



Subject card

|   |   |  |                                     |            |  |         |     |
|---|---|--|-------------------------------------|------------|--|---------|-----|
| Subject name and code                       | Radio Communication Systems, PG_00048121  |  |                                     |            |  |         |     |
| Field of study                              | Electronics and Telecommunications  |  |                                     |            |  |         |     |
| Date of commencement of studies             | October 2023  | Academic year of realisation of subject  |                                     |            | 2025/2026  |         |     |
| Education level                             | first-cycle studies   | Subject group  |                                     |            | Optional subject group<br>Subject group related to scientific research in the field of study |         |     |
| Mode of study                               | Full-time studies   | Mode of delivery   |                                     |            | at the university  |         |     |
| Year of study                               | 3   | Language of instruction  |                                     |            | Polish   |         |     |
| Semester of study                           | 5   | ECTS credits   |                                     |            | 2.0  |         |     |
| Learning profile                            | general academic profile  | Assessment form  |                                     |            | exam   |         |     |
| Conducting unit                             | Department of Radiocommunication Systems and Networks -> Faculty of Electronics, Telecommunications and Informatics   |  |                                     |            |  |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  | dr inż. Andrzej Marczak  |                                     |            |  |         |     |
|   | Teachers  | dr inż. Andrzej Marczak  |                                     |            |  |         |     |
| Lesson types and methods of instruction     | Lesson type   | Lecture  | Tutorial                            | Laboratory | Project  | Seminar | SUM |
|   | Number of study hours   | 30.0   | 0.0                                 | 0.0        | 0.0  | 0.0     | 30  |
|   | E-learning hours included: 0.0  |  |                                     |            |  |         |     |
| Learning activity and number of study hours | Learning activity   | Participation in didactic classes included in study plan   | Participation in consultation hours |            | Self-study   | SUM     |     |
|   | Number of study hours   | 30   | 2.0                                 |            | 18.0   | 50      |     |
| Subject objectives                          | The aim of the course is teach students the types of radiocommunication systems.  |  |                                     |            |  |         |     |
| Learning outcomes                           | Course outcome  | Subject outcome  |                                     |            | Method of verification   |         |     |
|   | [K6_U31] can identify telecommunications network architectures, differentiates their areas and functional elements, evaluates the quality of service delivery, calculates parameters of functional elements | The student is able to identify the architecture of radio communication networks and distinguishes between their functional elements.      |                                     |            | [SU1] Assessment of task fulfilment  |         |     |
|   | [K6_K02] is ready to critically assess possessed knowledge and acknowledge the importance of knowledge in solving cognitive and practical problems  | The student is able to choose the right radio communication system for specific applications.  |                                     |            | [SK5] Assessment of ability to solve problems that arise in practice                         |         |     |
|   | [K6_W34] Knows the characteristics of telecommunications channels, methods of securing information, modulation systems, methods of access to the channel.   | The student distinguishes between the basic multiple access methods and determines the basic properties of the radiocommunication channel. |                                     |            | [SW1] Assessment of factual knowledge  |         |     |
|   | [K6_W35] Knows the concepts of the technique of signal transmission, operation of telecommunications networks and multimedia services and the rules for providing them                                      | Student describes the properties of various types of the radio communication systems.  |                                     |            | [SW1] Assessment of factual knowledge  |         |     |

| Subject contents   | <ol style="list-style-type: none"> <li>1. Idea of radio communication system and network. Mobile and fixed communication system.</li> <li>2. Architecture of system, base station and mobile terminal.</li> <li>3. Multiple access methods FDMA, TDMA, CDMA, characteristics and comparison.</li> <li>4. Switching modes: channel switching and packet switching, their features and analysis. Applications.</li> <li>5. Characteristics and description of radio channel: noise, fading.</li> <li>6. Terrestrial radio communication systems.</li> <li>7. Satellite radio communication systems.</li> <li>8. The cellular system concept.</li> <li>9. Cell cluster, frequency reuse.</li> <li>10. First generation cellular systems.</li> <li>11. Digital cellular systems, their architecture and services.</li> <li>12. The GSM cellular system.</li> <li>13. The equipment of base stations, and mobile terminals.</li> <li>14. Elements of the cellular network architecture.</li> <li>15. Voice and data transmission in the GSM.</li> <li>16. The HSCSD, the GPRS and the EDGE high speed data subsystems.</li> <li>17. Physical and logical channels in GSM.</li> <li>18. Principles of operation and organisation of trunked radio systems.</li> <li>19. Characteristics and applications of trunked radio systems.</li> <li>20. The TETRA trunked radio system.</li> <li>21. Digital wireless telephony systems.</li> <li>22. The DECT system.</li> <li>23. The UMTS, 3rd generation cellular system.</li> <li>24. Architecture of the UMTS system.</li> <li>25. The IEEE802.15.1 Bluetooth wireless data transmission standard.</li> <li>26. The IEEE802.15.4 ZigBee wireless data transmission standard.</li> <li>27. The IEEE802.16 WIMAX wireless data transmission standard.</li> <li>28. The IEEE802.11 wireless local area network standard.</li> <li>29. Technical solutions used in modern radio communication systems.</li> <li>30. Software defined radio.</li> </ol> |                   |  |                          |                   |                               |              |       |        |
|--|--|-------------------|--|--------------------------|-------------------|-------------------------------|--------------|-------|--------|
| Prerequisites and co-requisites                                | No requirements  |                   |  |                          |                   |                               |              |       |        |
| Assessment methods and criteria                                | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Subject passing criteria</th> <th style="width: 25%;">Passing threshold</th> <th style="width: 25%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Written exam</td> <td>51.0%</td> <td>100.0%</td> </tr> </tbody> </table>   |                   |  | Subject passing criteria | Passing threshold | Percentage of the final grade | Written exam | 51.0% | 100.0% |
|  | Subject passing criteria   | Passing threshold | Percentage of the final grade                                |                          |                   |                               |              |       |        |
| Written exam   | 51.0%  | 100.0%            |  |                          |                   |                               |              |       |        |
|  |  |                   |  |                          |                   |                               |              |       |        |
| Recommended reading  | Basic literature   |                   | K. Wesołowski Systemy radiokomunikacji ruchomej WKŁ Warszawa |                          |                   |                               |              |       |        |
|  | Supplementary literature   |                   | R. Zienkiewicz Telefony komórkowe GSM i DCS WKŁ Warszawa     |                          |                   |                               |              |       |        |
|  | eResources addresses   |                   | Adresy na platformie eNauczanie:                             |                          |                   |                               |              |       |        |
| Example issues/<br>example questions/<br>tasks being completed |  |                   |  |                          |                   |                               |              |       |        |
| Work placement   | Not applicable   |                   |  |                          |                   |                               |              |       |        |