

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babes-Bolyai University
1.2 Faculty	Faculty of Mathematics and Computer Science
1.3 Department	Department of Mathematics
1.4 Field of study	Mathematics
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Mathematics-Computer Science

2. Information regarding the discipline

2.1 Name of the discipline		Algebra 2 (Basic Algebraic Structures)					
2.2 Course coordinator		Assistant Professor PhD. Cosmin Pelea					
2.3 Seminar coordinator		Assistant Professor PhD. Cosmin Pelea					
2.4. Year of study	1	2.5 Semester	2	2.6. Type of evaluation	E	2.7 Type of discipline	Compulsory

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					28
Additional documentation (in libraries, on electronic platforms, field documentation)					20
Preparation for seminars/labs, homework, papers, portfolios and essays					28
Tutorship					14
Evaluations					4
Other activities:					-
3.7 Total individual study hours	94				
3.8 Total hours per semester	150				
3.9 Number of ECTS credits	6				

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	

5. Conditions (if necessary)

5.1. for the course	
5.2. for the seminar /lab activities	

6. Specific competencies acquired

Professional competencies	<p>C1.1 Identifying the notions, describing the theories and using the specific language</p> <p>C2.3 Applying the adequate analytical theoretical methods to a given problem.</p>
Transversal competencies	<p>CT1. Applying some rules of precise and efficient work, showing a responsible attitude regarding the the scientific domain and teaching training for an optimal and creative development of the personal potential in specific situations, respecting the deontological norms.</p>

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	<ul style="list-style-type: none"> To introduce some basic notion and results regarding algebraic structures.
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> To introduce some basics of group theory and ring theory.

8. Content

8.1 Course	Teaching methods	Remarks
1. Groups. Homomorphisms	<ul style="list-style-type: none"> Interactive exposure Explanation Conversation Didactical demonstration 	
2. Subgroups. Generated subgroup	<ul style="list-style-type: none"> Interactive exposure Explanation Conversation Didactical demonstration 	
3. Cyclic groups, the order of an element	<ul style="list-style-type: none"> Interactive exposure Explanation Conversation Didactical demonstration 	
4. The equivalence relations induced by a subgroup. Lagrange Theorem	<ul style="list-style-type: none"> Interactive exposure Explanation Conversation Didactical demonstration 	
5. Normal subgroups. Factor group	<ul style="list-style-type: none"> Interactive exposure Explanation Conversation Didactical demonstration 	
6. Isomorphism theorems for groups	<ul style="list-style-type: none"> Interactive exposure Explanation Conversation Didactical demonstration 	
7. Symmetric groups	<ul style="list-style-type: none"> Interactive exposure Explanation 	

	<ul style="list-style-type: none"> • Conversation • Didactical demonstration 	
8. Conjugacy class equation	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
9. Test	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
10. Rings and fields	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
11. Subrings and subfields. Homomorphisms	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
12. Ideals	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
13. The quotient ring of integers modulo n	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
14. Rings of polynomials	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
Bibliography 1. I.D. ION, N. RADU, Algebra (ed.4), Editura Didactica si Pedagogica, 1990. 2. S. CRIVEI, Basic Abstract Algebra, Ed. Casa Cartii de Stiinta, Cluj-Napoca, 2002, 2003. 3. I. PURDEA, I. POP, Algebra, Editura GIL, Zalau, 2003. 4. J. ROTMAN, Advanced Modern Algebra, Prentice Hall, New Jersey, 2002.		
8.2 Seminar / laboratory	Teaching methods	Remarks
1. The basic structures of number sets	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
2. Groups. The table of a finite group	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
3. Homomorphisms	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	

4. Subgroups	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
5. Cyclic groups, the order of an element	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
6. Normal subgroups. Factor group	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
7. Isomorphism theorems for groups	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
8. Symmetric groups	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
9. Conjugacy class equation	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
10. Rings and fields	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
11. Subrings and subfields. Homomorphisms	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
12. Ideals	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
13. The quotient ring of integers modulo n	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
14. Rings of polynomials	<ul style="list-style-type: none"> • Interactive exposure • Explanation • Conversation • Didactical demonstration 	
<p>Bibliography</p> <p>1. G. CALUGAREANU, P. HAMBURG, Exercises in basic ring theory, Kluwer, Dordrecht, 1998.</p> <p>2. I.D. ION, C. NITA, D. POPESCU, N. RADU: Probleme de algebra, Editura Didactica si Pedagogica, Bucuresti, 1981.</p> <p>3. I. PURDEA, C. PELEA, Probleme de algebra, EIKON, Cluj-Napoca, 2008.</p>		

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The course presents notions which often appear in other undergraduate courses.
- The course offers a sufficiently general background for some highschool algebra topics and the opportunity to develop some problem solving skills useful for further teaching activities.

10. Evaluation

10.4 Course	Knowledge of basic concepts	Tests	25%
	Knowledge of basic results	Final exam.	25%
10.5 Seminar/laborator	Examples and problem solving	Final exam.	50%
10.6 Minimum performance standards			
The final grade must be at least 5.			

Date

3.05.2017

Signature of course coordinator

Assist. Prof. PhD. Cosmin Pelea

Signature of seminar coordinator

Assist. Prof. PhD. Cosmin Pelea

Date of approval

Signature of the head of department

Prof.PhD. Octavian AGRATINI