## COURSE DESCRIPTION

| | | |
|---|---|---|
| Course code | full-time studies | |
| | part-time-studies | |
| Course name | **Implementacje zaawansowanych rozwiązań teleinformatycznych** | |
| Course name in English | **Implementing advanced network technologies** | |
| Valid from academic year | **2022/23** | |

## PLACEMENT IN THE TEACHING PROGRAM

| | |
|---|---|
| Field of study | **Computer Science** |
| Level of education | **1ˢᵗ degree** |
| Studies profile | **General** |
| Form and method of teaching classes | **Full-time and part-time studies** |
| Specialization | **Information and communication technology** |
| Organizational unit responsible for the course | **Chair of Informatic Systems** |
| Course coordinator | **Dr Radoslaw Belka, Eng.** |
| Approved by | **Dean of the Faculty of Electrical Engineering, Automatic Control and Computer Science Roman Deniziak, KUT prof., DSc, PhD** |

## GENERAL CHARACTERISTIC OF THE COURSE

| | | |
|---|---|---|
| Course affiliation | **Specialty** | |
| Course status | **Elective** | |
| Language | **English** | |
| Semester | full-time studies | **VII** |
| | part-time-studies | **VII** |
| Requirements | **Computer Networks, Routing and Switching Essential, Enterprise Network** | |
| Exam (YES/NO) | **NO** | |
| ECTS | **4** | |

| Course form | | lecture | classes | laboratory | project | other |
|---|---|---|---|---|---|---|
| **Hours per semester** | full-time studies | **30** | **-** | **30** | **-** | **-** |
| | part-time-studies | **18** | **-** | **18** | - | **-** |

## LEARNING RESULTS

| Category | Result Symbol | Learning Results | References to the field of study results |
|---|---|---|---|
| Knowledge | W01 | Student knows and understands advanced routing protocols and their importance in professional ICT networks. | INF_W30 |
| | W02 | Student knows and understands how to configure and integrate different routing protocols | INF_W30 |
| | W03 | Student knows and understands the methods of planning advanced networks from the point of view of practical applications. | INF_W30 |
| Skills | U01 | Student can implement advanced routing mechanisms in ICT networks. | INF_U30 |
| | U02 | Student can configure and integrate advanced routing techniques as part of network scaling. | INF_U30 |
| | U03 | Student can analyze the operation of advanced routing protocols and diagnose and solve problems | INF_U30 |
| Social competence | K01 | Student is ready to undertake activities in the field of implementation of advanced ICT solutions | INF_K1 INF_K2 |
| | K02 | Student is ready to work and cooperate in a group in the field of implementing advanced routing techniques | INF_K1 INF_K2 |

## COURSE CONTENT

| Course Form | Content |
|---|---|
| **lecture** | 1.General rules for designing wired ICT networks, taking into account the issues of scalability and reliability.<br>2. Principles of designing and implementing wireless WLAN networks<br>3. Software-defined network solutions (SD-WAN and SD-Access)<br>4. QoS concepts for wired and wireless networks.<br>5. Advanced distance vector routing protocols. Route balancing and loop avoidance methodology. Diagnosing and solving problems<br>6. Advanced scaling of multi-area link state protocols using the intermediate area.<br>7. Integration of different routing domains. Basics of redistribution. Advanced redistribution in internal gateway routing protocols.<br>8. Conditional routing (Route-Map) and virtual domains (Virtual Routing).<br>9. Integration of various autonomous systems. External gateway routing. BGP pro-protocol in external and internal variant. BGP path control. |

| | 1. Configuration and verification of advanced spanning tree protocol settings and link aggregation functions<br>2. Load balancing in advanced dynamic routing protocols.<br>3. Advanced scaling of multi-area link state protocols using intermediate area.<br>4. Integration of routing domains using route redistribution mechanism<br>5. Redistribution of routes for IPv6 networks<br>6. Advanced configuration of network address translation and its integration with routing mechanisms<br>7. Configure External Gateway (BGP) Routing<br>8. Management Plane Security.<br>9. Increasing the reliability of the computer network through the redundant gate mechanism (First Hop Redundancy Protocols) |
|---|---|
| **laboratory** | |

## LEARNING RESULTS VERIFICATION METHODS

| Result Symbol | Learning results verification methods | | | | | |
|---|---|---|---|---|---|---|
| | **Oral Exam** | **Written Exam** | **Midterm** | **Project** | **Report** | **Other** |
| W01 | | | ☑ | | | |
| W02 | | | ☑ | | | |
| W03 | | | ☑ | | | |
| U01 | | | ☑ | ☑ | ☑ | |
| U02 | | | ☑ | ☑ | ☑ | |
| U03 | | | ☑ | ☑ | ☑ | |
| K01 | | | | ☑ | ☑ | |
| K02 | | | | ☑ | ☑ | |

## ASSESSMENT FORMS AND CRITERIA

| Course Form | Assessment Form | Assessment Criteria |
|---|---|---|
| lecture | assessments | Passing the assessments (at least 50% of the total point) |
| laboratory | assessments | Handlab realization of all recommended laboratory exercies. Passing the integration challenge tasks (at least 50% of the total point) |

## STUDENT'S VOLUME OF WORK

| | ECTS Balance | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No.** | **Activity Type** | **Student Involvement** | | | | | | | | | **Unit** |
| | | **full-time studies** | | | | | **part-time-studies** | | | | |
| | | Lec | C | Lab | P | S | Lec | C | Lab | P | S | |
| 1. | Participation in classes according to the schedule | 30 | | 30 | | | 18 | | 18 | | | h |
| 2. | Other (consultations, exams) | 2 | | 2 | | | 2 | | 2 | | | h |
| 3. | **Total with the direct assist of an academic teacher** | **64** | | | | | **40** | | | | | h |
| 4. | **Number of ECTS, that students obtains with the direct assist of an academic teacher** | **2,56** | | | | | **1,60** | | | | | ECTS |

| 5. | Hours of unassisted student work | 36 | 60 | h |
|---|---|---|---|---|
| 6. | Number of ECTS that student obtains working unassisted | 1,44 | 2,40 | ECTS |
| 7. | Practical classes volume of work | 30 | 18 | h |
| 8. | Number of ECTS obtained by student at practical classes | 1,2 | 0,72 | ECTS |
| 9. | Total student's volume of work expressed in hours | 100 | 100 | h |
| 10. | ECTS | 4 | | ECTS |

## BIBLIOGRAPHY

1. Brad Edgeworth, CCNP and CCIE Enterprise Core ENCOR 350-401, 2019
2. Kevin Wallace, CCNP Enterprise Core ENCOR 350-401 and Advanced Routing ENARSI 300-410 Official Cert Guide Library, 2020