

POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2014/2015

Wydział Inżynierii i Technologii Chemicznej

Kierunek studiów: Studia Doktoranckie WliTCh

Profil: Ogólnoakademicki

Forma studiów: stacjonarne

Kod kierunku: D

Stopień studiów: III

Specjalności: Technologia Chemiczna

1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	III Dioxins in Environment and Industry
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Dioxins in Environment and Industry
KOD PRZEDMIOTU	WITCh D oIIIS C1 14/15
KATEGORIA PRZEDMIOTU	Przedmioty kierunkowe
LICZBA PUNKTÓW ECTS	1.00
SEMESTRY	5

2 RODZAJ ZAJĘĆ, LICZBA GODZIN W PLANIE STUDIÓW

SEMESTR	WYKŁADY	ĆWICZENIA	LABORATORIUM	LABORATORIUM KOMPUTERO- WE	PROJEKT	SEMINARIUM
5	15	0	0	0	0	0

3 CELE PRZEDMIOTU

Cel 1 The aim of the course is to explain the sources and mechanisms of formation of dioxins, as unintentionally produced chemicals mainly in thermal processes as well as contaminants of wide range of intentionally produced chlorinated compounds (e.g. some pesticides). The program of lectures will address ways to reduce emissions of these pollutants, as well as ways to measure emissions. Much attention will be devoted to the dioxin analytics,

especially the preparation of samples for the determination of these compounds and the instrumental analysis based on GC-HRMS and GC-MS/MS techniques.

4 WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

1 Basic knowledge of environmental and analytical chemistry. Basic knowledge of physical chemistry and organic chemistry

5 EFEKTY KSZTAŁCENIA

EK1 Wiedza The student knows the mechanism of formation of dioxins and dioxin-like compounds and mechanisms to reduce their emissions to the environment

EK2 Wiedza The student knows the methods of sampling for the determination of dioxins and dioxin-like compounds and preparation of samples for analysis.

EK3 Wiedza The student knows the methods of analysis of dioxins and dioxin-like compounds using GC-MS techniques and bioanalytical methods

EK4 Umiejętności The student is able to critically approach to industrial design in relation to the dioxin emission requirements, as well as enhanced onboard to perform measurements of dioxin. The student knows instruments and apparatus used in the preparation of samples for the determination as well as the determination of dioxins using GC-MS techniques.

EK5 Kompetencje społeczne Student is able to convince the public to use the techniques do not emit dioxins and provide professional advice in relation to the proposed and carried out the installation that affect the environment. Student is able to make decisions for the safe, waste incineration.

6 TREŚCI PROGRAMOWE

WYKŁADY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W1	Actual dioxin problem. Structure of dioxin (polychlorinated dibenzodioxins and dibenzofurans) and related compounds (dioxin-like compounds)	2
W2	Industrial and non-industrial sources of dioxins and dioxin-like compounds: PCB, HCB and brominated flame retardants (BFR). Best available techniques for the reduce emissions of dioxins into the environment.	2
W3	Health risk characterization of dioxin and related compounds. Biochemistry and toxicity of dioxins and dioxin-like compounds. Mechanisms of toxic action. Endocrine disruption problem.	1
W4	Dioxin environmental distribution and fate. Pathways of dioxin environmental distribution, bioaccumulation and biomagnification.	2
W5	Dioxin and related compounds in food, feedingstuff and in the Environment. Actual regulations for the dioxin and dioxin-like compounds in food and feed.	2
W6	Abatement methods for minimizing of emission dioxin to atmosphere from industrial sources like metallurgy, waste incineration, waste co-firing etc.	3

WYKŁADY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W7	Dioxin monitoring program. Chemical and biological methods for the determination of dioxin and dioxin-like compounds. Modern analytical methods for the determination of dioxins and dioxin-like compounds. GC-MS/MS, Orbitrap, MS-TOF etc.	3

7 NARZĘDZIA DYDAKTYCZNE

N1 Overhead projector, slides, films, multimedia presentation, etc.

8 OBCIĄŻENIE PRACĄ STUDENTA

FORMA AKTYWNOŚCI	ŚREDNIA LICZBA GODZIN NA ZREALIZOWANIE AKTYWNOŚCI
Godziny kontaktowe z nauczycielem akademickim, w tym:	
Godziny wynikające z planu studiów	15
Konsultacje przedmiotowe	5
Egzaminy i zaliczenia w sesji	1
Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	10
Opracowanie wyników	0
Przygotowanie raportu, projektu, prezentacji, dyskusji	0
SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA	31
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	1.00

9 SPOSOBY OCENY

Written examine. 5-6 questions in three different sets concerning the theory and practical aspects dioxin and dioxin-like problem. 20-30 min writing exam.

