

## SYLLABUS

### 1. Information regarding the programme

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 programme / Qualification	<b>Distributed Systems in Internet</b>

### 2. Information regarding the discipline

2.1 Name of the discipline	<b>Advanced topics in software testing</b>						
2.2 Course coordinator	<b>PhD Associate Professor Vescan Andreea</b>						
2.3 Seminar coordinator	<b>PhD Associate Professor Vescan Andreea</b>						
2.4. Year of study	<b>2</b>	2.5 Semester	<b>3</b>	2.6. Type of evaluation	<b>E</b>	2.7 Type of discipline	<b>optional</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	2	
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28	
Time allotment:						hours
Learning using manual, course support, bibliography, course notes						84
Additional documentation (in libraries, on electronic platforms, field documentation)						14
Preparation for seminars/labs, homework, papers, portfolios and essays						14
Tutorship						3
Evaluations						4
Other activities: .....						-
3.7 Total individual study hours			119			
3.8 Total hours per semester			175			
3.9 Number of ECTS credits			7			

### 4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	Java programming skills

### 5. Conditions (if necessary)

5.1. for the course	Video projector, Internet access
5.2. for the seminar /lab activities	Laboratory with computers, Eclipse framework

## 6. Specific competencies acquired

<b>Professional competencies</b>	C2.4 Using proper criteria and methods for evaluation of software applications
<b>Transversal competencies</b>	<p>CT1 Application of organized and efficient work rules, of responsible attitudes towards the didactic and scientific domain, for the creative exploitation of their own potential according to the principles and rules of professional ethics</p> <p>CT2 Efficient conduct of activities organized in an interdisciplinary group and development of empathic capacity of interpersonal communication, networking and collaboration with diverse groups</p> <p>CT3 Use of effective methods and techniques of learning, information, research and development of the capacity to exploit knowledge, to adapt to the requirements of a dynamic society and communication in Romanian language and in a foreign language</p>

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

7.1 General objective of the discipline	<ul style="list-style-type: none"> <li>• Definitions of common concepts and terms in the field</li> <li>• Gain familiarity with a variety of test techniques and compare them</li> <li>• To learn the methods of program verification and validation.</li> <li>• Team work abilities, assuming different execution and leading roles, performing professional tasks with considerable amounts of autonomy and responsibility</li> </ul>
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> <li>• Students will know how to use tools for the management of testing process.</li> <li>• Demonstrate advanced skills to analysis and design test cases</li> <li>• Understand that there are different missions for testing effort (selection of mission depends on contextual factors)</li> <li>• Understand the concept of oracles</li> </ul>

## 8. Content

8.1 Course	Teaching methods	Remarks
<p>Lecture 1. Introduction in Testing and Web Internals</p> <ul style="list-style-type: none"> <li>• General notions</li> <li>• Web Internals explained</li> <li>• (HTTP) Request Structure</li> <li>• Web System in test (Structure of web application, clients etc)</li> <li>• Application Sample and what we will test</li> <li>• Different Tools and frameworks - awareness on tools on market</li> <li>• Project Lifecycle - Scrum Agile methodologies</li> <li>• System Architecture Analysis - DB</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<p>Lecture 2. Web GUI Automation - Selenium</p> <ul style="list-style-type: none"> <li>• Programming languages testing context- C#, Javascript, Java, Ruby</li> <li>• Selenium IDE - WebDriver (1-2)</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical</li> </ul>	

<ul style="list-style-type: none"> <li>• CSS selectors</li> <li>• XPath</li> <li>• Page Object patterns</li> </ul>	demonstration	
<b>Lecture 3 – 4. Web GUI Automation - Selenium</b> <ul style="list-style-type: none"> <li>• Maven Config</li> <li>• Data Driven tests</li> <li>• GUI Automation FWKs - Serenity, Cucumber, Specflow</li> <li>• BDD pros and cons</li> <li>• DB NoSql + Big Decimal</li> <li>• Use of Oracles</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<b>Lecture 5. JS Unit Tests</b> <ul style="list-style-type: none"> <li>• Data generation</li> <li>• Coverage - examples</li> <li>• Javascript + unit tests</li> <li>• Leverage between GUI - UNIT - API tests (maybe moved in a web context course)</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<b>Lecture 6. API Testing - REST, SOAP</b> <ul style="list-style-type: none"> <li>• What you want to test</li> <li>• Execution types</li> <li>• SOAP and REST</li> <li>• Pros and cons in API testing</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<b>Lecture 7. API Testing - REST, SOAP</b> <ul style="list-style-type: none"> <li>• SOAP + JMeter (JAVA + jMeter    jMeter + jar)</li> <li>• Use of APIs for Test Data setup</li> <li>• Test using IMAP, POP3, SMTP, FTP, HTTP Client</li> <li>• Proxy Tools - fiddler etc</li> <li>• Libraries</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<b>Lecture 8. Performance Testing</b> <ul style="list-style-type: none"> <li>• Request Analysis - yslow, page speed</li> <li>• Load testing</li> <li>• User experience - practices</li> <li>• Browser tools</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<b>Lecture 9. Performance Testing</b> <ul style="list-style-type: none"> <li>• Report analysis</li> <li>• Stress, Volume, Spyke</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<b>Lecture 10- 11 Security Testing</b>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	
<b>Lecture 12-13 Mobile Testing</b> <ul style="list-style-type: none"> <li>• Issues</li> <li>• Native + Web + Embedded (hybrid)</li> <li>• API clients</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical</li> </ul>	

