

TEACH4EDU4

Accelerating the transition
towards Edu 4.0 in HEIs



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JOINT CREATIVE CLASSROOMS CATALOGUE



TALLINN UNIVERSITY



UNIVERSITY OF
BELGRADE



JCC TOPICS

Advanced Database Systems

Information Retrieval and Data Mining

Internet of Things Embedded Software Development

Internet Security and Trustworthiness

Machine Learning School

Modelling and Computer Simulation

Software Architectures Analysis and Design

Robotics: Embedded Software Development

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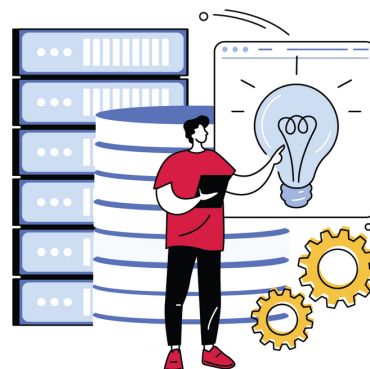


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"Accelerating the transition towards Edu 4.0 in HEIs – TEACH4EDU4"
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ADVANCED DATABASE SYSTEMS

Number of ECTS: 3
Synchronous workload: 35
Asynchronous workload: 51
Dates: 10/2022-02/2023
Language: English
Number of participants: 30



Goal of JCC:

The aim of this course is to acquaint students with the theory and technology needed to implement advanced database systems including relational, temporal, deductive, object oriented, active and graph databases. In addition, various indexing, partitioning, optimization, and denormalization techniques will be covered. Students will learn about new trends and open questions in the field of database theory.

Learning outcomes:

- conduct database analytics through practical work in SQL
- use basic concepts of data flow systems
- implement various database optimization techniques
- implement database indexing and partitioning techniques
- apply different optimization techniques in complex database applications
- manage temporal data
- analyze conflicts in active databases
- implement a data flow application using the default data flow system
- analyze databases using a specific data model
- implement an active database using the default database management system
- design and implement a complex database application

Learning outcomes assessment:

Forming teams for the implementation of the student's projects dealing with advanced database systems. Students will need to implement a complex example database, generate adequate data, implement a contextual application, present their work and write a report.

Teachers:

University of Zagreb:

Markus Schatten, mschatte@foi.unizg.hr

University of Belgrade:

Srđa Bjeladinović, srdja.bjeladinovic@fon.bg.ac.rs

Milica Škembarević, milica.skembarevic@fon.bg.ac.rs

Sladjan Babarogić, sladjan.babarogic@fon.bg.ac.rs

University of Žilina:

Michal Kvet, michal.kvet@fri.uniza.sk

Prerequisites for the JCC:

Students should have completed the elementary database course

Number and type of assesment:

Students will work on students' projects and take the final exam (test)



INFORMATION RETRIEVAL AND DATA MINING

Number of ECTS: 2

Synchronous workload: 30

Asynchronous workload: 30

Dates: 15.-30.09.2022.

Language: English

Number of participants: 25



Goal of JCC:

The aim of the program is to introduce the discipline of data mining and information retrieval, and to enable students to apply methods of data mining with an emphasis on textual data. The course is project-oriented and it is planned to solve different tasks on the same data sets for teams from the universities involved.

Learning outcomes:

- identify appropriate visualization methods and apply them to a given data set
- explain the principles of clustering and data classification algorithms and apply them to given data sets using appropriate software
- explain the principles of optimization of hyperparameters and selection of attributes for a given problem of grouping or classification of data and apply them in solving the problem of data analysis using the selected software
- explain the principles of inverted indexes and compression for the problem of information retrieval
- explain the principles of textual data representation using the bag of words model.
- apply pre-processing methods on a given set of text data and represent them in a form that will enable the application of basic tasks of text mining (visualization, grouping, classification)

Learning outcomes assessment:

Checking theoretical knowledge through quizzes, evaluating solutions to problem tasks of data mining for given data sets.

Teachers:

University of Belgrade:

Sandro Radovanović,
sandro.radovanovic@fon.bg.ac.rs

University of Zagreb:

Jasminka Dobša jasminka.dobsa@foi.unizg.hr

Prerequisites for the JCC:

Participants should have passed exams of mathematical courses including area of mathematical analysis and linear algebra and introductory course of probability and statistics

Number and type of assesment:

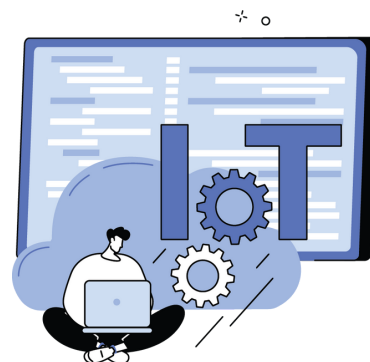
2 assessments of practical work (10 points), 3 quizzes (30 points), 2 project tasks (2*90 min joint students work, 60 points)





INTERNET OF THINGS EMBEDDED SOFTWARE DEVELOPMENT

Number of ECTS: 2
Synchronous workload: 20
Asynchronous workload: 40
Dates: 01.06.-30.06.2022.
Language: English
Number of participants: 15



Goal of JCC:

IOT ESD is a short 3-week training in which students are taught to develop microprocessor-based hardware solutions. As part of the education, students are introduced to the basics of electronic circuits and the physical characteristics of various components. Solution development includes hardware design and application background development in C / C ++. The microprocessor used and the basic hardware are based on the Photon Particle component. In addition to application development, students are introduced to different types of sensors and actuators that they can use when designing their projects. Thanks to the IOT features of the Photon Particle component, the training includes connecting and managing devices over the Internet.

