

# POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

## KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2019/2020

Wydział Inżynierii i Technologii Chemicznej

Kierunek studiów: Technologia Chemiczna

Profil: Ogólnoakademicki

Forma studiów: stacjonarne

Kod kierunku: T

Stopień studiów: II

Specjalności: Innovative Chemical Technologies, Innovative Chemical Technologies (4sem)

### 1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	Concept of biorefinery and platform chemicals
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Concept of biorefinery and platform chemicals
KOD PRZEDMIOTU	WITCh TCH oIIS D30 19/20
KATEGORIA PRZEDMIOTU	Przedmioty specjalnościowe
LICZBA PUNKTÓW ECTS	1.00
SEMESTRY	3

### 2 RODZAJ ZAJĘĆ, LICZBA GODZIN W PLANIE STUDIÓW

SEMESTR	WYKŁADY	ĆWICZENIA	LABORATORIUM	LABORATORIUM KOMPUTERO- WE	PROJEKT	SEMINARIUM
3	0	0	0	0	0	15

### 3 CELE PRZEDMIOTU

**Cel 1** The seminar presents the idea of the biorefinery and current strategies in the integrated production of energy and chemicals from biomass. The topic is highlighted on the examples of fatty-acid and lignocellulosic materials processing. The idea of chemical platform will be discussed on selected examples of C3-C6 components, which by chemical or biochemical transformations can be converted to valuable intermediates.

**Cel 2** improving the skills in preparation of public presentation (in front of group) on the chosen topic, with discussion.

**Cel 3** As a result of the course the student should be able to identify the trends and perspectives in the chemical market based on biomass, and also know the basics of so called "balanced biomass economy".

#### 4 WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

1 basic knowledge in the organic chemistry, technology and biotechnology

#### 5 EFEKTY KSZTAŁCENIA

**EK1 Wiedza** As a result of the course students should know what is a biorefinery and what kind of raw materials can be included in an integrated energy production and chemicals. Has well arranged knowledge in the field of industrial biotechnology, renewable sources of energy, biomaterials and biorefineries.

**EK2 Umiejętności** can find the necessary information from the scientific literature, databases and other sources of knowledge, analyze them in a critical way.

**EK3 Kompetencje społeczne** on the basis of changes in the field of biorefineries concepts, understands the need for continuous studying, broadening the knowledge and skills

**EK4 Umiejętności** Is able to prepare in English a well-documented report and present his findings in front of the group.

#### 6 TREŚCI PROGRAMOWE

SEMINARIUM		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
S1	The introduction - Organization of course, conditions of assessment and dates of final evaluation test. Introduction to actual Polish, European and worldwide bioenergy policy development and perspectives. Explaining the definition of biomass economy and draft of existing legislation.	1
S2	Traditional and alternative sources of energy, fuels and chemicals in up-to-date world: Comparison of current, traditional raw materials for energy and chemicals production with new, alternative sources based on biomass.	1
S3	Advantages and disadvantages of traditional technologies lignocellulose pathway for energy and alcohols	2
S4	Idea of biorefinery on basis of lignocellulose-rich crops	1
S5	Advantages and disadvantages of traditional technologies vegetable oil pathway	2
S6	Idea of biorefinery on basis of oil-seeds crops: Possible ways of waste glycerol conversion to various chemicals, valuable from technological point of view. The possibilities of decreasing the overall amount of wastes from biodiesel production, and new ways of their utilization	1

SEMINARIUM		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
S7	List of top platform chemicals sources and properties: List of most important chemicals, which can be used as a raw materials for building chemical platform: glycerol, 3-hydroxypropionic acid, aspartic, fumaric, succinic and malic acids, 3-hydroxybutyrolactone, xylitol, glutamic, itaconic, levulinic, glutaric acids, 2,5-furan-di-carboxylic acid and sorbitol. Explanation of their most important physicochemical properties and sources.	2
S8	List of top platform chemicals ways of valorization and examples of processing.	3
S9	Realistic perspectives for biorefinery: Analysis of the feasibility of building in current times the biorefinery, including the discussion of necessary improvements in existing plants allowing realization of biorefinery concept	1
S10	Evaluation of knowledge	1

## 7 NARZĘDZIA DYDAKTYCZNE

N1 Dyskusja

N2 Praca w grupach

N3 Prezentacje multimedialne

N4 Konsultacje

## 8 OBCIĄŻENIE PRACĄ STUDENTA

FORMA AKTYWNOŚCI	ŚREDNIA LICZBA GODZIN NA ZREALIZOWANIE AKTYWNOŚCI
<b>Godziny kontaktowe z nauczycielem akademickim, w tym:</b>	
Godziny wynikające z planu studiów	15
Konsultacje przedmiotowe	5
Egzaminy i zaliczenia w sesji	2
prezentacje	3
<b>Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:</b>	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	15
Opracowanie wyników	10
Przygotowanie raportu, projektu, prezentacji, dyskusji	10
<b>SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA</b>	<b>60</b>
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	1.00

## 9 SPOSOBY OCENY

### OCENA FORMUJĄCA

F1 Projekt zespołowy

F2 Odpowiedź ustna

F3 Test

### OCENA PODSUMOWUJĄCA

P1 Średnia ważona ocen formujących

### WARUNKI ZALICZENIA PRZEDMIOTU

W1 oddane na czas opracowanie i prezentacja na forum grupy (prepared on time report and passed presentation in front of group)

