# COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Electrical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Electrical and Electronics Engineering</td><td colspan="2">Degree level and programme type</td><td>bachelor's degree, full time programme</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">-</td><td colspan="2">Study profile</td><td>-</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Wireless Transmission Systems</td><td colspan="2">Course code</td><td>IS-FEE-10019W</td></tr>
<tr><td colspan="2">Course type</td><td>elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>winter</td></tr>
<tr><td>30</td><td></td><td></td><td></td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>2</td></tr>
<tr><td>Entry requirements</td><td colspan="9">-</td></tr>
<tr><td>Course objectives</td><td colspan="9">To acquaint students with the techniques used to transmit information in wireless systems. To acquaint students with the architecture, principles of operation and application of modern wireless systems.</td></tr>
<tr><td>Course content</td><td colspan="9">Decibel calculation in radiocommunication. Ranges and properties of radio waves used in wireless communication. Basics of radio wave propagation. Radio wave propagation in free space. The structure and characteristics of the radio link. Radiocommunication equation. Bases of antenna array operation. Mathematical description of multiport radio devices. Impedance, admittance and dissipation matrices in the description of the properties of wireless devices. The matching of radio devices. Rayleigh ratio. Basics of operation of various types of commonly used wireless systems - architecture, principle of operation, radio channels, application. Satellite systems, trunking systems, cellular systems.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">lecture</td></tr>
<tr><td>Assessment method</td><td colspan="9">exam and evaluation of reports</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="8">Learning outcomes</td><td>Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="8">has knowledge about radio wave propagation</td><td></td></tr>
<tr><td>LO2</td><td colspan="8">has knowledge about techniques used for transmission information in wireless systems</td><td></td></tr>
<tr><td>LO3</td><td colspan="8">has knowledge about structure, operation, mathematical description of multiport radio devices</td><td></td></tr>
<tr><td>LO4</td><td colspan="8">has knowledge about operation of antenna arrays</td><td></td></tr>
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|---|---|---|
| **LO5** | **has knowledge about operation of commonly used wireless systems** | |
| **LO6** | | |
| **Symbol of learning outcome** | **Methods of assessing the learning outcomes** | **Type of tuition during which the outcome is assessed** |
| **LO1** | **exam on lecture content** | **L** |
| **LO2** | **exam on lecture content** | **L** |
| **LO3** | **exam on lecture content** | **L** |
| **LO4** | **exam on lecture content** | **L** |
| **LO5** | **evaluation of reports and presentation of selected topic** | **L** |
| **LO6** | | |
| **Student workload (in hours)** | | **No. of hours** |
| **Calculation** | **lecture attendance** | **30** |
| | **preparation reports from homeworks** | **15** |
| | **preparation for and participation in exams/tests** | **15** |
| | | |
| | | |
| | | |
| | **TOTAL:** | **60** |

| **Quantitative indicators** | **HOURS** | **No. of ECTS credits** |
|---|---|---|
| **Student workload – activities that require direct teacher participation** | **30** | **1** |
| **Student workload – practical activities** | **15** | **0,5** |

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| **Basic references** | Siwiak K.: Radiowave propagation and antennas for personal communications. Artech House, 2007.<br>Saunders S.: Antennas and propagation for wireless communications systems. Wiley & Sons, 2007.<br>Rohde U.: RF/microwave circuit design for wireless applications. Wiley & Sons, 2013. |
| **Supplementary references** | Fujimoto K., James J. R.: Mobile antenna system handbook. Artech House, 1994.<br>Sorrentino R., Bianchi G.: Microwave and RF engineering. Wiley & Sons, 2010.<br>Randy L.: Antenna arrays : a computational approach. Wiley & Sons, 2010.<br>Rhee M.Y., Mobile communication systems and security. Wiley & Sons, 2009.<br>Maral G., M. Bousquet M., Satellite communications systems. Wiley & Sons, 2002. |
| **Organisational unit conducting the course** | Department of Photonics, Electronics and Lighting Technology — **Date of issuing the programme** |
| **Author of the programme** | **Marek Garbaruk, Ph.D. Eng.** — **20.02.2021** |

**L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar**