



MODULE SPECIFICATION

Module code	
Module title in Polish	Technologie Przetwarzania Biomasy
Module title in English	Biomass Treatment Technologies
Module running from the academic year	2016/2017

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	Environmental Engineering
Level of qualification	first cycle (first cycle, second cycle)
Programme type	academic (academic/practical)
Mode of study	full-time (full-time/part-time)
Specialism	Water Supply, Treatment of Wastewater and Solid Waste, Sanitary Pipelines and Systems
Organisational unit responsible for module delivery	Division of Waste Management
Module co-ordinator	Jolanta Latosińska , PhD, Eng.
Approved by:	Prof. Maria Żygadło

B. MODULE OVERVIEW

Module type	Core module (core/programme-specific/elective HES*)
Module status	optional module (compulsory/optional)
Language of module delivery	Polish/ English
Semester in the programme of study in which the module is taught	semester 7
Semester in the academic year in which the module is taught	winter semester (winter semester/summer semester)
Pre-requisites.	None (module code/module title, where appropriate)
Examination required	No (Yes/No)
ECTS credits	3

* elective HES – elective modules in the Humanities and Economic and Social Sciences



Politechnika Świętokrzyska

WYDZIAŁ INŻYNIERII ŚRODOWISKA, GEOMATYKI I ENERGETYKI

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	15			15	



C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to familiarise students with: biomass processing technologies, the types and properties of biomass, the technologies of thermal way of gaining energy from biomass.
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Module outcome code	Module learning outcomes	Mode of instruction (l/c/lab/p/others)	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student knows basic principles of obtaining biomass.	l/p	IŚ_W09 IŚ_W15	T1A_W03 T1A_W04 T1A_W05 T1A_W06 T1A_W07
W_02	A student knows the requirements concerning energy plants grown in Poland.	l/p	IŚ_W07	T1A_W01 T1A_W03 T1A_W08
W_03	A student is familiar with basic principles of obtaining energy from biomass.	l/p	IŚ_W15	T1A_W06
U_01	A student can obtain information from databases, literature on the subjects, and other sources.	l/p	IŚ_U02	T1A_U01 T1A_U05 T1A_U07
U_02	A student can prepare and give a short presentation on the effect of work on a project assignment.	p	IŚ_U05	T1A_U03 T1A_U04
U_03	A student can take environmental aspects while solving tasks.	p	IŚ_U15 IŚ_U25	T1A_U07 T1A_U09 T1A_U10 T1A_U14 T1A_U15
K_01	A student has the ability of presenting his/her results during project defence.	p	IŚ_K07	T1A_K07
K_02	A student is aware of the necessity to raise his/her professional and personal competences. A student individually improves and broadens his/her knowledge as regards environmental engineering.	l/p	IŚ_K03 IŚ_K05	T1A_K01 T1A_K02 T1A_K03 T1A_K04
K_03	A student understands the necessity of technological progress and the necessity of implementing new technical solutions in environmental engineering.	l/p	IŚ_K09	T1A_K02

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	Legal status of biomass utilisation. The potential of biomass in Poland and in the world.	W_01 U_01 K_02 K_03
2-3	The types of biomass (wood and wood scraps – chopped wood, sawdust, shavings, woodchips, bark; enriched fuels, i.e. briquette and pellets, plants from energy farming – their requirements and types; agricultural products and waste – haystraw and energy grains. Basic properties. The process of photosynthesis.	W_01 W_02 U_01 K_02 K_03
4-5	Energy plants grown in Poland. The features of energy plants. Energy cultivation: the techniques of growth and production of biomass; selecting a stand and preparing soil,	W_01 W_02



	selecting seedlings and the technology of planting; nurturing and the fertilisation of maintenance, collecting biomass, liquidating the plantation; the cost of establishing a plantation on farms.	U_01 K_02 K_03
6	The production of pellets and briquette. Basic parameters of granulating and briquetting devices.	W_03 U_01 K_02 K_03
7	The types of conversion processes and the technology of utilising biomass. Thermochemical processes of obtaining energy functional energy forms (combustion, pyrolysis, and gasification). The products of thermal conversion of biomass. The methods of utilizing wood biomass in professional energetics. Biomass torrefication. Co-combusting biomass.	W_03 U_01 K_02 K_03

2. Topics to be covered in the classes
3. Topics to be covered in the laboratories
4. Topics to be covered in the project

No.	Topics	Module outcome code
1	Assessing energy potential of municipal landfill in a given county. Discussing the subject and project range. Output data for a project assignment.	U_02
2	The methods of determining energy potential concerning municipal waste landfills.	W_01 U_01 U_03 K_02 K_03
3	The characteristics of municipal waste. Agreeing the list of landfills together with students (with respect to a project assignment).	W_01 U_01 U_03 K_02 K_03
4 -5	Assessing the potential of biomass in a given district for energy purposes.	W_01 W_02 W_03 U_01 U_03 K_02 K_03
6	Estimating the income from biomass utilised energetically.	W_01 W_03 U_01 U_03 K_02 K_03
7 - 8	Defending project assignments.	U_02 K_01 K_02

Assessment methods

Module outcome code	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
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W_01	A test and a project
W_02	A test and a project
W_03	A test and a project
U_01	A test and a project
U_02	A project
U_03	A project
K_01	A project
K_02	A test and a project
K_03	A test and a project



D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	15
2	Contact hours: participation in classes	-
3	Contact hours: participation in laboratories	-
4	Contact hours: attendance at office hours (2-3 appointments per semester)	4
5	Contact hours: participation in project-based classes	15
6	Contact hours: meetings with a project module leader	6
7	Contact hours: attendance at an examination	-
8		
9	Number of contact hours	40 <i>(total)</i>
10	Number of ECTS credits for contact hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	1,60
11	Private study hours: background reading for lectures	15
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	5
14	Private study hours: preparation for laboratories	
15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	15
18	Private study hours: preparation for an examination	
19		
20	Number of private study hours	35 <i>(total)</i>
21	Number of ECTS credits for private study hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	1,40
22	Total study time	75
23	Total ECTS credits for the module <i>(1 ECTS credit = 25-30 hours of study time)</i>	3
24	Number of practice-based hours <i>Total practice-based hours</i>	36
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	1,44

E. READING LIST

References	<ol style="list-style-type: none"> 1. Carroll A.R., Geofuels, Energy and the Earth, ed. Cambridge University Press, 2015 2. Buxton G., Alternative Energy Technologies, ed., Robert Morris University, Taylor & Francis Group, 2015 3. Chinnappan B., Biomass conversion, The interface of Biotechnology, Chemistry and Material Science, Springer, 2012
Module website	