SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**Babeş-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	**Master**
1.6 Study programme / Qualification	**Advanced Mathematics**

2. Information regarding the discipline

2.1 Name of the discipline			**Category theory**			
2.2 Course coordinator			**Prof.PhD. Septimiu Crivei**			
2.3 Seminar coordinator			**Prof.PhD. Septimiu Crivei**			
2.4. Year of study	**2**	2.5 Semester	**2**	2.6. Type of evaluation	**C**	2.7 Type of discipline	**Optional**

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

3.1 Hours per week	3	Of which: 3.2 course	2	3.3 seminar/laboratory	1
3.4 Total hours in the curriculum	36	Of which: 3.5 course	24	3.6 seminar/laboratory	12

Time allotment:	hours
Learning using manual, course support, bibliography, course notes	36
Additional documentation (in libraries, on electronic platforms, field documentation)	36
Preparation for seminars/labs, homework, papers, portfolios and essays	68
Tutorship	12
Evaluations	12
Other activities:	

3.7 Total individual study hours	164
3.8 Total hours per semester	200
3.9 Number of ECTS credits	8

4. Prerequisites (if necessary)

4.1. curriculum	• Algebraic structures
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	• Ability to operate with abstract concepts. • Ability to apply the acquired knowledge to subdomains of mathematics.
Transversal competencies	• Development of abstract thinking. • Ability to perform research.

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

7.1 General objective of the discipline	• To acquire the basic knowledge on category theory.
7.2 Specific objective of the discipline	• To acquire specific working techniques.

8. Content

8.1 Course	Teaching methods	Remarks
1. Categories - definition and examples	Exposition, proof, examples	
2. Special objects and morphisms	Exposition, proof, examples	
3. Products and coproducts	Exposition, proof, examples	
4. Pullbacks and pushouts	Exposition, proof, examples	
5. Limits and colimits	Exposition, proof, examples	
6. Generators and cogenerators	Exposition, proof, examples	
7. Abelian categories	Exposition, proof, examples	
8. Adjoint functors	Exposition, proof, examples	
9. Equivalence of categories	Exposition, proof, examples	
10. Grothendieck categories	Exposition, proof, examples	
11. Functor categories	Exposition, proof, examples	
12. Exact categories	Exposition, proof, examples	

Bibliography
1. S. Awodey, *Category theory*, Oxford University Press, 2010.
2. S. Mac Lane, *Categories for the working mathematician*, Springer, 1998.
3. B. Mitchell, *Theory of categories*, Academic Press, New York, London, 1965.
4. C. Nastasescu, *Inele, module, categorii* (in Romanian), Editura Academiei, Bucuresti, 1976.
5. I. Purdea, *Tratat de algebra moderna*, vol. II (in Romanian), Editura Academiei, Bucuresti, 1982.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Categories - definition and examples	Explanation, problematization, examples	
2. Special objects and morphisms	Explanation, problematization, examples	
3. Products and coproducts	Explanation, problematization, examples	
4. Pullbacks and pushouts	Explanation, problematization, examples	
5. Limits and colimits	Explanation, problematization, examples	
6. Generators and cogenerators	Explanation, problematization, examples	
7. Abelian categories	Explanation, problematization, examples	

8. Adjoint functors	Explanation, problematization, examples	
9. Equivalence of categories	Explanation, problematization, examples	
10. Grothendieck categories	Explanation, problematization, examples	
11. Functor categories	Explanation, problematization, examples	
12. Exact categories	Explanation, problematization, examples	

Bibliography
1. S. Awodey, *Category theory*, Oxford University Press, 2010.
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5. I. Purdea, *Tratat de algebra moderna*, vol. II (in Romanian), Editura Academiei, Bucuresti, 1982.

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 contents is directed towards theory and applications of categories. The topic is present in many master programs from other universities.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Use of basic concepts, examples	Test, project.	25
10.5 Seminar/lab activities	Problem solving	Presentation, assignments.	75
10.6 Minimum performance standards			
➢ Grade 5			

Date	Signature of course coordinator	Signature of seminar coordinator
30.04.2016	Prof.PhD. Septimiu CRIVEI	Prof.PhD. Septimiu CRIVEI

Date of approval   Signature of the head of department

Prof.PhD. Octavian AGRATINI