

## SYLLABUS

### 1. Information regarding the program

1.1 Higher education institution	<b>Babes Bolyai University</b>
1.2 Faculty	<b>Faculty of Mathematics and Computer Science</b>
1.3 Department	<b>Department of Computer Science</b>
1.4 Field of study	<b>Computer Science</b>
1.5 Study cycle	<b>Master</b>
1.6 Study program/ Qualification	<b>Component Based Programming</b>

### 2. Information regarding the discipline

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

### 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	<b>OOP, Functional Programming, Compiler Theory courses</b>
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

<b>Professional competencies</b>	<ul style="list-style-type: none"> <li>• C2.1 A solid overview of the state of the art of DSLs.</li> <li>• C2.3 Understanding and using the most used DSLs tools workbench</li> <li>• C2.2 Understanding similarities and differences between internal and external DSLs</li> <li>• C2.5 Abilities to design, implement and use DSLs in Software Engineering.</li> </ul>
<b>Transversal competencies</b>	<ul style="list-style-type: none"> <li>• CT1 Understanding both the advantages and the price to pay when using DSLs compared with classical methods of designing, implementing and testing software</li> <li>• CT3 Acquiring concepts, techniques and technologies supporting specialists in managing the rapidly changing of requirements and technologies</li> </ul>

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

7.1 General objective of the discipline	<ul style="list-style-type: none"> <li>• Convincing students that between modeling and programming the similarities are more numerous than the differences</li> <li>• Teaching students the modern modeling techniques</li> </ul>
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> <li>• Learning students about designing, specifying, testing and using DSLs in different domains</li> <li>• Presenting and working with the best DSL language workbenches</li> </ul>

## 8. Content

8.1 Course	Teaching methods	Remarks
<ul style="list-style-type: none"> <li>• <b>Introduction to DSLs</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Conceptual Foundations</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Design Dimensions</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Fundamental Paradigms &amp; Process Issues</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	

<ul style="list-style-type: none"> <li>• <b>Concrete and Abstract Syntax</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Scoping and Linking</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Constraints</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Type Systems</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Transformation and Generation</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Building Interpreters</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>IDE Services</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Testing DSLs</b></li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	

## **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
<ul style="list-style-type: none"> <li>• The MPS editor overview</li> <li>• The entities of the language</li> </ul>	Explanation, Dialogue, debate, case studies, examples, proofs	The seminar is structured as 2 hours classes at each two weeks period
<ul style="list-style-type: none"> <li>• Language Combination with the UI Language</li> <li>• Language Extension with Expression Blocks</li> </ul>	Explanation, Dialogue, debate, case studies, examples, proofs	
<ul style="list-style-type: none"> <li>• Language Reuse with the persistence Languages</li> <li>• Language reuse with the RBAC Languages</li> </ul>	Explanation, Dialogue, debate, case studies, examples, proofs	
<ul style="list-style-type: none"> <li>• Language Embedding with the UI Validations/Expression Languages</li> <li>• MPS Annotations</li> </ul>	Explanation, Dialogue, debate, case studies, examples, proofs	
<ul style="list-style-type: none"> <li>• Integration with EMF and Other EMF Editors</li> </ul>	Explanation, Dialogue, debate, case studies, examples, proofs	
<ul style="list-style-type: none"> <li>• Creating projects with Xtext</li> </ul>	Explanation, Dialogue, debate, case studies, examples, proofs	
<b>Bibliography</b>  MPS; Documents and Live Demos – online at: <a href="http://www.jetbrains.com/mps/documentation/index.html#MPS_Use_Cases_and_Other_Related_Reading">http://www.jetbrains.com/mps/documentation/index.html#MPS Use Cases and Other Related Reading</a>  Xtext 2.5 Documentation – online at: <a href="http://www.eclipse.org/Xtext/documentation/2.5.0/Xtext%20Documentation.pdf">http://www.eclipse.org/Xtext/documentation/2.5.0/Xtext%20Documentation.pdf</a>		

**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**

<ul style="list-style-type: none"> <li>• The course respects the IEEE and ACM Curricula Recommendations for Computer Science Studies;</li> <li>• The course exists in the studying program of all major universities in Romania and abroad;</li> <li>• The content of the course contains knowledge mandatory for any IT specialist working in a software company</li> </ul>
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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	<ul style="list-style-type: none"> <li>• know the basic concepts of DSLs</li> <li>• understand the true relationship between modeling and programming</li> <li>• knowledge of designing, specifying, testing and using DLSs</li> </ul>	Written exam	30%
10.5 Seminar/lab &	<ul style="list-style-type: none"> <li>• be able to understand</li> </ul>	Practical examination and	70%

project activities	and extend the examples realized by tools makers, to design, specify test and use a DSL	continuous observation	
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Date

11/05/2014

Signature of course coordinator

Conf. Dr. Dan CHIOREAN

Signature of seminar coordinator

Conf. Dr. Dan CHIOREAN

Date of approval

Signature of the head of department

Prof. Dr. Bazil PARV