COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">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>Specialization/ 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">Renewable Energy Technologies</td><td>Course code</td><td>IS-FEE-10078S</td></tr>
<tr><td>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>summer</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>3</td></tr>
<tr><td>Entry requirements</td><td colspan="9">-</td></tr>
<tr><td>Course objectives</td><td colspan="9">This module will introduce students to various renewable energy resources and technologies used for harnessing them. Students will also be able to understand introductory concepts of economics surrounding renewable energy system.</td></tr>
<tr><td>Course content</td><td colspan="9">Power system structure, systems for converting various forms of energy into electricity. Primary energy sources and processing systems. Hydro, Wind, Solar photovoltaic, Biomass and Geothermal Energy resources. Construction, operating principle, basic functional characteristics of these RES. Storage systems. Energy economics surrounding RES, costs, and pricing scheme.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Lectures with the support of media (video) and assignments.</td></tr>
<tr><td>Assessment method</td><td colspan="9">Assignments during the semester and a written test at the end of the semester.</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">Understand power system structure and the distinction between renewable and non-renewable energy sources.</td><td colspan="2"></td></tr>
<tr><td>LO2</td><td colspan="7">Understand global scenario involving energy demand and the need for renewable energy.</td><td colspan="2"></td></tr>
<tr><td>LO3</td><td colspan="7">Explain RES technologies: Hydro, Wind, Solar, Biomass and Geothermal.</td><td colspan="2"></td></tr>
<tr><td>LO4</td><td colspan="7">Compare various RES technologies and identify the most suitable technology based on local conditions</td><td colspan="2"></td></tr>
<tr><td>LO5</td><td colspan="7">Discuss the importance of storage in RES and the latest storage technologies.</td><td colspan="2"></td></tr>
<tr><td>LO6</td><td colspan="7">Understand energy costs including LCOE, LCC etc and</td><td colspan="2"></td></tr>
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	describe various pricing scheme surrounding RES.	
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	Assignments and test based on the lecture	**L**
LO2	Assignments and test based on the lecture	**L**
LO3	Assignments and test based on the lecture	**L**
LO4	Assignments and test based on the lecture	**L**
LO5	Assignments and test based on the lecture	**L**
LO6	Assignments and test based on the lecture	**L**
Student workload (in hours)		**No. of hours**
Calculation	**Class attendance**	**30**
	Assignments and self-study	**30**
	Preparation and write tests	**15**
	TOTAL:	**75**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**30**	**1.5**
Student workload – practical activities	**45**	**1.5**

Basic references	1. John Twidell and Tony Weir, "Renewable Energy Resources", 3rd edition, Taylor & Francis, 2015. 2. Gilbert M. Masters, "Renewable and Efficient Electric Power Systems", 2nd edition, Wiley-IEEE Press, 2013. 3. Aldo da Rosa, "Fundamentals of Renewable Energy Processes", Academic Press, 2005. 4. Francis M. Vanek, Louis D. Albright, and Largus T. Angenent, "Energy Systems Engineering: Evaluation and Implementation", 3rd edition, McGraw Hill, 2016.
Supplementary references	1. Bent Sorensen, "Renewable Energy: Physics, Engineering, Environmental Impacts, Economics and Planning", 5th Edition, Elsevier Academic Press, 2017. 2. B.K. Hodge, "Alternative Energy Systems & Applications", 2nd edition, Wiley, 2017. 3. Godfrey Boyle, "Renewable Energy: Power for a Sustainable Future", 3rd edition, Oxford University Press, 2012.

Organisational unit conducting the course	**Department of Electrotechnics, Power Electronics and Power Engineering**	**Date of issuing the programme**
Author of the programme	**Andu Dukpa, PhD**	**20.1.2022**

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