Załącznik nr 2 do Zarządzenia Nr 16/2022 Rektora PB

COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Bialystok University of Technology
Faculty of Electrical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Electrical Engineering</td><td>Degree level and programme type</td><td>Bachelor’s degree</td></tr>
<tr><td>Specialisation/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>-</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Electric Power Systems</td><td>Course code</td><td>IS-FEE-10068W</td></tr>
<tr><td>Course type</td><td>elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of educational activities</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>30</td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Fundamentals of electrical engineering</td></tr>
<tr><td>Course objectives</td><td colspan="9">To introduce the students into power system operation under normal and abnormal conditions. To get the knowledge of per unit system and symmetrical components method to be used in power system analysis. To introduce the students into the methods, modeling framework and approaches to be used in analysis of load flow, faults, and stability. To get the skill with practical power system analysis under its normal and abnormal conditions, relying on professional software.</td></tr>
<tr><td>Course content</td><td colspan="9">Introduction to power systems. General requirements and conditions in power system operation. Fundamentals of power generation, transmission and distribution. The per-unit system and symmetrical components. Power flow analysis. Symmetrical and unsymmetrical faults analysis. Power system stability. Voltage and power control. Protective relays. Power system reliability. Case studies on: power flow analysis, symmetrical and unsymmetrical fault analysis.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Lecture, specialization workshops</td></tr>
<tr><td>Assessment method</td><td colspan="9">Exam, discussion on case studies outcomes</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></td><td colspan="8">Knowledge: the graduate knows and understands</td><td></td></tr>
<tr><td>LO1</td><td colspan="8">student knows and understands the issues of power system operation under normal and abnormal</td><td></td></tr>
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	conditions	
LO2		
	Skills: the graduate is able to	
LO3	**student is able to gather the information based on different sources involving power system operation under normal and abnormal conditions**	
LO4	**student is able to apply the different methods and approaches to power system analysis purpose**	
	Social competence: the graduate is ready to	
LO5	**student is ready to work on the subject individually and in a team**	
LO6		
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	**exam**	**L**
LO3	**exam, discussion on the case studies' outcomes**	**L, SW**
LO4	**discussion on the case studies' outcomes**	**SW**
LO5	**discussion on the case studies' outcomes**	**SW**
LO6		
LO7		
Student workload (in hours)		**No. of hours**
Calculation	**class attendance**	**60**
	participation in classes and specialization workshops	**30**
	preparation for classes and specialization workshops	**10**
	work on the reports	**15**
	participation in student-teacher sessions related to the classes	**5**
	TOTAL:	**120**
Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**65**	**3**
Student workload – practical activities	**55**	**2**
Basic references	**1. Grigsby L.L.: *Power Systems*. CRC Press, 2007.** **2. Kothari D.P., Nagroth I.J.: *Modern Power System Analysis*. McGraw-Hill, 2008.** **3.Wayne B.H., Santoso S.: *Handbook of electric power calculations*. New York, McGraw-Hill Education, 2015.** **4. Bevtani H., Watanabe M., Mitani Y.: *Power system monitoring and control*. John Wiley and Sons, 2014.** **5. Gonen T.: *Modern power system analysis*. CRC/Taylor and Francis, 2013.** **6. Hase Yoshihide: *Handbook of power systems engineering with power electronics applications*. John Wiley and Sons, 2013.** **7. Glover D.J., Sarma M., Overbye T.J.: *Power system analysis and***	

	***design*. Cengage Learning, 2012.** **8. Grigsby L.L.: *Power systems*. CRC/Taylor and Francis, 2012.** **9.Grigsby L.L.: *Electric power generation, transmission and distribution*. CRC/Taylor and Francis, 2012.** **10. Gomez-Exposito A., Conejo A., Canizares C.: *Electric Energy systems: analysis and operation*. CRC/Taylor and Francis 2009.**	
Supplementary references	**1. Crappe M.: *Electric power systems*. ISTE, Wiley, 2008.** **2. El-Hawary M.E.: *Introduction to electrical power systems*. John Wiley and Sons, 2008.** **3. Gonen T.: *Electric power distribution system engineering*. CRC/Taylor and Francis, 2008.** **4. Xi-Fan Wang, Yonghua Song, Irving M: *Modern power systems analysis*. Springer, 2008.** **5. Grigsby L.L.: *Power systems*. CRC/Taylor and Francis 2007.**	
Organisational unit conducting the course	**Department of Electrotechnics, Power Electronics and Electric Power Engineering**	**Date of issuing the programme**
Author of the programme	**Robert Adam Sobolewski**	**01.02.2023**

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