Learning outcomes:

- interpret and use ESD development documentation
- develop a prototype IOT application
- program an ARM based micro-controller using C / C ++ development tools
- develop an IoT solution and connect it to existing business systems

Learning outcomes assessment:

Simple independent tasks that will test the mastery of basic knowledge and skills relevant to the project, work on the project within the team - design the development of a new IoT device that will send simple data to the cloud infrastructure (cloud). (e.g. create a circuit that will send the cloud storage temperature in real time), they need to develop a prototype IOT solution and application. (e.g. create a prototype system that will record cloud temperatures in real time with an average display on mobile devices), the student team should develop a part of the IOT solution within the project and connect it with the existing business systems. (e.g. create a product counter in the production business system and integrate it with the existing delivery note system).

Teachers:

University of Zagreb:

Boris Tomas, Boris.Tomas@foi.unizg.hr

University of Žilina:

Michael Hodon, Michal.Hodon@fri.uniza.sk

Prerequisites for the JCC:

Undergraduate or graduate students with basic C/C++ or higher language skills

Number and type of assesment:

One written exam, one team project presentation and evaluation





INTERNET SECURITY AND TRUSTWORTHINESS

Number of ECTS: 3
Synchronous workload: 35
Asynchronous workload: 55
Dates: 26.09.2022. – 31.01.2023.
Language: English
Number of participants: 24



Goal of JCC:

The program will guide students toward the safe use of web resources through an in-depth understanding of core technologies and security issues from three key perspectives - human, computer networks, and web technologies.

Learning outcomes:

- summarize concepts, theories and research within the domain of trust in technology
- explain the types of data used in network security monitoring, the alert assessment process and the classification of intrusion events with a diamond model
- use the knowledge gained to solve the Capture-The-Flag (CTF) challenge
- apply NIST incident management procedures in response to an incident
- analyze common vulnerabilities in network and web technologies, attacks, and data for the purpose of identifying warning sources
- assess vulnerability assessment tools
- create a virtual laboratory environment for conducting simulated penetration testing

Learning outcomes assessment:

Self-assessments, automated checks, monitoring through CTF activities.

Teachers:

University of Zagreb:

Igor Tomićić, igor.tomicic@foi.hr

Tallinn University:

Sonia Sousa, sonia.sousa@tlu.ee

University of L'Aquila:

Dajana Cassioli, dajana.cassioli@univaq.it

University of Žilina:

Jana Uramova, Jana.Uramova@fri.uniza.sk

Prerequisites for the JCC:

Basics of computer networks

Number and type of assesment:

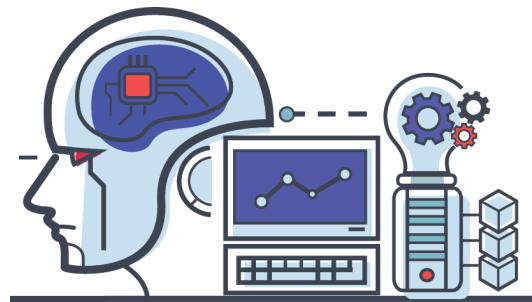
Self-assessments, automated checks, monitoring through CTF activities





MACHINE LEARNING SCHOOL

Number of ECTS: 6
Synchronous workload: 132
Asynchronous workload: 48
Dates: 5.9.2022. – 30.11.2022.
Language: English
Number of participants: 30



Goal of JCC:

A course in modern machine learning methods that covers theoretical and practical aspects.

Learning outcomes:

- explain basic concepts in the field of machine learning such as: machine learning, implicit and explicit representation of knowledge, local and global generalization, overfitting, bias, variance, regularization and others
- explain the principle of basic machine learning methods
- assess where and how machine learning methods can be applied
- apply machine learning methods and approaches
- identify machine learning problems and look for appropriate modern methods

Learning outcomes assessment:

Evaluation of mandatory tasks and final exam.