<ul style="list-style-type: none"> <li>• Responsiveness</li> <li>• Segmentation</li> <li>• Analytics</li> </ul>	demonstration	
<b>Lecture 14. Continuous Integration</b> <ul style="list-style-type: none"> <li>• Jenkins, TeamCity, Bamboo</li> <li>• Master - Slave Setup</li> <li>• Parallel test execution</li> <li>• Selenium Grid</li> <li>• Continuous Delivery</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive exposure</li> <li>• Explanation</li> <li>• Conversation</li> <li>• Didactical demonstration</li> </ul>	

## Bibliography

### Books

- [Eri15] Bayo Erinle, Performance testing with JMeter, 2015  
[Eri14] Bayo Erinle, JMeter CookBook, Packt Publishing, 2014  
[Ava14] S. Avasarala, SeleniumWebDriver Practical Guide, 2014  
[Kov14] Dima Kovalenko, Selenium Design Patterns ad Best Practices, Packt Publishing , 2014  
[Bur12] David Burns, Selenium 2 Testing Tools: Beginner's guide, 2012  
[Unm12] G. Unmesh, Selenium Testing CookBook, 2012  
[Gra12] D. Graham, M. Fewster, Experiences of test automation: Case studies of Software Test Automation, 2012
- [Pres10] R. S. Pressman, Software engineering: a practinioner's approach, seventh edition, Higher Education, 2010  
[Kan99] C. Kaner, J. Falk, H. Nguyen, Testing Computer Software, 1999
- [Crs09] L. Crispin, J. Grecory, Agile testing: a practical guide for testers and agile teams, Addison-Wesley, 2009  
[You08] M. Pezzand, M. Young, Software Testing and Analysis: Process, Principles and Techniques, John Wiley & Sons, 2008  
[Nai08] K. Naik, P. Tripathy, Software testing and quality assurance. Theory and Practice, A John Wiley & Sons, Inc., 2008  
[Pat05] R. Patton, Software Testing, Sams Publishing, 2005  
[Mye04] Glenford J. Myers, The Art of Software Testing, John Wiley & Sons, Inc., 2004  
[Brn02] I. Brnstein, Practical software testing, Springer, 2002

### Articles

- [1] Meszaros, G., Smith, S., Andrea, J, The test automation manifesto, LNCS vol 2753, pp. 73-81, 2003

### Internet resources

- Serenity, <http://thucydides.info/docs/serenity-staging/>
- Selenium, <http://www.seleniumhq.org/>
- CSS Selector, [http://www.w3schools.com/cssref/css\\_selectors.asp](http://www.w3schools.com/cssref/css_selectors.asp)
- Selenium tutorial, <http://software-testing-tutorials-automation.blogspot.ro/2014/01/selenium-webdriver-tutorials-basic.html>

### Tutorials

During lectures/seminars/laboratories tutorials will be given for each assignment.

8.2 Seminar / laboratory	Teaching methods	Remarks
<b>Seminar 1:</b> Selenium IDE, CSS Selectors, Webdriver project	Presentation, Conversation,	

setup (Page Object)	Problematizations, Discovery, Other methods – individual study, exercises	
<b>Seminar 2</b> Webdriver project DDT BDT Page Object Reporting (FWKs) DB NoSql + BigDecimal – Optional (Bonus)	Presentation, Conversation, Problematizations, Discovery, Other methods – individual study, exercises	
<b>Seminar 3</b> API testing in Java/JMeter	Presentation, Conversation, Problematizations, Discovery, Other methods – individual study, exercises	
<b>Seminar 4</b> Performance test using JMeter	Presentation, Conversation, Problematizations, Discovery, Other methods – individual study, exercises	
<b>Seminar 5</b> Security testing	Presentation, Conversation, Problematizations, Discovery, Other methods – individual study, exercises	
<b>Seminar 6</b> Mobile testing Appium	Presentation, Conversation, Problematizations, Discovery, Other methods – individual study, exercises	
<b>Seminar 7</b> Jenkins	Presentation, Conversation, Problematizations, Discovery, Other methods – individual study, exercises	
<b>Bibliography</b>		
See from Course bibliography		

**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 exists in the studying program of all major universities in Romania and abroad;
- The content of the course is considered the software companies as important for average programming skills.

**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 principle of the domain;	Written examination	25%
	- apply the course concepts problem solving	Practical examination	25%
10.5 Seminar/lab activities	-be able to implement course concepts - apply techniques for different classes of problems	Project -documentation -design -continous observations	50%

10.6 Minimum performance standards

**Remark .**

- Seminar/Laboratory assignments work may not be redone in the retake session.
- Written and practical exams can be taken during the retake session.
- Students from Previous Years to the current academic year
  - All the above rules apply to students from previous years.
  - Seminar/Laboratory assignments must be redone during didactic activity time (in the 12 weeks before normal session).
- At least grade 5 (from a scale of 1 to 10) at written exam. The final grade computed with the given formula must be at least 5 in order to pass the exam. At least grade 5 (from a scale of 1 to 10) at written and practical exams and laboratory/seminar activity.

Date

29 April 2024

Signature of course coordinator

Assoc. Prof. PhD. Andreea Vescan,

Signature of seminar coordinator

Assoc. Prof. PhD. Andreea Vescan

Date of approval

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Signature of the head of department

Assoc. Prof. PhD. Sterca Adrian