POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)
pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technologies for enterprise applications

Course

Field of study	Year/Semester
Computing	1/1
Area of study (specialization)	Profile of study
Data Processing Technologies	general academic
Level of study	Course offered in
Second-cycle studies	Polish
Form of study	Requirements
full-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	30	
Tutorials	Projects/seminars	

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

Marek Wojciechowski, PhD, Dr. Habil.
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faculty: Computing and Telecommunications
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Responsible for the course/lecturer:

Prerequisites

The learning outcomes from the 1st cycle studies defined in the Resolution of the Senate of PUT, especially the effects K_W1-2, K_W4, K_W6-15, verified in the recruitment process for the 2nd cycle studies - these effects are presented on the faculty's website.

The learning outcomes of first cycle studies defined in the Resolution of the Senate of PUT, in particular effects K_U1-2, K_U4, K_U7-8, K_U14-20, K_U22-23, K_U26, verified in the process of recruitment for second cycle studies - these effects are presented on the faculty's website.

The learning outcomes from the 1st cycle studies defined in the Resolution of the Senate of PUT, especially the effects K_K1-9, verified in the process of recruitment for the 2nd cycle studies - these effects are presented on the faculty's website. Moreover, in the scope of social competences, a student must present such attitudes as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

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Course objective

1. provide students with basic knowledge of how to develop modern enterprise applications in a web architecture with a particular emphasis on component and multitier applications, using the most important platforms for developing such applications: Java Enterprise Edition (Java EE / Jakarta EE) and Microsoft .NET, but also including important solutions from the JavaScript language ecosystem, mainly regarding frontend development.

2. developing in students the ability to solve problems related to the creation of modern enterprise applications in a component and multitier architecture and the selection of appropriate technologies for the developed system and problems to be solved.

Course-related learning outcomes

Knowledge

1. has advanced and in-depth knowledge of multitier and distributed applications, architectural patterns for such applications, tools, frameworks, libraries, and programming environments used to implement them (K2st_W1)
2. has advanced detailed knowledge of selected issues in the field of multitier and distributed applications (K2st_W3)
3. has advanced and detailed knowledge of processes occurring in the life cycle of web applications (K2st_W5)
4. knows advanced methods, techniques, and tools used to create complex enterprise web applications (K2st_W6)

Skills

1. is able to obtain information from documentation concerning technologies, frameworks, and tools for creating Internet applications (in Polish and English), analyzing their strengths and weaknesses and assessing their adequacy in the context of the created information system (K2st_U1)
2. is able to integrate knowledge from the fields of databases, Internet technologies, distributed systems, as well as principles of user interface design (K2st_U5) when creating advanced enterprise applications
3. is able to assess the usefulness and applicability of new technologies, frameworks, and tools for developing enterprise-class applications (K2st_U6)
4. is able to critically analyze existing architectural patterns, technologies, and frameworks used in the context of enterprise-class applications and identify opportunities for improvement (K2st_U8)
5. is able to assess the usefulness of methods and tools for solving the engineering task of building an enterprise-class web application, including the limitations of these methods and tools (K2st_U9)
6. is able to design a web application according to the specification, including non-technical aspects, using methods, techniques, and tools specific to enterprise-class applications (K2st_U11)

Social competences

1. understands that, in the area of web applications and distributed applications, knowledge and skills are rapidly becoming obsolete (K2st_K1)

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2. understands the importance of using the latest architectures, patterns, and technologies to create enterprise applications (K2st_K2)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formative evaluation:

(a) as for lectures:

- based on answers to questions about the material discussed during previous lectures

(b) as for laboratories:

- on the basis of an assessment of the ongoing progress of the tasks

Summative evaluation:

a) as for lectures, the verification of the assumed learning outcomes is carried out by:

- assessment of knowledge and skills shown on a written test (the test consists of 16 equally scored questions, for mark 3.0 it is necessary to obtain at least half of the possible points)
- active participation in lectures rewarded with additional points on the test

b) as for laboratories the verification of the assumed learning outcomes is carried out by:

- verification of the realization of laboratory exercises

- the evaluation and defense of the project

Obtaining additional points for activity during classes, especially for:

