GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Server-side application frameworks (E761038)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	Dutch	Gent	group work lecture seminar

Lecturers in academic year 2023-2024

Ongenae, Veerle	TWO5	lecturer-in-charge

Offered in the following programmes in 2023-2024	crdts	offering
Bachelor of Science in Engineering Technology(main subject Information Engineering Technology)	6	A
Linking Course Master of Science in Information Engineering Technology	6	A
Preparatory Course Master of Science in Information Engineering Technology	6	A

Teaching languages

Dutch

Keywords

Web applications, .NET-platform, J2EE, MVC, REST, AJAX, nodeJS, HTTP, websockets, Database access, ADO.NET, JDBC, API contracts, ORM, Securing webapplications, Computer science (P170), Informatics (P175), Computer technology (T120)

Position of the course

The objective of this course is to understand the basic principles of the architecture and the functioning of the backend of a mobile or web application. The students learn to develop web applications and web services that manipulate data in a database.

Contents

- Communication with the server
  - The operation of the HTTP protocol and the structure of HTTP messages
  - Handling of HTTP messages
- Interface definitions: specification via contracts (OAS) and schemas
- REST API and services: concepts and development (synchronous and asynchronous)
- Security aspects of web applications: OAuth, SQL-injection, XSS, CSRF
- Architecture of web applications: multilayer model, MVC server side: principles f.o. request routing and handling dynamic generation of webpages, dependency injection
- ORM: concepts, basic principles and functioning of ORM frameworks
- Crosscutting concerns like logging, authentication, monitoring: principles and implementation

Frameworks: .NET focus on ASP.NET MVC and Web API, Spring: JPA, REST, gateways, nodeJS

Initial competences

- Being able to program and design in an object oriented way on an advanced level (in Java and C#)
- Basic knowledge of databases
- To master the operation and principles of user interfaces that use a backend

Final competences

1 Design, implement and validate an interface contract for services.
2 Develop REST web services using different frameworks
3 Develop a web application with dynamically generated pages

4 Explain the architecture and the basic principles of a backend and provide an overview of the protocols used for this
5 Using dependency injection and annotations to realize easily maintainable, testable, ... backends.
6 Explain the MVC principle using an example and implent it in a web application (serverside).
7 Explain and illustrate the basic principles of ORM with an example and design and implement a data layer.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Group work, Seminar, Lecture

Extra information on the teaching methods

- Lectures (24 hrs)
- Labs (36 hrs): individual work on PC and teamwork (extensive computer lab)

Learning materials and price

Syllabi, supplemented with the presentation material (slides and sample applications) used during the lectures, tutorials on the internet.
Bundled slides are distributed via Hermes at approximately 6 €.
Software: Visual Studio 2022 Community Edition, IntelliJ, ...

References

- "Programming Web Applications with Node, Express and Pug", Jörg Krause, Apress, 2017
- "Securing PHP Apps", Ben Edmunds, Apress, 2016
- "Professional ADO.NET 3.5 with LINQ and the Entity Framework", Roger Jennings, Wrox, 2009
- "XML in a Nutshell - A Desktop Quick Reference", Harold Elliotte Rusty, Means W Scott, O'Reilly, 2001
- Create a web API with ASP.NET Core, https://docs.microsoft.com/en-1 us/aspnet/core/tutorials/first-web-api6
- ASP.NET documentation, https://docs.microsoft.com/en-us/aspnet/core/
- Building a RESTful Web Service, https://spring.io/guides/gs/rest-service
- Accessing Relational Data using JDBC with Spring, https://spring.io/guides/gs/relational-data-access/
- Accessing Data with JPA, https://spring.io/guides/gs/accessing-data-jpa/
- Open API specification, https://oai.github.io/Documentation/
- Oauth 2.0, https://oauth.net/2/
- Top 10 Web Application Security Risks, https://owasp.org/www-project-top-ten/
- The WebSocket Protocol, https://tools.ietf.org/html/rfc6455

Course content-related study coaching

The student can always make an appointment with the teachers.

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Skills test, Written assessment

Examination methods in case of periodic assessment during the second examination period

Skills test, Written assessment

Examination methods in case of permanent assessment

Skills test, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

During the labs several tests are organized on the computer. The score on the NPE is the combination of tests on the labs (3/4) and the group assignment (1/4).
The exam is a combination of a written exam and computer exercises. The computer exercises are open book.

Calculation of the examination mark

Exam: 60% (written examen and computer exercises)
Labs: 40% (tests and group assignment)
In the second examination period: score = maximum (E, 40% L + 60% E), where L is the score of the lab and E the score of the exam in the second examination period.