COURSE DESCRIPTION

1. Information about the program

1.1 Institution of higher education	**Alexandru Ioan Cuza University of Iasi**
1.2 Faculty	**Faculty of Economics and Business Administration**
1.3 Department	**Department of Accounting, Information Systems and Statistics**
1.4 Field of study	**Business Informatics**
1.5 Level	**Master**
1.6 Study programme/ Qualification	**Software Development and Business Information Systems**

2. Information about the course

2.1 Course name	**Multi-tier Software Development**					
2.2 Course coordinator	**Associate Prof. Cătălin STRÎMBEI, Ph.D.**					
2.3 Seminar coordinator	**Ionuț HRUBARU Phd.**					
2.4 Year of study	I	2.5 Semester	I	2.6 Type of assessment	P	2.7 Discipline status	**C**

* C – Compulsory / E - Elective

3. Total estimated time (hours allotted to didactic activity per semester)

3.1 Total number of hours per week	3	of which: 3.2 lecture	2	3.3 seminar/lab	1
3.4 Total number of hours in the curriculum	42	of which: 3.5 lecture	28	3.6 seminar/lab	14
Time distribution					hours
Study of the handbook, coursebook, bibliography and notes					**30**
Additional research in the library, online and on the field					**15**
Preparation of seminars/labs, homework and projects					**40**
Tutorials					**15**
Assessment					**8**
Other activities....................................					
3.7 Total number of self-study hours					**108**
3.9 Total number of hours per semester					**150**
3. 10 Number of credits					**6**

4. Prerequisites (if applicable)

4.1 curriculum-based	• Programming Languages (or similar), Databases (or similar)
4.2 competence-based	• Object Oriented Programming (Java) SQL

5. Conditions (if applicable)

5.1. for lectures	• Lecture rooms shall be provided with video projector

5.2. for seminars/labs	• IT services of the faculty will provide a real or virtual machine with JEE Application Server and Oracle Database Server • Students are invited to bring and use their own laptops with JEE Application Server, SQL Database (Oracle DB), Eclipse JEE Distribution (e.g., JBoss Tools Distribution) • Labs will have enough computers for students not owning a laptop • Lab computers will have installed Eclipse JEE Distribution (JBoss Tools Distribution) and JEE Application Server and network infrastructure to connect to the Oracle DB Server

6. Assimilated specific competences	
Professional competences	• C1.3 Combine and adapt the tools, methods and techniques for analysis, design and testing of information systems based on functional and technological requirements of the system (1) • C3.3 Choose and adapt different commercial and open-source solutions in order to fulfill organizational requirements and which are suited to the organizational constraints (3) • C4.3 Identification of information sources, application modules and available services, both inside and outside the business system; estimate the solutions of their integration in order to match the current and future information needs of the organization (1.5)
Transversal competences	• • CT3 – Continuous improvement of specific skills and knowledge towards approaching information systems, development of new software technologies and management of information systems. (0.5)

7. Discipline objectives (provided by the assimilated specific competences grid)	
7.1 The general objective of the discipline	• To provide the core knowledge, methodologies and tools in order to deal with implementation and deployment of complex enterprise business applications.
7.2 Specific objectives	• Knowledge of implementation, building and consolidation process within enterprise software engineering cycle • Knowledge of and skills for programming in Java Enterprise design patterns and technological approaches • Knowledge and skills for implementing multitier enterprise apps • Knowledge and skills for implementing service-oriented architectures

8. Content			
8. 1	**Lectures**	**Teaching methods**	**Observations**
1.	*C1. Enterprise Software Development Context* 1.1 Software development lifescycle: from implementation to deployment	Course lecture, explanation, conversation, questioning.	1 lecture
2.	1.2 Multi-tier Architectures: enterprise layered architectures, service oriented architectures,	Course lecture, explanation, conversation,	1 lecture

