridge University Press, 1994. Z. Stojaković, D. Paunić, Zbirka zadataka iz algebre, Građevinska knjiga, Beograd

programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	Anonymous student evaluations at the end of semester according to the regulations of the University of Split.
Other (as the proposer wishes to add)	