


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


Course title		ECTS code	
Monographic lecture – Lipid analysis		13.3.0425	
Name of unit administrating study			
null			
Studies			
faculty	field of study	type	drugiego stopnia
Wydział Chemii	Chemia	form	stacjonarne
		specjalty	chemia biomedyczna, chemia i technologia środowiska, analityka i diagnostyka chemiczna, chemia obliczeniowa
		specialization	wszystkie
Teaching staff			
dr hab. Łukasz Haliński; dr hab. Marek Gołębiowski, profesor uczelni			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		3	
Lecture		classes 30 h	
The realization of activities		Tutorial classes 10 h	
classroom instruction		Student's own work 35 h	
Number of hours		TOTAL: 75 h - 3 ECTS	
Lecture: 30 hours			
The academic cycle			
2023/2024 summer semester			
Type of course		Language of instruction	
obligatory		polish	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
multimedia-based lecture		Final evaluation	
		Graded credit	
		Assessment methods	
		- (mid-term / end-term) test	
		- graded course credit based on individual grades obtained during the semester	
		The basic criteria for evaluation	
		Lecture:	
		• pass tests with open and closed questions; the final score from the results of both tests gives the following grade:	
		91-100%: 5.0	
		81-90%: 4.5	
		71-80%: 4.0	
		61-70%: 3.5	
		51-60%: 3.0	
		Less than 51% 2.0	
Method of verifying required learning outcomes			
Required courses and introductory requirements			
A. Formal requirements			
Organic chemistry; Analytical chemistry.			
B. Prerequisites			
Basic skills in organic chemistry and analytical chemistry, including instrumental analysis			

Aims of education

- To provide students a clear understanding of basic issues in lipid chemistry and analysis
- To familiarize students with lipid chemistry, nomenclature and properties
- To familiarize students with the theory and practice of lipid extraction, purification, fractionation and chemical analysis
- To introduce students to principles of designing the analytical process basing on the structure and properties of certain lipid classes
- To learn students how to independently design simple analytical process

Course contents

The course includes principles of the modern qualitative and quantitative analysis of lipids, with the special attention paid to determination of fatty acids, triacylglycerols and phospholipids. Specified topics of lectures are given below.

Introduction to lipid chemistry (definitions, chemical structure and nomenclature of non-polar and polar lipids). Sample preparation and lipid extraction. Fractionation of lipids using chromatographic techniques (TLC, LC, HPLC, SPE). Fractionation and analysis of lipids using HPLC. Detectors used in HPLC analysis of lipids (spectrophotometric/UV, IR, refractive index detector, light scattering detector, CAD). Gas chromatography: columns, stationary phases, injectors and detectors (FID, IR, MS) used in lipid analysis. Mass spectrometry of lipids (GC-MS, LC-MS, MALDI-TOF/MS techniques). Interpretation of mass spectra of selected lipids. Usefulness of coupled analytical techniques. Applications of instrumental techniques for the analysis of selected lipid classes. Extraction of lipids from certain organisms: special cases. Lipids as markers of selected human disorders

Bibliography of literature

Literature required to pass the course

A.1. Literature used during classes:

- Christie W.W. Gas chromatography and lipids. The Oily Press, Wielka Brytania, dostępne on-line: <http://lipidlibrary.aocs.org/> , przeglądane 2012-01-20
- Hamilton R.J., Hamilton S. Lipid Analysis. A Practical Approach. IRL Press, Wielka Brytania.
- Gunstone F.D., Harwood J.L., Padley F.B. The Lipid Handbook. Chapman & Hall, Wielka Brytania.

A.2. Literature for individual studies:

- Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Techniki separacyjne. Wydawnictwo UG, 2010.
- Kocjan R. (red.). Chemia analityczna. Podręcznik dla studentów. Wydawnictwo Lekarskie PZWL, Warszawa, 2000, Tom 2.
- Szczepaniak W. Metody instrumentalne w analizie chemicznej. Wydawnictwo Naukowe PWN, Warszawa, 1996.

Extracurricular readings

- scientific articles concerning course contents

The learning outcomes (for the field of study and specialization)**Knowledge**

Students characterize basic lipid classes, their nomenclature, chemical structure and properties.

Students are able to describe main stages of lipid analysis, including extraction methods and sample preparation using chromatographic techniques.

Students characterize main techniques used in qualitative and quantitative analysis of lipids, including liquid chromatography, gas chromatography and mass spectrometry.

Skills**Social competence**

Students are able to identify their level of knowledge and skills and understand the necessity of life-long learning in lipid-related topics and personal development.

Contact

lukasz.halinski@ug.edu.pl