



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Methods of organic compounds analysis

Course

Field of study

Chemical Technology

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

English

Requirements

compulsory

Number of hours

Lecture

15

Tutorials

15

Laboratory classes

15

Projects/seminars

Other (e.g. online)

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

prof. dr hab. inż. Adam Voelkel

Responsible for the course/lecturer:

Prerequisites

Basic physical, inorganic, organic and analytical chemistry on academic level; Can use basic laboratory techniques of separation and cleaning of chemical compounds

Course objective

Gaining the skills of the application of spectroscopic methods for identification of organic compounds and determination of their structure..



Course-related learning outcomes

Knowledge

1. knowledge in the field of techniques, methods connected with identification of organic pollutants in the environment - [K_W03, K_W11]
2. can describe methods, techniques, tools and materials used for the solution of simple problems connected with identification of substances during solving the problems connected with the field of study - [K_W07, K_W15]

Skills

1. Student can select the proper spectroscopic technique for basic qualitative and quantitative determination of organic compounds - [K_U11, K_U16, K_U20]
2. has basic skills for maintenance of basic tools (methods) for solving the problem in the field of environment analysis - [K_U07, K_U21]
3. Student can use specialist English - [K_U03]

Social competences

Student understands the need to supplement her/his education and increasing professional competences. - [K_K01]

2. Student has the awareness to obey the engineer ethic rules. - [K_K02, K_K05]
3. Student can act and cooperate in the group accepting different roles. - [K_K03]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Final written control work. In case of stationary work approx. 10-15 open questions. In case of on-line control work through approx. 10 open questions and approx. 5 closed.

Permanent control before laboratory classes. Written reports from exercises.

Programme content

Problems of the course are connected with the application of the interaction of electromagnetic radiation with the molecules of organic compounds and its use for identification of organic species. The theoretical background enabling the understanding the rules of UV/VIS spectroscopy, IR, NMR and MS. The possibilities and limitations of these techniques are presented and discussed. Sample preparation methods are discussed and further used during laboratory classes. Experimental technique is presented on level enabling the self-maintenance of popular equipment and contact with the operator of more sophisticated equipment.

Teaching methods

lecture, laboratory classes



Bibliography

Basic

- 1) Robert M. Silverstein, Francis X. Webster, David J. Kiemle, David L. Bryce, Spectrometric Identification of Organic Compounds, 8th Edition, Wiley, September 2014, ISBN: 978-0-470-61637-6
- 2) L.D.S. Yadav, Organic Spectroscopy, Springer-Science+Business Media, B.V. 2005, ISBN 978-1-4020-2575-4 (eBook)
- 3) Ian Fleming, Dudley Williams, Spectroscopic Methods in Organic Chemistry, 7th Edition, Springer, 2019, Print ISBN: 978-3-030-18251-9
- 4) Editors-in-Chief: John C. Lindon, George E. Tranter and David W. Koppenaal, Encyclopedia of Spectroscopy and Spectrometry, 3rd Edition, Academic Press, 2017, ISBN: 978-0-12-803224-4
Encyclopedia of Spectroscopy and Spectrometry - online

Additional

1. N.P.G. Roeges, A guide tot He complete interpretation of infrared spectra of organic structures, Wiley, Chichester, 1994.
2. J.S. Splitter, F. Turecek, Application of mass spectrometry to organic stereochemistry, VCH, New York, 1994
3. Rosaleen J. Anderson, David J. Bendell & Paul W. Groundwater, Organic Spectroscopic Analysis, Cambridge : Royal Society of Chemistry, 2004 - Organic Spectroscopic Analysis - online
4. M. Hesse, H. Meisner, B. Zeeh, Spectroscopic Methods in Organic Chemistry, 2nd Edition, Thieme, 2008, Print ISBN: 9783131060426.

Articles:

- K. Milczewska, A. Voelkel, J. Zwolińska, D. Jędro „Preparation of hybrid materials for controlled drug release” Drug Dev. Ind. Pharm. 42 (07), 2016, 1058-1165
- K. Adamska, M. Szubert, A. Voelkel, Z. Okulus, Characterisation of hydroxyapatite surface modified by poly(ethylene glycol) and poly(hydroxyethyl methacrylate) grafting, Chemical Papers 67 (2013) 429-436.
- M. Sandomierski, Z. Buchwald, A. Voelkel, Calcium montmorillonite and montmorillonite with hydroxyapatite layer as fillers in dental composites with remineralizing potential, Applied Clay Science, 198 (2020) 105822.
- J. Jurga, A. Voelkel, B. Strzemiecka, Application of different analytical methods used in the study of the cross-linking of resins in intermediate-product used in manufacturing of abrasive articles, J. Applied Polymer Sci., 112 (2009) 3305-3312.



Breakdown of average student's workload

	Hours	ECTS
Total workload	60	4
Classes requiring direct contact with the teacher	45	
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	15	

¹ delete or add other activities as appropriate