1. Information regarding the program

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

2. Information regarding the discipline

2.1 Name of the discipline	**Domain Specific Languages (DSLs)**					
2.2 Course coordinator		**conf. dr. Dan CHIOREAN**				
2.3 Seminar coordinator		**conf. dr. Dan CHIOREAN**				
2.4. Year of study	**2**	2.5 Semester	**4**	2.6. Type of evaluation	**E**	2.7 Type of discipline	**Opt**

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	1/1
3.4 Total hours in the curriculum	48	Of which: 3.5 course	24	3.6 seminar/laboratory	12/12

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	28
Tutorship	10
Evaluations	20
Other activities:	-

3.7 Total individual study hours	102
3.8 Total hours per semester	150
3.9 Number of ECTS credits	8

4. Prerequisites (if necessary)

4.1. curriculum	OOP, Functional Programming, Compiler Theory courses
4.2. competencies	Experience in object oriented programming as well as basic knowledge about functional programming and modeling.

5. Conditions (if necessary)

5.1. for the course	beamer
5.2. for the seminar /lab activities	Laboratory with EMF and MPS

6. Specific competencies acquired

Professional competencies	• C2.1 A solid overview of the state of the art of DSLs. • C2.3 Understanding and using the most used DSLs tools workbench • C2.2 Understanding similarities and differences between internal and external DSLs • C2.5 Abilities to design, implement and use DSLs in Software Engineering.
Transversal competencies	• CT1 Understanding both the advantages and the price to pay when using DSLs compared with classical methods of designing, implementing and testing software • CT3 Acquiring concepts, techniques and technologies supporting specialists in managing the rapidly changing of requirements and technologies

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

7.1 General objective of the discipline	• Convincing students that between modeling and programming the similarities are more numerous than the differences • Teaching students the modern modeling techniques
7.2 Specific objective of the discipline	• Learning students about designing, specifying, testing and using DSLs in different domains • Presenting and working with the best DSL language workbenches

8. Content

8.1 Course	Teaching methods	Remarks
• **Introduction to DSLs**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Conceptual Foundations**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Design Dimensions**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Fundamental Paradigms & Process Issues**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	

• **Concrete and Abstract Syntax**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Scoping and Linking**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Constraints**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Type Systems**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Transformation and Generation**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Building Interpreters**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **IDE Services**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
• **Testing DSLs**	• Interactive exposure • Explanation • Conversation • Didactical demonstration	

Bibliography

Markus Voelter - DSL Engineering - Designing, Implementing and Using Domain-Specific Languages
http://www.dslbook.org

Martin Fowler - Domain Specific Languages - Addison-Wesley 2011

Jack Greenfield, Keith Short, Steve Cook, Stuart Kent, John Crupi - Software Factories: Assembling Applications with Patterns, Models, Frameworks, and Tools - Wiley Publishing 2004

Tony Clark, Paul Sammut, James Willans - APPLIED METAMODELLING A FOUNDATION FOR LANGUAGE DRIVEN DEVELOPMENT, SECOND EDITION - Ceteva Copyright - 2008

8.2 Seminar / laboratory	Teaching methods	Remarks
• **The MPS editor overview** • **The entities of the language**	Explanation, Dialogue, debate, case studies, examples, proofs	The seminar is structured as 2 hours classes at each two weeks period
• **Language Combination with the UI Language** • **Language Extension with Expression Blocks**	Explanation, Dialogue, debate, case studies, examples, proofs	
• **Language Reuse with the persistence Languages** • **Language reuse with the RBAC Languages**	Explanation, Dialogue, debate, case studies, examples, proofs	
• **Language Embedding with the UI Validations/Expression Languages** • **MPS Annotations**	Explanation, Dialogue, debate, case studies, examples, proofs	
• **Integration with EMF and Other EMF Editors**	Explanation, Dialogue, debate, case studies, examples, proofs	
• **Creating projects with Xtext**	Explanation, Dialogue, debate, case studies, examples, proofs	

Bibliography

MPS; Documents and Live Demos – online at:
http://www.jetbrains.com/mps/documentation/index.html#MPS_Use_Cases_and_Other_Related_Reading

Xtext 2.5 Documentation – online at:
http://www.eclipse.org/Xtext/documentation/2.5.0/Xtext%20Documentation.pdf

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 respects the IEEE and ACM Curricula Recommendations for Computer Science Studies;
- ☐ The course exists in the studying program of all major universities in Romania and abroad;
- ☐ The content of the course contains knowledge mandatory for any IT specialist working in a software company

10. Evaluation

Type of activity	10.1 Evaluation Criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	• know the basic concepts of DSLs • understand the true relationship between modeling and programming • knowledge of designing, specifying, testing and using DLSs	Written exam	30%

10.5 Seminar/lab & project activities	• be able to understand and extend the examples realized by tools makers, to design, specify test and use a DSL	Practical examination and continuous observation	70%

Date   Signature of course coordinator   Signature of seminar coordinator

04/05/2014   Conf. Dr. Dan CHIOREAN   Conf. Dr. Dan CHIOREAN

Date of approval   Signature of the head of department

                                                              Prof. Dr. Bazil PARV