General information		
Course leader	**Aleksander Radovan, Senior Lecturer**	
Course title	**Advanced Information Systems Interoperability**	
Study programme		
Course status	Elective	
Year	Year 1, semester 2	
Number of credits and mode of teaching delivery	ECTS student workload coefficient	4
	Number of hours (L+E+S)	60 (30 P + 30 V + 0 S)

COURSE DESCRIPTION

1.1. Course objectives

Application of scientific and engineering methods to design services provided by business entities. Understanding business process automation using services using Service Oriented Architecture and Event-Driven Architecture. Adoption of business process analysis methods aimed at building services, as well as designing services based on business processes. Understanding of choreography and orchestration of services and adoption of design patterns of service-oriented architecture and event-driven architecture. Understanding the concept of the Enterprise Service Bus and its connection to a service-oriented architecture. Understanding how Business Process Management systems work and integrating with other systems. Observation of service systems and measures to improve their operation.

1.2. Conditions for enrolment in the course

No formal conditions. Student should be able to write programs comfortably in any object-oriented programming language.

1.3. Expected learning outcomes of the course

- **LO1 - Assess the justification for using a particular information system architecture through suitable patterns of integration of different information systems**
- **LO2 - Assess the justification for the introduction of new services in the case of implementation of web services using the selected program framework**
- **LO3 - Compare the way information systems are integrated using a service bus and without using a service bus**
- **LO4 - Determine how to configure the selected service bus, message broker that works with the selected service bus, and security properties of the selected service bus**
- **LO5- Analyse the BPM integration options with other information systems and propose and appropriate way to integrate BPM systems with other information systems**

1.4. Course content

Types of integrations
SOA design
Spring MVC and Hibernate
Web application implementations using SOA principles
ESB integration patterns
Mule ESB connectors
Data processing at the Mule bus
Components and patterns of use of the Mule bus
Error handling and security settings at the Mule bus
Implementation of an integration system using Spring, Mule and ActiveMQ
Concepts and principles of operation of business process management systems
Integration of jBPM systems with other technologies
Process modelling using BPMN 2.0 language

1.5. Teaching delivery modes:	☒ lectures ☐ seminars and workshops ☒ exercises ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☒ laboratory ☒ mentoring ☐ other _____
1.6. Comments		

1.7. Student obligations

STUDENT ATTENDANCE

Class attendance is mandatory in the percentage prescribed by the Studies and examination regulations.

PASSING THE EXAM

The course has defined learning outcomes. In order for a student to pass the course, he/she must achieve a minimum of 50% of the points available for each learning outcome and collect a minimum of 50.01 points out of a possible 100 points per course.

1.8. Monitoring[1] student work

Class attendance		Activity during class		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project	80%	Continuous assessment of knowledge		Student report		Practical work	
Portfolio		Homework		Preparations for labs	20%		

[1] IMPORTANT NOTES: Next to each method of monitoring student work it is necessary to insert an adequate share of each activity in ECTS credits, so the total number of ECTS credits corresponds to the credit value of the course. You can use empty fields for additional activities.

1.9. Assessment and evaluation of student work during classes and the final exam

A grading system based is on a credit accumulation model combined with a defined sub-model, providing a model of the grading method and checking the satisfaction of learning outcomes used in this course.

CONCRETE REVIEW OF EVALUATION METHODS

The maximum number of points that a student can earn in a course is 100. Grades are calculated according to the following criteria table within which the distribution of passing grades in terms of the number of points is applied.

Points	Grade
0,00 - 50,00	(1) unsatisfactory
50,01 - 58,00	(2) sufficient
58,01 - 75,00	(3) good
75,01 - 92,00	(4) very good
92,01 - 100,00	(5) excellent

The method of accumulating points is determined in this course in accordance with the elements of scoring as follows:

Criterion	Maximum points
Project	80
Preparations for labs	20
TOTAL	100

The way of taking the colloquiums, the learning outcomes it covers, as well as the implementation of exams and remedial exams are defined by the "Instructions for attending and taking the course".

1.10. Required reading (at the moment of submitting the joint study programme report)

- **Do More with SOA Integration: Best of Packt, Packt Publishing, several authors, 2011, ISBN: 978-1-84968-572-6**

1.11. Additional reading (at the moment of submitting the joint study programme report)

- **Open Source SOA, Jef Davies, Manning Publications, 2009, ISBN: 978-1-933988-54-2**
- **Mule in Action, Second Edition, Manning Publications, several authors, 2014, ISBN: 9781617290824**
- **ActiveMQ in Action, Manning Publications, several authors, 2011, ISBN: 978-1-933988-94-8**

- **jBPM6 Developer Guide, Packt Publishing, M. N. De Maio, 2014, ISBN: 978-1783286614**

1.12. Number of copies of required reading in relation to the number of students who currently attend a course

Title	*Number of copies*	*Number of students*

1.13. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competencies.

Monitoring the fulfilment of the desired learning outcomes is an important element of assessment because learning outcomes are the "guarantees" that the school gives to students, but also to employers and the wider community. Learning outcomes represent the minimum threshold that each student must achieve in order to pass the course. For a passing grade, the student must satisfy all the learning outcomes with the demonstrated knowledge, which corresponds to 50% of the points achieved for each learning outcome. The method of scoring based on learning outcomes is presented in the document "Instructions for attending and taking the course".