SYLLABUS

1. Information regarding the programme

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

2. Information regarding the discipline

2.1 Name of the discipline		Algebra 2 (Basic Algebraic Structures)					
2.2 Course coordinator		**Prof. PhD. Septimiu Crivei**					
2.3 Seminar coordinator		**Prof. PhD. Septimiu Crivei**					
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	C1.1 Idetifying the notions, describing the theories and using the specific language C2.3 Applying the adequate analytical theoretical methods to a given problem.
Transversal competencies	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.

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

7.1 General objective of the discipline	• To introduce some basic notion and results regarding algebraic structures.
7.2 Specific objective of the discipline	• To introduce some basics of group theory and ring theory.

8. Content

8.1 Course	Teaching methods	Remarks
1. Groups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
2. Subgroups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
3. Generated subgroup. Subgroup lattice	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
4. Group homomorphisms	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
5. Cyclic groups. Order of an element	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
6. Equivalence relations induced by a subgroup	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
7. Normal subgroups. Factor group	• Interactive exposure • Explanation	

	• Conversation • Didactical demonstration	
8. Isomorphism theorems for groups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
9. Permutation groups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
10. Rings and fields	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
11. Subrings and subfields. Homomorphisms	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
12. Ideals. Factor ring	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
13. Special rings	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
14. Rings of polynomials	• 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. W.J. GILBERT, W.K. NICHOLSON, Modern Algebra with Applications, John Wiley, 2004.

4. I. PURDEA, I. POP, Algebra, Editura GIL, Zalau, 2003.

5. J. ROTMAN, Advanced Modern Algebra, Prentice Hall, New Jersey, 2002.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Groups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
2. Subgroups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
3. Generated subgroup. Subgroup lattice	• Interactive exposure • Explanation • Conversation	

	• Didactical demonstration	
4. Group homomorphisms	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
5. Cyclic groups. Order of an element	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
6. Equivalence relations induced by a subgroup	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
7. Normal subgroups. Factor group	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
8. Isomorphism theorems for groups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
9. Permutation groups	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
10. Rings and fields	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
11. Subrings and subfields. Homomorphisms	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
12. Ideals. Factor ring	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
13. Special rings	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
14. Rings of polynomials	• Interactive exposure • Explanation • Conversation • Didactical demonstration	

Bibliography

1. G. CALUGAREANU, P. HAMBURG, Exercises in basic ring theory, Kluwer, Dordrecht, 1998.

2. I.D. ION, C. NITA, D. POPESCU, N. RADU, Probleme de algebra, Editura Didactica si Pedagogica, Bucuresti, 1981.

3. I. PURDEA, C. PELEA, Probleme de algebra, EIKON, Cluj-Napoca, 2008.

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	Test	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	Signature of course coordinator	Signature of seminar coordinator
30.04.2019	Prof. PhD. Septimiu Crivei	Prof. PhD. Septimiu Crivei

Date of approval

Signature of the head of department

Prof.PhD. Octavian AGRATINI