Teachers:

University of Belgrade:

Sandro Radovanović,
sandro.radovanovic@fon.bg.ac.rs

University of L'Aquila:

Andrea Manno, andrea.manno@univaq.it

University of Žilina:

Milan Straka, milan.straka@fri.uniza.sk
Michal Gregor, michal.gregor@feit.uniza.sk

Prerequisites for the JCC:

Participants should have basic programming skills, e.g. Python; a background in basic algebra, analysis - for the majority of modules, they are not strictly required

Number and type of assesment:

Student assessment is going to be three-fold: based on select activities in each module (such as Google Colab notebooks and quizzes), the team project and the final exam





MODELING AND COMPUTER SIMULATION

Number of ECTS: 2
Synchronous workload: 35
Asynchronous workload: 25
Dates: 19.4.2022. – 6.5.2022.
Language: English
Number of participants: 25



Goal of JCC:

The goal of the JCC is to work together and exchange knowledge of teachers and students on modeling and computer simulations.

Learning outcomes:

- compare simulation experiments and conduct sensitivity analysis
- identify system problems that can be solved using modeling and computer simulation
- identify the input parameters of the model from the system observation
- evaluate the results of the simulation in order to improve the system
- formulate simulation experiments

Learning outcomes assessment:

Self-assessments and monitoring through collaborative activities.

Teachers:

University of Belgrade:

Aleksandar Marković,
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University of L'Aquila:

Vittorio Cortellessa,
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University of Žilina:

Peter Márton, peter.marton@fri.uniza.sk

Prerequisites for the JCC:

There are none

Number and type of assesment:

3 quizzes and 3 projects





SOFTWARE ARCHITECTURES ANALYSIS AND DESIGN

Number of ECTS: 2

Synchronous workload: 17

Asynchronous workload: 43

Dates: 01.10.2022. – 31.01.2023.

Language: English

Number of participants: 10



Goal of JCC:

The aim of this program is to expand the knowledge and skills of students from partner universities who receive in the home courses Analysis and Development of Program and Software Architecture. These courses are disjoint, but complementary and allow students from both universities to expand their knowledge in the theoretical and practical level in areas that complement each other.

Learning outcomes:

- model the entire software architecture of the system and design a mobile application
- apply practices and principles of agile development process according to the development methodology "SCRUM"
- develop mobile application and background services
- prepare documentation for architectural design and prototyping product
- explore current trends related to architecture and software product development
- explore DevOps tools and practices
- determine the appropriate SOLID software design concepts to be used in the project
- assess the technical debt of the implemented software project

Learning outcomes assessment:

Verification of learning outcomes would be conducted through formative and summative tests of knowledge. Formative checks would be: self-assessment of knowledge in the form of automated tests/quizzes and direct feedback, self-assessment of knowledge through the application and implementation of the activities covered in the practical project. Summative knowledge tests would include: evaluation of the project application with teacher feedback, evaluation of architecture design with teacher feedback, examination of theoretical knowledge in the form of a classical exam, evaluation of the finished project in the form of presentation and defense of the project.

Teachers:

University of Zagreb:

Zlatko Stapić, zlatko.stapic@foi.hr

University of L'Aquila:

Henry Muccini,

henry.muccini@univaq.it

Prerequisites for the JCC:

Students' need to have attended a basic Software Engineering course. Better if they also have good programming skills in Java, Kotlin or C#

Number and type of assesment:

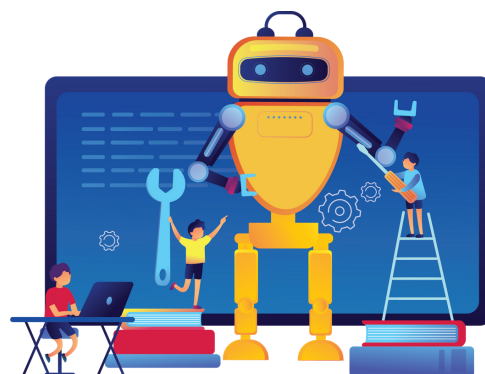
Students' will have to work together on a shared project. UnivAQ students' will focus more on architectural aspects of the shared project. FOI's students will focus more on the mobile app implementation of the selected joint project.





ROBOTICS: EMBEDDED SOFTWARE DEVELOPMENT

Number of ECTS: 3
Synchronous workload: 30
Asynchronous workload: 59
Dates: 25.04.2022.-29.04.2022.
Language: English
Number of participants: 10



Goal of JCC:

In the course, students should get the basic knowledge about the embedded systems development. They should get in touch with the C/C++ programming of special embedded systems with ATmega328 MCU used as the control unit. IDE Atmel Studio is used for this purpose. The students will program the robot controlled through Bluetooth interface via the smartphone application.

Learning outcomes:

- acquiring the basic knowledge about the embedded systems development,
- learning how to assemble control boards driven by AtMega328,
- how to program control boards driven by AtMega328,
- how to integrate control boards driven by AtMega328, into the mobile robotics.

Learning outcomes assessment:

The students will present the functionality of the assembled robot by driving its movement through the mobile-phone application.

Teachers:

University of Zagreb:

Boris Tomaš, boris.tomas@foi.unizg.hr

University of Žilina:

Michal Hodon, michal.hodon@fri.uniza.sk

Prerequisites for the JCC:

Basics of physics, basics of electrotechnics, basics of programming

Number and type of assesment:

Final project - student work on the own project which will be evaluated



CONTACT US



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