

Program	Level		Second cycle				
	Name of the program		Pure Mathematics				
COURSE							
Course title	Group Representation Theory						
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)			
PMAT 485	II	Mandatory course	7	3+2+0			
Lecturer							
Course Goals	<ul style="list-style-type: none"> - To present, in an approachable way, an introduction to the representation theory of finite groups, - To define and then to prove series of claims related to representations, direct sums; reducible, irreducible, regular representations; inner product; Schur's lemma (after all basic terms are introduced and appropriate examples are given), - To introduce terms: operations, the character of representations, orthogonality relations. Then, to prove the corresponding claims, to illustrate them by appropriately selected examples and to point out their applications. 						
Learning Outcomes	<ul style="list-style-type: none"> - To master terms of the representation theory of finite groups, - To feel the potential of the theory through examples, - To get ready to apply the theory in geometry and physics (through typical examples). 						
COURSE CONTENT							
<ul style="list-style-type: none"> - Linear representations of finite groups. Representations (meaning). Exact representations. Isomorphisms. Examples. - Subrepresentations. Direct sum of representations. - Reducible, irreducible and total reducible representations. - Regular representations. Examples. - Functions defined over groups. Central functions. - Inner products along the space of functions defined on groups. - Schur's lemma. Applications. - Operations with representations. Binary operations. Direct products. - Characters of representations. Properties. - Orthogonality relations. Meaning and examples. - Orthogonality relations for simple characters. - Burnside theorem. Consequences. - Representations of cyclic and dihedral groups. - Characters of groups of rotations of tetrahedron. 							
LITERATURE							
<ol style="list-style-type: none"> 1. M. Vuković, <i>Teorija grupa i reprezentacija s primjenama u fizici</i>, Sarajevo Publishing, Sarajevo 2003. 2. W. Fulton and J. Harris, <i>Representation Theory, A first Course</i>, Springer Science & Business Media, 1991. 3. A. W. Knap, <i>Representation theory of Semisimple Groups, An overview based on examples</i>, Princeton University Press, Princeton, New Jersey, 1986. 							
STUDENT WORKLOAD (hours in a semester)							
Lectures	45	Exercises	30	Individual work	100	T o t a l	175
GRADING				REMARKS			
Criterion	Maximum points	Minimum points					
Midterm exams	100	55					
Final exam	100	55					
T o t a l	100	55					

