SYLLABUS

1. Information regarding the programme

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

2. Information regarding the discipline

2.1 Name of the discipline							
2.2 Course coordinator		Militon FRENTIU					
2.3 Seminar coordinator		Militon FRENTIU					
2.4. Year of study	**1**	2.5 Semester	**1**	2.6. Type of evaluation	**ex**	2.7 Type of discipline	

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	42	Of which: 3.5 course	28	3.6 seminar/laboratory	14
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					28
Additional documentation (in libraries, on electronic platforms, field documentation)					14
Preparation for seminars/labs, homework, papers, portfolios and essays					14
Tutorship					14
Evaluations					4
Other activities:					2

3.7 Total individual study hours	70
3.8 Total hours per semester	118
3.9 Number of ECTS credits	

4. Prerequisites (if necessary)

4.1. curriculum	•
4.2. competencies	•

5. Conditions (if necessary)

5.1. for the course	• course attendance
5.2. for the seminar /lab activities	• Individual work

6. Specific competencies acquired

Professional competencies	To introduce the students to the formal techniques needed in the development of systems. To have an understanding of both the theory and practice of formal mathematical thinking in software specification, verification and development. To be able to perform formal analysis and to reason about designs and developments. To obtain the ability to analyse the correctness of algorithms, and to measure the qualities of programs.
Transversal competencies	

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

7.1 General objective of the discipline	• To introduce the students to the formal techniques needed in the development of systems. To have an understanding of both the theory and practice of formal mathematical thinking in software specification, verification and development.
7.2 Specific objective of the discipline	• To be able to perform formal analysis and to reason about designs and developments. To obtain the ability to analyse the correctness of algorithms, and to measure the qualities of programs.

8. Content

8.1 Course	Teaching methods	Remarks
1. What are Formal Methods? Myths. Applications.	exposition	
2. Formal Specification	Exposition	
3. Derivation of correct program from specifications	Exposition	
4. Introduction to Z language	Exposition	
5. Schema operators	Exposition	
6. Promotion	Exposition	
7. Refinement calculus	Exposition	
8. Formal Verification	Exposition	
9. Formal Methods and program testing	Exposition	
10. Industrial use of Formal Methods	Exposition	
11. Model Checking: Kripke Transition Systems	Exposition	
12. Model Checking: Temporal Logic: LTL and CTl	Exposition	
13. Model Checking Tools	Exposition	
14. Model Checking in practice	exposition	

Bibliography

MORGAN C., Programming from Specifications, Prentice Hall, 1990.

WOODCOCK,J., J. DAVIES, Uzing Z. Specification, Refinement and Proof, Prentice-Hall, 1996

Spivey, J., The Z Notation: A Reference Manual, Prentice Hall International Series in Computer Science, 1992.

Internet articles

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Levels of Formal Methods	conversation	

2. Formal derivation of programs	Conversation	
3. Formal specification	Conversation	
4. Z schemas	Conversation	
5. Project one presentation	Conversation	
6. Project two presentation	Conversation	
7. Consequences in practice	conversation	
Bibliography Internet papers		

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

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10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	a final written examination covering both theory and practice	Marks for answers	50%
10.5 Seminar/lab activities	the activity during the term reflected in two projects	Two marks for projects	50%
10.6 Minimum performance standards			
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Date

17 september .2012

Signature of course coordinator

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Signature of seminar coordinator

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Date of approval

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Signature of the head of department

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