



## COURSE PROGRAMME

### 1. Information about the programme

1.1 University	University "Alexandru Ioan Cuza" of Iasi
1.2 Faculty	Faculty of Mathematics
1.3 Department	Department of Mathematics
1.4 Domain	Mathematics
1.5 Cycle	Masters
1.6 Programme / Qualification	Applied Mathematics

### 2. Information about the course

2.1 Course Name	Algebraic foundations of computer science						
2.2 Course taught by	Assoc. Prof. PhD. VIOREL MIHAI GONTINEAC						
2.3 Seminary / laboratory taught by	Assoc. Prof. PhD. VIOREL MIHAI GONTINEAC						
2.4 Year	I	2.5 Semester	II	2.6 Type of evaluation*	E	2.7 Course type**	Op

\*E - Exam / C - Colloquium / V - Verification

\*\*OB - Obligatory / OP - Optionally / F - Facultative

### 3. Total hours (estimated per semester and activities)

3.1 Number of hours per week	4	3.2 course	2	3.3 seminary/ laboratory	2
3.4 Total number of hours	56	3.5 course	28	3.6 seminary/ laboratory	28
Distribution					hours
Individual study using textbooks, course notes, bibliography items, etc.					60
Supplementary study (library, on-line platforms, etc.)					20
Individual study for seminary/laboratory, homeworks, projects, etc.					35
Tutoring					0
Examination					4
Other activities					0
3.7 Total hours of individual activity*					119
3.8 Total hours per semester					175
3.9 Credit points					7

### 4. Pre-requisites - Curriculum (if necessary)

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### 5. Conditions (if necessary)

5.1 Course	
5.2 Seminary / Laboratory	

## 6. Objectives

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## 7. Specific competencies/Learning outcomes

- writes scientific papers, academic work, and technical documentation
- promotes knowledge transfer
- carries out interdisciplinary research activities
- uses computer-aided software engineering tools
- thinks abstractly

## 8. Contents

8.1 Course	Teaching methods	Remarks (number of hours, references)
1. Introduction	Interactive blackboard or online whiteboard presentation	2 ore
Category	Interactive blackboard or online whiteboard presentation	4ore
Special objects and morphisms	Interactive blackboard or online whiteboard presentation	2 ore
Limits and colimits	Interactive blackboard or online whiteboard presentation	4ore
Functors	Interactive blackboard or online whiteboard presentation	2 ore
Natural transformations 1	Interactive blackboard or online whiteboard presentation	2 ore
Natural transformations 2	Interactive blackboard or online whiteboard presentation	2 ore
Adjoint functors	Interactive blackboard or online whiteboard presentation	2 ore
9. (Co)Algebra of a functor Interactive blackboard or online whiteboard presentation	Interactive blackboard or online whiteboard presentation	4 ore
Monads 1	Interactive blackboard or online whiteboard presentation	2 ore
Monads 2	Interactive blackboard or online whiteboard presentation	2 ore
Closed Cartesian Categories	Interactive blackboard or online whiteboard presentation	2 ore
Monoidal Categories	Interactive blackboard or online whiteboard presentation	2 ore
	Interactive blackboard or online whiteboard presentation	

## Bibliography

Main references:

M. Barr, C. Wells, Category Theory Lecture Notes for ESSLLI, 1999

B.C.Pierce, Basic Category Theory for Computer Scientists, M.I.T. Press, 1991

G. Radu, Teoria Categoriilor, Ed. Junimea, Iași

Other references:

A. Asperti, G.Longo, Categories Types and Structures, M.I.T. Press, 1991

J.L. Fiadeiro, Categories for Software Engineering, Springer Verlag, 2004

G.Gierz, ș.a., Continuous Lattices and Domains, Cambridge Univ. press, 2003

G. Winskel, Lecture Notes in Category Theory, BRICS Lecture Series, 2002

<b>8.2 Seminary / Laboratory</b>	<b>Teaching methods</b>	<b>Remarks</b> (number of hours, references)
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<b>Bibliography</b>
<p>Main references:</p> <p>M. Barr, C. Wells, Category Theory Lecture Notes for ESSLLI, 1999  B.C.Pierce, Basic Category Theory for Computer Scientists, M.I.T. Press, 1991  G. Radu, Teoria Categoriilor, Ed. Junimea, Iași</p> <p>Other references:</p> <p>A. Asperti, G.Longo, Categories Types and Structures, M.I.T. Press, 1991  J.L. Fiadeiro, Categories for Software Engineering, Springer Verlag, 2004  G.Gierz, ș.a., Continuous Lattices and Domains, Cambridge Univ. press, 2003  G. Winskel, Lecture Notes in Category Theory, BRICS Lecture Series, 2002</p>

## 9. Coordination of the contents with the expectations of the community representatives, professional associations and relevant employers in the corresponding domain

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## 10. Assessment and examination

10.1 Continuous assessment		Percentage (min. 30%)		50
Course	Assessment type			Mixed assessment
	Percentage			50
	Failure to pass the continuous assessment results in failure to pass the final assessment			No
	Assessment methods	Details	Percentage	with reexamination
		Project	25	Yes
		Homework	75	Yes
Seminary / Laboratory	Assessment type			Mixed assessment
	Percentage			50
	Failure to pass the continuous assessment results in failure to pass the final assessment			No
	Assessment methods	Details	Percentage	with reexamination
		Case study	25	Yes
		Essay	75	Yes

<b>10.2 Final assessment</b>	Percentage (max. 70%)	50
	Assessment type	Final written assessment

<b>10.3 Special notes (special situations is assessment)</b>

<b>10.4 Minimum performance standard</b>	

<b>Date,</b>	<b>Course coordinator,</b>	<b>Seminary coordinator,</b>
	<b>Assoc. Prof. PhD. VIOREL MIHAI GONTINEAC</b>	<b>Assoc. Prof. PhD. VIOREL MIHAI GONTINEAC</b>

<b>Aproval date in the department,</b>	<b>Head of the departament,</b>
	<b>Prof. PhD. IONEL DUMITREL GHIBA</b>