COURSE DESCRIPTION CARD

Faculty of Civil Engineering and Environmental Sciences									
Field of study								**Degree level and programme type**	
Specialization/ diploma path								**Study profile**	**Academic profile**
Course name	**Energetic use of biomass**							**Course code**	**IS-FCEE-00224W/S**
								Course type	**Erasmus**
Forms and number of hours of tuition	**L**	**C**	**LC**	**P**	**SW**	**FW**	**S**	**Semester**	**Winter/Summer**
	15		**15**					**No. of ECTS credits**	**4**
Entry requirements	**Basic information about chemistry; basic skills in laboratory tests**								
Course objectives	- presenting the principles of safe laboratory work -presenting the methods of testing the basic properties of biomass which influence its energetic purposes - preparation for conducting scientific research including thermal analysis and calorimetry								
Course content	**Lectures.** Proximate and ultimate properties of biomass. Characteristics and requirements for solid, liquid and gaseous biofuels. Biomass thermal processing. Waste-to-biomass. Environmental pollution caused by the energy sector. Current programs preventing pollution in the energy sector. **Laboratory.** Principles of work in a biomass laboratory. Proximate and ultimate analysis of biomass by the means of thermogravimetry, bomb calorimetry and TOC. Methodologies in investigating the moisture and ash content of biomass.								
Teaching methods	**Lecture, laboratory classes**								
Assessment method	**Lecture - written exam, laboratory – written exam, laboratory tests**								
Symbol of learning outcome	**Learning outcomes**								**Reference to the learning outcomes for the field of study**
LO1	collects and preserves biomass samples								**IS2_W01**
LO2	estimates basic physicochemical indexes of biomass								**IS2_W01, IS2_U05**
LO3	describes the study results with regard to current regulations								**IS2_U01, IS2_U05 IS2_U09**
LO4	student is aware of non-technical aspects of engineering activities								**IS2_K05**
LO5	student is able to work in a team								**IS2_U12**
LO6									

Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	Written exam	LC
LO2	Written exam	L, LC
LO3	Written exam	L, LC
LO4	Written exam	L
LO5	Written exam	LC
LO6		

Student workload (in hours)		No. of hours
Calculation	Participation in lectures	15
	Participation in laboratory classes	15
	Preparation for the written exam in lectures	15
	Preparation for laboratory tests	15
	Preparation for and attendance at the examination	15
	Participation in consultations	5
	TOTAL:	80

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	35	1,4
Student workload – practical activities	45	1,8

Basic references	Michaelides E.E.S. Alternative Energy Sources, Springer 2012. Brown R. C. Thermochemical Processing of Biomass: Conversion into Fuels, Chemicals and Power. Wiley 2011. Bonilla-Petriciolet, A., Rangaiah, G. P. Process Systems Engineering for Biofuels Development, Wiley 2020.
Supplementary references	Heinrichs H.· Martens P., Michelsen G.,· Wiek A. Sustainability Science An Introduction, Springer 2016. Simpson R., Sastry S. K. Chemical and Bioprocess Engineering, Springer 2013. Zweifel P., Praktiknjo A., Erdmann G. Energy Economics Theory and Applications, Springer 2017.

Organisational unit conducting the course	Department of Agri-Food Engineering and Environmental Management	Date of issuing the programme
Author of the programme	Magdalena Joka-Yildiz, PhD	20.03.2022

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