COURSE DESCRIPTION

1. Information about the programme

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	**Information Integration**					
2.2 Course coordinator	**Associate Prof. Cătălin Strîmbei, Phd.**					
2.3 Seminar coordinator	**Cătălin STRÎMBEI, Ionuț HRUBARU**					
2.4 Year of study	II	2.5 Semester	I	2.6 Type of assessment	E	2.7 Discipline status	**C**

* C – Compulsory / E - Elective

3. Total estimated time (hours alloted 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	● Databases (or similar) ● Object Oriented Programming (or similar)
4.2 competence-based	● SQL ● Spring/JEE Application Development for SOA (Service Oriented Architectures).

5. Conditions (if applicable)

5.1. for lectures	● Lecture rooms shall be provided with video projector. ● Students will attend lectures. Cell phones must be turned off.
5.2. for seminars/labs	● IT services of the faculty will provide a real or virtual machine to act as Database SQL Server (Oracle, PostgreSQL) and No-SQL (MongoDB, Hbase, Cassandra) ● Students are invited to bring and use their own laptops: Database Server (e.g. Oracle, MongoDB), SQL Developer, Eclipse/IntelliJ IDE ● Labs will have enough computers for students not owning a laptop. ● Lab computers will have installed/access to Database Servers (e.g. Oracle, MongoDB), SQL Developer, Eclipse/IntelliJ IDE, Java/JEE Tools

6. Assimilated specific competences

Professional competences	● C2.5 Develop projects and case-studies concerning modeling, implementation (database logic), administration and analysis of data for real-world applications (2) ● C4.5 Write the specifications and deploy the modules regarding data, applications and services integration (3)
Transversal competences	● CT1 – The ability to communicate and collaborate in teams of different professionals (0.5) ● 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 be able to define and implement feasible and efficient strategies to acquire, integrate and optimize data and applications originated from heterogeneous and web sources (SQL and NoSQL) and to prepare them to be suitable for the processing specific to BigData analytics.
7.2 Specific objectives	● Knowledge of Data Integration Design methodologies. ● Knowledge of Enterprise Application Integration Design methodologies. ● Knowledge and skills to implement distributed database systems. ● Knowledge and skills to integrated Web based data providers ● Knowledge and skills to integrated Web Services-based Applications ● Knowledge and skills to prepare integrated data structures in order to be exploited by analytical tools.

8. Content

8. 1 Lectures	Teaching methods	Observations
Chapter 1. Information Integration Introduction 1.1 Integration Problem 1.2 Integration Strategies: Federated Systems, Data Service Integration (SOA), Enterprise Architecture Integration	PPT presentation, explanation, conversation, questioning.	2 lectures
Chapter 2. Data Integration with Federated Database Architecture 2.1 Data Integration Concept 2.2 Architecture and components 2.2.1 Data Source Model and Access Components Oracle Federated Database Options for: • SQL Data Source Access • XML Data Source Access • XLSx/CSV Data Source Access • JSON Data Source Access 2.2.2 Integration and Analytical Model Oracle SQL Multidimensionnal ROLAP 2.2.3 Integration Web Model Web Views with Oracle APEX and ORDS	PPT presentation, code execution, explanation, conversation, questioning.	4 lectures
Chapter 3. Data Service Integration with REST Java Architecture 3.1 Concept: REST Data Services for SOA 3.2 Architecture and components 3.2.1 Data Source Model and Access Components Data Source Access • SQL Data Source Access: JDBC REST Services • SQL Data Source Access: JPA REST Services • XML Data Source Access(JAXB): XML Access Services • XLSx Data Source Access(Apache POI): XLSx REST Services • JSON Data Source Access(Jackson): JSON REST Services Data Sources Services integration with Federated Systems 3.2.2 Integration and Analytical Model Java Stream.API Data Processing SparkSQL Java Data Processing 3.2.3 Integration Web Model with REST Web Services SpringBoot REST Web Services	PPT presentation, code execution, explanation, conversation, questioning.	4 lectures
Chapter 4. Enterprise Application Integration 4.1 EAI Concept and Enterprise Integration Patterns 4.2 EAI Architectural components EAI framework basic components of Apache Camel 4.3 ETL flow with EAI	PPT presentation, code execution, explanation, conversation, questioning.	2 lectures