	design patterns	questioning.	
3.	1.3 Tools: IDE Distributions • Spring Tools for Spring Framework • JBoss Studio for JEE Wildfly Container • Building tools: Ant, Maven. • Source code management tools: Git, SVN	Course lecture, explanation, conversation, questioning.	1 lecture
4.	*Chapter 2. Enterprise Architecture and Components* 2.1 Principles and Architectural Design Patterns	Course lecture, explanation, conversation, questioning.	1 lecture
5.	2.2 Enterprise architectural components • Business Logic Components – CDI design pattern: (Containers and components: dependencies, resources, integration) with Spring Framework	Course lecture, explanation, conversation, questioning.	1 lecture
6.	• Business Logic Components – AOP (integrity, security, logging) with Spring Framework and JEE container • Transactions with Spring Framework	Course lecture, explanation, conversation, questioning.	1 lecture
7.	• Data Layer Components (JPA Repositories and Spring Data Components) o JPA: ORM principles, JPQL o Spring Data JPA	Course lecture, explanation, conversation, questioning.	1 lecture
8.	*Chapter 3. Service Oriented Architectures* 3.1 Principles and Service Design Patterns • Service Styles: SOA vs REST • Service Architectural Categories: o Data Services, o Business Logic Services, o Business Process/Orchestration Services	Course lecture, explanation, conversation, questioning.	2 lectures
9.	3.2 Enterprise Components and Services • Spring Services • JEE EJB Services	Course lecture, explanation, conversation, questioning.	1 lecture
10.	3.3 RESTfull Services Implementation • RESTFull Fmks: o Spring MVC o JAX-RS • RESTFull Data Services: o Repository Services, o Data Mapping: JAXB, JSON.P, JSON.B	Course lecture, explanation, conversation, questioning.	1 lecture
11.	3.4 Microservices Architectures • SpringBoot	Course lecture, explanation, conversation, questioning.	1 lecture
12.	*Chapter 4. Web-UIX Layer and Web Services* 4.2 Web Framework • Web Apps Architecture • Integration with RESTful Services 4.2 UIX Flow and Components	Course lecture, explanation, conversation, questioning.	2 lectures

8. 2	Seminar/lab	Teaching methods	Observations
1.	Setting Enterprise Data Components	Practical Case Discussion, Individual Practical Project-1st stage	1 lab
2.	Building enterprise data repositories	Practical Case Discussion, Individual Practical Project-2nd stage	1 lab
3.	Building web/REST data services	Practical Case Discussion, Individual Practical Project-3rd stage	1 lab
4.	Building web clients Apps and integration with web data services	Practical Case Discussion, Individual Practical Project-4th stage	1 lab
5.	Multitier application component deploying, integration and publishing	Practical Case Discussion, Individual Practical Project-5th stage	1 lab
6.	Integration testing and publishing	Practical Case Discussion, Individual Practical Project-6nd stage	1 lab

Bibliography

Eric Evans, *Domain-Driven Design: tackling complexity in the heart of software*, Addison-Wesley, 2004
Martin Fowler, David Rice, Matthew Foemmel, Edward Hieatt, Robert Mee, Randy Stafford, *Patterns of Enterprise Application Architecture*, Addison Wesley, 2002
Thomas Erl, SOA: principles of service design, PRENTICE HALL, 2007
Robert Daigneau, *Service design patterns : fundamental design solutions for SOAP/WSDL and restful Web services*, 2012 Pearson Education, Inc., Addison-Wesley

Antonio Goncalves, *Beginning Java EE 7*, Apress Media, LLC, 2013
Jonathan Wetherbee, Chirag Rathod, Raghu Kodali, with Peter Zadrozny, *Beginning EJB 3: Java EE7 Edition*, Apress Media, LLC, 2013
Mike Keith, Merrick Schincariol, Massimo Nardone, *Pro JPA 2 in Java EE 8: An In-Depth Guide to Java Persistence APIs,* Apress, 2018
Bauke Scholtz, Arjan Tijms, *The Definitive Guide to JSF in Java EE 8: Building Web Applications with JavaServer Faces*, Apress, 2018
Sudheer Jonna, *Learning PrimeFaces Extensions Development*, 2014 Packt Publishing
Iuliana Cosmina, Rob Harrop, Chris Schaefer, Clarence Ho, *Pro Spring 5: An In-Depth Guide to the Spring Framework and Its Tools*, Apress, 2017

Strîmbei, Cătălin *Dezvoltarea aplicaţiilor oriéntate obiect pe platforma Java*, Ed.Univ.Al.I.Cuza, Iaşi, 2010

9. Corroboration of the discipline content with the expectations of epistemic community representatives, professional associations as well as of representative employers in the programme related field.

10. Assessment

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Share of final grade
Grid Test Evaluation			25%
Part I of the project	Real-world application, complexity, validity	Presentation of the persistence model and Data/Business Architectural Model	30%
Part II of the project	Real-world application, complexity, validity	Presentation of Web Data/Business Service solution	30%
Part II of the project	Real-world application, complexity, validity	Presentation of Web Application/Consumer Modules	15%
10.6 Minimum performance standard			

- Minimum 5 for the final grade.

Date of completion	Lecture Coordinator	Seminar Coordinators
	Assoc.Prof. Cătălin STRÎMBEI, PhD.	**PhD. Ionuț HRUBARU**

Date of approval within the department

Head of Department
Prof. Florin Dumitriu, PhD.