European Funds
Knowledge Education Development

Republic of Poland

NAWA
POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

European Union
European Social Fund

STUDY GUIDE

Cybersecurity of the IoT Solutions (hybrid)

Organised by

Poznan University of Technology

POLITECHNIKA POZNAŃSKA

PROGRAM SPINAKER

1. IDENTIFYING DATA.	
· Course Name.	Cybersecurity of the Internet of Thing solutions (hybrid)
· Coordinating University.	Poznan University of Technology
· Partner University(ies) Involved.	-
· Course Field(s).	Comprehensive approach to data security in IoT solutions
· Related Study Programme.	-
· Course Code.	-
· ISCED Code.	06 Information and Communication Technologies (ICTs)
· SDG.	Goal 4: Quality education, Goal 11: Sustainable cities and communities
· Study Level.	Bachelor (B), Master (M)

· Number of ECTS credits allocated.	15 ECTS
· Mode of Delivery.	Hybrid
· Language of Instruction.	English
· Delivery Period.	Summer semester
· Course Dates.	1st (online) part: 12-30.06.2023; 2nd (onsite PUT) part: 03-30.07.2023
· Precise Schedule of the Lectures.	In the first part (12-30.06), students will start remote learning on a dedicated e-learning platform, in which they will learn about theoretical issues through access to didactic materials in the form of interactive multimedia presentations and recordings with their discussion. The online part will last 20 days (60 hours), during which the teaching staff will be constantly available to students online. In the second part (03-30.07), students will carry out the course in a full-time form at Poznan University of Technology, through laboratory classes (60 hours) in 3 groups of 15 students. Each group, under the supervision of the teaching staff, will have access to network devices, IoT laboratory sets, and specialized software. Students will be introduced to Polish culture, visit Poznań and take a dance course (20 hours). For the duration of the full-time part of the summer school, students will be housed in PUT dormitories.
· Key Words.	Cybersecurity, network security, IoT systems, networking, Big Data, IT forensics, post-hacking analysis

· Catchy Phrase.	The course is characterized by a unique approach aimed at providing knowledge and skills in the field of a comprehensive approach to data security in IoT solutions.
· Link to Course Description.	https://nawa-spinaker.put.poznan.pl/?page_id=137

· Prerequisites and co-requisites.	Fundamentals of Computer Networks, English B2 (A student joining this course should have basic knowledge of TCP / IP stack protocols. He/she should understand the communication process between network devices and know the basics of operating systems.)
· Number of EUNICE students that can attend the Course.	The IoT Security course will also be offered in a hybrid mode, divided into 2 parts, in which 45 students are expected to participate (10 students from UPC, and 35 students from Europe).
· Course inscription procedure(s).	Submit your application via the button 'Apply Now' on the Eunice website

2. CONTACT DETAILS.	
· Department.	Faculty of Computing and Telecommunications
· Name of Lecturer.	Prof. Mariusz Głąbowski, D.Sc. Eng; Michał Weissenbergj, M.Sc. Eng
· E-mail.	mariusz.glabowski@put.poznan.pl; michal.weissenberg@put.poznan.pl
· Office.	Faculty of Computing and Telecommunications
· Other Lecturers.	-

3. COURSE CONTENT.

The course „Cybersecurity of the Internet of Thing solutions" is an intensive international course offered to students of the European University EUNICE and other partner universities. The course is characterized by a unique approach aimed at providing knowledge and skills in the field of a comprehensive approach to data security in IoT solutions: from the place of data generation/collection, through its transfer, to its processing and analysis with the use of artificial intelligence.

4. LEARNING OUTCOMES.

After completing the course, students will receive certificates of completion and 15 ECTS points.

5. OBJECTIVES.

1. *IoT and IIoT, including planning, configuration, and protection of the IoT system, edge computing, design of industrial IoT systems, protocols used for communication,*
2. *Networking, including local networks used to build the IoT system along with their protection, data transmission from end devices to the system analysing the obtained results along with security*
3. *Big Data, including analysis, security, and interpretation of data from the IoT system, security of the applications and algorithms used*

4. *System security, including security audit, penetration tests, and hacking, post-hacking analysis, IT forensics*

6. COURSE ORGANISATION.	
UNITS	
1.	*Introduction* a) *Cybersecurity cube* b) *Cryptography* c) *TCP/IP protocol stack* d) *Threats and Attacks (warms, botnets, sociotechnics, DoS, DDoS, spoofing, etc.)* e) *Data Protection in IoT (Lifecyle, Data at Rest, Data in Use, Data on the Move)* f) *Cybersecurity Technologies*
2.	*IoT and IIoT Fundamentals* a) *IoT architecture* b) *Sensors* c) *Microcontrollers in IoT* d) *Sensors & Microcontrollers* e) *Radio communication for IoT and IIoT* f) *Messages exchanging: i.a., CoAP, MQTT, RabbitMQ, Protecting MQTT and RabbitMQ* g) *Examples of IoT Attacks: Mirai, Stuxnet, critical infrastructure attacks*
3.	*IoT Networks and Systems* a) *Vulnerabilities and Attacks at the Hardware Layer (physical vulnerabilities, firmware vulnerabilities)* b) *Vulnerabilities and Attacks at the Communication Layer* c) *Threat Mitigation Technologies* d) *Examples of IoT Network Systems*
4.	*IoT Networks and Systems Analysis and Security* a) *System Security* b) *Introduction to Incident Response* c) *IT systems audits* d) *Penetration tests* e) *Advanced (Web) Hacking* f) *Digital forensics*
5.	*Big Data Security* a) *Data processing cycle analysis* b) *Systems for Big Data management* c) *Security issues related to the processing of big data (including AI)*
LEARNING RESOURCES AND TOOLS.	
The IoT Security course will be implemented using a dedicated e-learning platform based on the Moodle platform. Students will gain access to teaching materials in the form of interactive multimedia presentations, recordings with theoretical issues, laboratory instructions, and instructional videos on the implementation of laboratory tasks. The implementation of the course will be supported by providing remote access to Poznan University of Technology computers connected to ready-made laboratory sets and equipped with specialized software. In addition, students will be provided with a virtual machine with instructions, containing a set of the necessary software for the implementation of the course. The teaching staff will include employees of PUT and the European University EUNICE.	
PLANNED LEARNING ACTIVITIES AND TEACHING METHODS.	

The course consists of many form of activities and is offered in hybrid (140 hours) and online (120 hours) modes. Materials in the form of films, presentations, and instructions will be available for the students. An important element of the course is software developed in the form of a virtual machine, which will enable the course to be completed in both hybrid and online modes. As part of the project, remote access to physical devices will be provided.

7. ASSESSMENT METHODS AND CRITERIA.
Written exam at PUT.
OBSERVATIONS.

8. BIBLIOGRAPHY AND TEACHING MATERIALS.
The bibliography and teaching materials will be provided at Moodle platform.