

## SYLLABUS

### 1. Information regarding the programme

1.1 Higher education institution	<b>Babeş 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 programme / Qualification	<b>Component-based Programming</b>

### 2. Information regarding the discipline

2.1 Name of the discipline	<b>Programming paradigms</b>						
2.2 Course coordinator	<b>Prof.PhD. Bazil Parv</b>						
2.3 Seminar coordinator	<b>Prof.PhD. Bazil Parv</b>						
2.4. Year of study	<b>1</b>	2.5 Semester	<b>1</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	<b>3</b>	Of which: 3.2 course	<b>2</b>	3.3 seminar/laboratory	<b>1</b>	
3.4 Total hours in the curriculum	<b>42</b>	Of which: 3.5 course	<b>28</b>	3.6 seminar/laboratory	<b>14</b>	
Time allotment:						Hours
Learning using manual, course support, bibliography, course notes						<b>30</b>
Additional documentation (in libraries, on electronic platforms, field documentation)						<b>30</b>
Preparation for seminars/labs, homework, papers, portfolios and essays						<b>70</b>
Tutorship						<b>14</b>
Evaluations						<b>14</b>
Other activities: .....						-
3.7 Total individual study hours			<b>158</b>			
3.8 Total hours per semester			<b>200</b>			
3.9 Number of ECTS credits			<b>8</b>			

### 4. Prerequisites (if necessary)

4.1. curriculum	<ul style="list-style-type: none"> <li>• Fundamentals of Programming</li> <li>• Object-Oriented Programming</li> <li>• Functional and Logic Programming</li> </ul>
4.2. competencies	<ul style="list-style-type: none"> <li>• Average programming skills</li> </ul>

### 5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none"> <li>• Videoprojector, Internet access</li> </ul>
5.2. for the seminar /lab activities	<ul style="list-style-type: none"> <li>• Computers, Internet access, UML tool</li> </ul>

## 6. Specific competencies acquired

<b>Professional competencies</b>	<ul style="list-style-type: none"> <li>• Understanding and working with basic concepts in computer programming;</li> <li>• Capability of analysis and synthesis;</li> <li>• Proficient use of tools and languages specific to software systems development;</li> <li>• Knowing the specifics of main programming paradigms.</li> </ul>
<b>Transversal competencies</b>	<ul style="list-style-type: none"> <li>• Professional communication skills; concise and precise description, both oral and written, of professional results;</li> <li>• Independent work capabilities; able to fulfill different roles;</li> <li>• Antepreneurial skills.</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>• Know and understand fundamental concepts of programming.</li> <li>• Be able to apply different programming paradigms to different programming projects</li> </ul>
7.2 Specific objective of the discipline	<p>At the end of the course, students should</p> <ul style="list-style-type: none"> <li>• know the main features of different programming paradigms: procedural, object-oriented, concurrent, functional, logical, event-based, scripting</li> <li>• have a good understanding of the following concepts: value, type, variable, binding, procedural abstraction, data abstraction, object, class, component, interface, polymorphism;</li> <li>• learn the similarities and differences between different programming paradigms in terms of the concepts they implement</li> </ul>

## 8. Content

8.1 Course	Teaching methods	Remarks
1. <i>Programming paradigms</i> . Definitions. Main programming paradigms. Programming styles. Evolution of programming languages	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
2. <i>Basic concepts 1</i> . Values and types. Variables and storage	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
3. <i>Basic concepts 2</i> . Bindings and scope. Control flow	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
4. <i>Advanced concepts 1</i> . Type systems. Composite types	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
5. <i>Advanced concepts 2</i> . Subroutines and control abstraction (procedural abstraction)	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
6. <i>Advanced concepts 3</i> . Data abstraction and object orientation. Generic abstraction	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
7. <i>Advanced concepts 4</i> . Errors and events. Concurrency	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> </ul>	

	<ul style="list-style-type: none"> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
8. <i>Paradigms 1. Imperative programming</i>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
9. <i>Paradigms 2. Object-oriented programming</i>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
10. <i>Paradigms 3. Concurrent programming</i>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
11. <i>Paradigms 4. Functional programming</i>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
12. <i>Paradigms 5. Logic programming</i>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
13. <i>Paradigms 6. Event-driven programming</i>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Conversation</li> </ul>	
14. <i>Paradigms 7. Scripting</i>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	

### Bibliography

1. SCOTT, MICHAEL L.: *Programming Language Pragmatics*, 4<sup>th</sup> ed, Morgan-Kaufmann, 2016
2. SEBESTA, ROBERT W.: *Concepts of Programming Languages*, 10<sup>th</sup> ed, Pearson Education, 2012
3. SZYPERSKI, CLEMENS: *Component Software. Beyond Object-Oriented Programming*, Addison-Wesley (1st ed. 1998, 2<sup>nd</sup> ed. 2002 with GRUNTZ, DOMINIK and MURER, STEFAN).
4. STROUSTRUP, BJARNE: *The C++ Programming Language Special Edition*, Addison-Wesley, 2000 chapter 2
5. VAN ROY, PETER; HARIDI, SEIF: *Concepts, Techniques and Models of Computer Programming*, MIT Press, 2004
6. WATT, David A.: *Programming Language Design Concepts*, Wiley, 2004
7. WEGNER, PETER: Concepts and paradigms of OOP, OOPSLA '89 Keynote talk

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Establishing the paper title	Conversation, debate, case studies, presentations	Seminar is organized as a total of 14 hours – 2 hours every other week
2. Establish the project title	Conversation, debate, case studies, examples	
3. Paper presentations & project progress reports	Exposure, debate, case studies, examples	
4. Paper presentation & project progress reports	Exposure, debate, case studies, examples	
5. Paper presentations & project progress reports	Exposure, debate, case studies, examples	
6. Paper presentations & project progress reports	Exposure, debate, case studies, examples	
7. Project presentation	Exposure, live demos	

### Bibliography

- Students will search and use programming paradigms documentation
- on the department server (win/labor/Romana/master/PP)

- on the web, using main CS databases
- The ELISA project <http://jklunder.home.xs4all.nl>

**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**

- This course follows the IEEE and ACM Curricula Recommendations for Software Engineering studies;
- Courses with similar content are taught in the major universities in Romania offering similar study programs;
- Course content is considered very important by the software companies for improving average software development skills

**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>• knowing the basic concepts of programming</li> <li>• applying different paradigms to different problem domains</li> </ul>	Written exam	40%
10.5 Seminar/lab activities	<ul style="list-style-type: none"> <li>• be able to study and review literature regarding programming paradigms</li> <li>• be able to solve a problem using different paradigms</li> </ul>	<ul style="list-style-type: none"> <li>• Paper work</li> <li>• Project work</li> <li>• Seminar/lab attendance</li> <li>• Default</li> </ul>	20% 20% 10% 10%
10.6 Minimum performance standards			
<ul style="list-style-type: none"> <li>• At least grade 5 (from a scale of 1 to 10) at written exam, paper and project work.</li> </ul>			

Date

April 29, 2016

Date of approval

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Signature of course coordinator

Prof.PhD. Bazil PARV

Signature of seminar coordinator

Prof.PhD. Bazil PARV

Signature of the head of department

Prof.PhD. Anca ANDREICA