- discussing additional aspects of a covered topic

- remarks regarding potential improvement of teaching materials

Programme content

The programme of lectures includes the following topics:

Introduction to multitier applications, multitier architecture vs. Model-View-Controller (MVC), monolithic architecture vs. microservices. Java Enterprise Edition platform (Java EE / Jakarta EE) and its component technologies. Overview of presentation layer and business logic layer technologies of Java EE platform. Servlets and JavaServer Pages (JSP) as classic presentation technologies. JavaServer Faces (JSF) as a presentation layer technology and implementation of the MVC pattern. Enterprise JavaBeans (EJB) as a classic business logic implementation technology: EJB component types, EJB clients, transaction management in EJB. Message-Oriented Middleware architecture, asynchronous communication in Java EE applications, Java Message Service (JMS) standard, message-driven EJB components. Object-relational mapping as the dominant approach to communication with an SQL database, an overview of technologies responsible for communication with SQL databases on the Java

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EE platform, Java Persistence API (JPA) standard. Integration of Java EE application layers, Contexts and Dependency Injection (CDI) technology. Design patterns used on the Java EE platform. Spring Framework and its ecosystem of related project (including Spring Boot). Microsoft .NET platform and its basic architectural concepts and component technologies. Microsoft .NET Core. ASP.NET MVC and ASP.NET Web API frameworks. Communication with the database in Microsoft .NET applications, LINQ queries, ADO.NET Entity Framework technology as an implementation of the object-relational mapping concept. Ajax model for web applications, its advantages and disadvantages, an overview of solutions related to it. Single Page Application (SPA) architecture. Angular framework. Web Services of SOAP and REST type, basic standards, implementation of services and clients on Java EE and Microsoft .NET platforms.

The programme of laboratories includes the following topics:

Java Enterprise Edition (Java EE) platform and its component technologies: implementation and configuration of servlets, creating simple JavaServer Pages (JSP), design and implementation of user interface in JavaServer Faces (JSF) technology, implementation of business logic based on session Enterprise JavaBeans components (EJB) and Contexts and Dependency Injection (CDI) components, communication with a database based on object-relationship mapping using Java Persistence API (JPA) technology, implementation of asynchronous communication based message-driven EJBs. Creating applications using the Spring framework. Microsoft .NET platform and its component technologies: creation of multitier applications using the ASP.NET MVC framework with support for communication with a database using the ADO.NET Entity Framework. RESTful Web Services on Java EE and Microsoft .NET platforms. Ajax model of web applications with examples of support for it in the form of jQuery library.Using Angular framework to implement SPA applications.

Teaching methods

Lecture: multimedia presentation, discussion.

Laboratory exercises: practical exercises, discussion, demonstration, projects.

Bibliography

Basic
1. Java Platform, Enterprise Edition, The Java EE Tutorial, Release 8, Oracle, 2017
2. Microsoft Docs, www.msdn.com
3. Spring Guides, https://spring.io/guides
4. Angular Docs, https://angular.io/docs

Additional
1. Oracle ADF i JBoss Seam - dwa skrajnie różne podejścia do współpracy JSF z EJB, B. Mordaka, M. Wojciechowski, Materiały XV konf. PLOUG, 2009
2. Co nowego w Java EE?, M. Wojciechowski, Materiały XII konf. PLOUG, 2006
3. Java EE 8. Wzorce projektowe i najlepsze praktyki, R. Rocha, J. Purificação, 2019
4. Architectural Styles and the Design of Network-based Software Architectures, R. Fielding, University

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of California, 2000

5. Ajax w akcji, D. Crane, E. Pascarello, D. James, Helion, 2007

6. ASP.NET Core MVC 2. Zaawansowane programowanie. Wydanie VII, A. Freeman, Helion, 2018.

7. Microsoft .NET: Architecting Applications for the Enterprise, D. Esposito, A. Saltarello, Microsoft Press, 2008

8. Web Services: Principles and Technology, M. Papazoglou, Prentice Hall, 2007

9. Spring w Akcji. Wydanie V, Craig Walls, Helion, 2019

10. Angular w akcji, Jeremy Wilken, Helion, 2019

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	60	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	65	2,5

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[1] delete or add other activities as appropriate