OCENA PODSUMOWUJĄCA

P1 Written examine. 5-6 questions in three different sets concerning the theory and practical aspects dioxin and dioxin-like problem. 20-30 min writing exam.

WARUNKI ZALICZENIA PRZEDMIOTU

W1 Written examine. 5-6 questions in three different sets concerning the theory and practical aspects dioxin and dioxin-like problem. 20-30 min writing exam.

KRYTERIA OCENY

EFEKT KSZTAŁCENIA 1	
NA OCENĘ 3.0	Positive response to at least three of the five questions
NA OCENĘ 4.0	Positive response to at least four of the five questions
NA OCENĘ 5.0	Positive response to all of the five questions
EFEKT KSZTAŁCENIA 2	
NA OCENĘ 3.0	Positive response to at least three of the five questions
NA OCENĘ 4.0	Positive response to at least four of the five questions
NA OCENĘ 5.0	Positive response to all of the five questions
EFEKT KSZTAŁCENIA 3	
NA OCENĘ 3.0	Positive response to at least three of the five questions
NA OCENĘ 4.0	Positive response to at least four of the five questions
NA OCENĘ 5.0	Positive response to all of the five questions
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 3.0	Positive response to at least three of the five questions
NA OCENĘ 4.0	Positive response to at least four of the five questions
NA OCENĘ 5.0	Positive response to all of the five questions
EFEKT KSZTAŁCENIA 5	
NA OCENĘ 3.0	Positive response to at least three of the five questions
NA OCENĘ 4.0	Positive response to at least four of the five questions
NA OCENĘ 5.0	Positive response to all of the five questions

10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓŁOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1	The student knows the mechanism of formation of dioxins and dioxin-like compounds and mechanisms to reduce their emissions to the environment	Cel 1	W1 W2 W3 W4 W5 W6 W7	N1	P1
EK2	The student knows the methods of sampling for the determination of dioxins and dioxin-like compounds and preparation of samples for analysis.	Cel 1	W1 W2 W3 W4 W5 W6 W7	N1	P1
EK3	The student knows the methods of analysis of dioxins and dioxin-like compounds using GC-MS techniques and bioanalytical methods	Cel 1	W1 W2 W3 W4 W5 W6 W7	N1	P1

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓŁOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK4	The student is able to critically approach to industrial design in relation to the dioxin emission requirements, as well as enhanced onboard to perform measurements of dioxin. The student knows instruments and apparatus used in the preparation of samples for the determination as well as the determination of dioxins using GC-MS techniques.	Cel 1	W1 W2 W3 W4 W5 W6 W7	N1	P1
EK5	Student is able to convince the public to use the techniques do not emit dioxins and provide professional advice in relation to the proposed and carried out the installation that affect the environment. Student is able to make decisions for the safe, waste incineration.	Cel 1	W1 W2 W3 W4 W5 W6 W7	N1	P1

11 WYKAZ LITERATURY

LITERATURA PODSTAWOWA

- [1] **Schechter A.** — *Dioxins and Health*, USA, 2003, Wiley Interscience
- [2] **Nollet L.M.L** — *Chromatographic Analysis of the Environment*, Ghent, 2006, Taylor&Francis
- [3] **Dennis J. Paustenbach** — *Health Hazards Posed by Dioxin*, USA, 2014, John Wiley & Sons, Ltd.
- [4] **Takayuki Shibamoto, Akio Yasuhara, Takeo Katami** — *Dioxin Formation from Waste Incineration*, Japonia, 2007, *Reviews of Environmental Contamination and Toxicology*, 190, 1-41

12 INFORMACJE O NAUCZYCIELACH AKADEMICKICH

OSOBA ODPOWIEDZIALNA ZA KARTĘ

dr hab. inż. prof. PK Adam Grochowalski (kontakt: agrochow@chemia.pk.edu.pl)

13 ZATWIERDZENIE KARTY PRZEDMIOTU DO REALIZACJI

(miejsowość, data)

(odpowiedzialny za przedmiot)

(dziekan)