



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Analiza związków azotu (Analysis of nitrogen compounds)

### Course

Field of study

Technologia chemiczna (Chemical Technology)

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

10

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Karolina Wieszczycka, prof. PP

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 (NMR and MS) 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\_W08, K\_W15]



### Skills

1. Student can select the proper spectroscopic technique for basic qualitative and quantitative determination of organic compounds - [K\_U13, K\_U21, K\_U32]
2. has basic skills for maintenance of basic tools (methods) for solving the problem in the field of environment analysis - [K\_U14, K\_U21]
3. Student can use specialist English. - [K\_U17]

### 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:

Written control work. Permanent control before laboratory classes. Written reports from exercises

### Programme content

Analysis of nitrogen compounds. New information will concern Raman spectroscopy, XPS and other techniques of surface investigation. . Possibilities and limitations of: UV/VIS, IR, NMR, MS and other techniques are discussed.

### Teaching methods

laboratory classes

### Bibliography

Basic

Spektroskopowe metody identyfikacji związków organicznych, R.M. Silverstein,

F.X. Webster, D.J. Kremler, PWN, Warszawa, 2007

2. Metody spektroskopowe wyznaczania struktury związków organicznych, L.A. Kazicyna,

N.B. Kupletska, PWN, Warszawa, 1974

3. Określanie struktury związków organicznych metodami spektroskopowymi, M. Szafran,

Z. Dega-Szafran, PWN, Warszawa, 1988

4. Metody spektroskopowe i ich zastosowanie do identyfikacji związków organicznych,

W. Zieliński, praca zbiorowa, WNT, Warszawa, 1995.



5. Spektroskopia mas związków organicznych, A. Płaziak, wyd. UAM, Poznań, 1997.

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

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	11	0,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	39	1,5

<sup>1</sup> delete or add other activities as appropriate