8. 2 Seminar/lab	Teaching methods	Observations
L1. Design Integration case study (integrated data model) - team project	Demonstration, Scripts and code execution, Assisted Modelling, Questioning	1 lab
L2. Federated Database Architecture with Oracle DB Server: Data Source Connectors	Demonstration, Scripts and code execution, Assisted Modelling, Questioning	1 lab
L3. Federated Database Architecture with Oracle DB Server: Integration Model and Analytical Processing with SQL-ROLAP	Demonstration, Scripts and code execution, Assisted Modelling, Questioning	1 lab
L4. Federated Database Architecture: Web model with Oracle APEX and ORDS Services	Demonstration, Scripts and code execution, Assisted Modelling, Questioning	1 lab
L5. REST Data Service Architecture Data Source Service Model	Demonstration, Scripts and code execution, Assisted Modelling, Questioning	1 lab
L6. REST Data Service Architecture Integration Model and Analytical Processing	Demonstration, Scripts and code execution, Assisted Modelling, Questioning	1 lab
L7. Data Service Orchestration with the EAI framework	Demonstration, Scripts and code execution, Assisted Modelling, Questioning	1 lab

Bibliography

AnHai Doan, Alon Halevy, Zachary Ives, *Principles of Data Integration*, 2012 Elsevier, Inc.
Anthony Giordano, *Data integration: blueprint and modeling techniques for a scalable and sustainable architecture*, 2010, Pearson Education, Inc.
April Reeve, Managing *Data in Motion Data Integration Best Practice Techniques and Technologies*, 2013 Elsevier, Inc.

Erl, Thomas, *Service-Oriented Architecture: Analysis and Design for Services and Microservices*, Prentice Hall, 2017
K. Siva Prasad Reddy, *Beginning Spring Boot 2 Applications and Microservices with the Spring Framework*, Apress, 2017
Craig Walls, *Spring Boot in Action*, Manning, 1st edition (January 3, 2016)
Magnus Larsson, *Microservices with Spring Boot and Spring Cloud: Build resilient and scalable microservices using Spring Cloud, Istio, and Kubernetes*, Packt Publishing; 2nd ed. edition (July 29, 2021)

Gregor Hohpe, Bobby *Woolf, Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions*, Addison-Wesley Professional; 1st edition (October 10, 2003)
David S. Linthicum, *Enterprise Application Integration*, Addison-Wesley Professional; 1st edition (November 12, 1999)
William A. Ruh, Francis X. Maginnis, William J. Brown, *Enterprise Application Integration: A Wiley Tech Brief*, Wiley; 1st edition (October 13, 2000)

Claus Ibsen, Jonathan Anstey, *Camel in Action*, Manning; 2nd edition (February 18, 2018)
Guilherme Camposo, *Cloud Native Integration with Apache Camel: Building Agile and Scalable Integrations for Kubernetes Platforms*, Apress (August 25, 2021)
Jean-Baptiste Onofre, *Mastering Apache Camel*, Packt Publishing (June 30, 2015)

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.

- The content of this discipline has been decided upon by considering both the curricula of some prestigious Western Universities and the demands of the economic environment provided by potential employers, either in the public or in the private IT companies.

10. Assessment Examen

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Share of final grade
Team Project Grade Part I - Federated Data System Architecture Part II - Integrated Data Service Architecture and EAI	Validity and elegance of the solutions	Presentation, code execution, discussion of each team's solution	75%
Exam		Quiz Test	25%
10.6 Minimum performance standard			
● Final grade >= 5			

Date of completion   Lecture Coordinator   Seminar Coordinators
21.02.2023   Assoc.Prof. Cătălin Strîmbei, Ph.D.   Cătălin Strîmbei , Ionut Hrubaru