### OCENA AKTYWNOŚCI BEZ UDZIAŁU NAUCZYCIELA

B1 Inne - report quality

### KRYTERIA OCENY

EFEKT KSZTAŁCENIA 1	
NA OCENĘ 3.0	student knows what is a biorefinery but can't explain what kind of raw materials can be included in an integrated energy production and chemicals.
NA OCENĘ 3.5	students know what is a biorefinery but know only simple example of raw materials which can be included in an integrated energy production and chemicals.
NA OCENĘ 4.0	students know what is a biorefinery and what kind of raw materials can be included in an integrated energy production and chemicals.
NA OCENĘ 4.5	students know what is a biorefinery and what kind of raw materials can be included in an integrated energy production and chemicals. Has minimum knowledge in the field of industrial biotechnology, renewable sources of energy, biomaterials and biorefineries.
NA OCENĘ 5.0	students know what is a biorefinery and what kind of raw materials can be included in an integrated energy production and chemicals. Has well arranged knowledge in the field of industrial biotechnology, renewable sources of energy, biomaterials and biorefineries.
EFEKT KSZTAŁCENIA 2	
NA OCENĘ 3.0	can't find the necessary information from the scientific literature, databases and other sources of knowledge, analyze them in a critical way
NA OCENĘ 3.5	can find the necessary information from the scientific literature and databases, omitting other sources of knowledge
NA OCENĘ 4.0	can find the only basic information from the scientific literature, databases and other sources of knowledge
NA OCENĘ 4.5	can find the necessary information from the scientific literature, databases and other sources of knowledge, but without critical analysis
NA OCENĘ 5.0	can find the necessary information from the scientific literature, databases and other sources of knowledge, analyze them in a critical way
EFEKT KSZTAŁCENIA 3	
NA OCENĘ 3.0	lack of understanding how the concept of biorefineries is changing under influence of new findings in the literature
NA OCENĘ 3.5	student knows how the concept of biorefineries is changing under influence of new findings in the literature but don't see the need of further improvement
NA OCENĘ 4.0	student recognize the changes in the idea of biorefineries and see the need of further improvement but don't search for futher informations
NA OCENĘ 4.5	student on the basis of the literature is able to find some new possibilities for broadering the concept of biorefineris but has small problems with their realistic analysis

NA OCENĘ 5.0	on the basis of changes in the field of biorefineries concepts, understands the need for continuous studying, broadening the knowledge and skills, on the basis of literature can find and propose realistic improvements for the future biorefineries
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 3.0	Is able to prepare in English a simple report but don't present his findings in front of the group.
NA OCENĘ 3.5	Is able to prepare in English a simple report and present his findings in front of the group.
NA OCENĘ 4.0	Is able to prepare in English a well-documented report but don't present his findings in front of the group.
NA OCENĘ 4.5	Is able to prepare in English a well-documented report but the quality of presentation is poor.
NA OCENĘ 5.0	Is able to prepare in English a well-documented report and present his findings in front of the group.

## 10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓŁOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1	K2_W01 K2_W05 K2_W11 b K2_W12 b K2_U02	Cel 1 Cel 3	S1 S2 S3 S4 S5 S6 S7 S8 S9	N1 N2 N3 N4	F1 F2 F3 P1
EK2	K2_U05 K2_U07	Cel 1 Cel 3	S2 S3 S4 S5 S6 S7 S8 S9 S10	N1 N2 N3	F1 F2 F3 P1
EK3	K2_U13 b K2_K02	Cel 3	S1 S2 S3 S5 S9	N1 N2 N3 N4	F1 F2 P1
EK4	K2_U02 K2_U03 K2_U04 K2_U05 K2_U06	Cel 2	S7 S8 S10	N1 N2 N3	F1 F2 P1

## 11 WYKAZ LITERATURY

### LITERATURA PODSTAWOWA

- [1 ] **Bogdan Burczyk** — *Biorafinerie: Ile w nich chemii*, W-wa,, 2009, Wiadomosci Chemiczne 63 (2009) 9
- [2 ] **H.R.Ghatak** — *Biorefineries from the perspective of sustainability: Feedstocks, products, and processes*, Science Direct, 2011, RenewSusEnergy Rev. 15 (2011) 4042
- [3 ] **Ayhan Demirbas** — *Biorefineries For Biomass Upgrading Facilities*, Springer, 2010, Springer
- [4 ] **Francesco Cherubini** — *The biorefinery concept: Using biomass instead of oil for producing energy and chemicals*, Science Direct, 2010, Energy Conversion and Management 51 (2010) 14121421

## 12 INFORMACJE O NAUCZYCIELACH AKADEMICKICH

### OSOBA ODPOWIEDZIALNA ZA KARTĘ

dr hab. inż. prof. PK Elżbieta Skrzyńska-Ćwiakalska (kontakt: [eskrzynska@pk.edu.pl](mailto:eskrzynska@pk.edu.pl))

### OSOBY PROWADZĄCE PRZEDMIOT

1 dr hab. inż. Elżbieta Skrzyńska (kontakt: [eskrzynska@pk.edu.pl](mailto:eskrzynska@pk.edu.pl))

## 13 ZATWIERDZENIE KARTY PRZEDMIOTU DO REALIZACJI

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(miejsowość, data)

(odpowiedzialny za przedmiot)

(dziekan)

PRZYJMUJĘ DO REALIZACJI (data i podpisy osób prowadzących przedmiot)

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