

## **Institute of Computer Science, University of Natural Sciences and Humanities, Siedlce, Poland**

Name of teacher/leader expert: Dariusz Mikulowski Phd

### Educational contents

1.1. Name of subject: **Programming Platforms.**

As educational content of this course, students of the 5th semester (3rd year) will get acquainted with Java and .NET platforms in the context of creating web applications using them. They will learn about the 3-tier architecture of creating such applications and its MVC paradigm. They do this with Spring family frameworks.

1.2. Name of subject: **Programming technologies Internet systems**

In this course, students will of V semester learn about various JavaScript-based frontend frameworks for creating web applications. These are technologies such as Node, Angular, Bootstrap or React etc.

1.3. Name of subject: **Designing web and distributed applications.**

As part of this course, students of II semester Master degrelearn to design and implement a web application based on the architecture of microservices using various technologies such as Spring-boot, .NET and Python Flask.

1.4. Name of subject: **Typhlo-informatics**

This course is designed for blind and partially sighted students of the 1st semester of all faculties. During the course, students learn to use assistive technologies designed for the visually impaired, such as screen readers, screen magnifiers and special equipment, such as soundproofed cell phones. They also learn to use these technologies to work with popular applications such as web browsers and office package. Applications.

### Research

Topic: **Supporting technical education, daily functioning and independent movement of visually impaired people**

**The research focuses on the several following aspects:**

1. **Supporting technical education, in particular teaching mathematics to the blind and visually impaired. These studies were carried out as part of the PlatMat and Euromath projects carried out in 2014 2020. As a result of the incidents, there were developed platforms for remote teaching mathematics of such people by sighted teachers and tutors. There were also created educational materials for children from schools in Poland, Ireland and the Netherlands regarding mathematics.**

2. **Developing technologies supporting independent movement of the blind. As part of this research, ontologies are used to design systems supporting outdoor and indor navigation of blind people. For navigation outside buildings, a specially designed object-oriented ontology map and 3-dimensional binaural sound scenes are used, which create the so-called Augmented Sound Reality. For the indoor**

navigation, the ontology of the object map, the graph database for routing and the beacon sensor sets are used. This research is currently underway as a building navigation support system called NaviSecure.

3. Supporting sustainable distance learning by exchanging accessible multilingual educational content. The research aims to provide a system in which able-bodied, blind and visually impaired students will be able to use the same educational content in an accessible way. These works were carried out as part of the international V4ACART project. As part of it, educational packages for students and facilities enabling their use by blind and partially sighted students have been created.