

Course description

Course abbreviation:	KCH/IMACH	Page:	1 / 3
Course name:	Instrumental Methods in Analytical Chemi		
Academic Year:	2016/2017	Printed:	17.11.2017 22:02

Department/Unit /	KCH / IMACH	Academic Year	2016/2017
Title	Instrumental Methods in Analytical Chemi	Type of completion	Exam
Long Title	Instrumental Methods in Analytical Chemistry		
Accredited/Credits	Yes, 5 Cred.	Type of completion	Oral
Number of hours	Přednáška 2 [Hours/Week] Seminář 1 [Hours/Week]		
Occ/max	Status A Status B Status C	Course credit prior to	NO
Summer semester	1 / - 0 / - 0 / -	Counted into average	YES
Winter semester	29 / - 0 / 0 2 / 3	Min. (B+C) students	not determined
Timetable	Yes	Repeated registration	NO
Language of instruction	Czech	Semester taught	Winter semester
Substituted course	None	Počet dnů praxe	0
Preclusive courses	N/A		
Prerequisite	N/A		
Informally recommended courses	N/A		
Courses depending on this Course	N/A		

Course objectives:

Aims

The theoretical and experimental bases of the instrumental methods of analytical chemistry. The electrochemical, optical, and separative methods.

Requirements on student

Requirements

Satisfying the requirements to obtain at least grading "good"

Evaluation of the subject as well as the exam grading is made according to the articles No 31 - 33 in the Regulations on Study and Examinations University of Ostrava

Content

Content

1. Introduction into the instrumental analytical chemistry - basic characteristics, comparison with the classical methods of chemical analysis. Diversification of methods.
2. Potentiometry - electrode, electrochemical cell. Indicator, reference electrodes. Ion-selective electrodes. Application of potentiometry.
3. Conductometry. Electrogravimetric analysis, coulometry.
The direct methods. Titration application. Practical application.
4. Voltammetry (polarography). Methods of pulse voltammetry.
Stripping voltammetry on the solid electrodes. Applications.
5. Electrochemical sensors, biosensors. Application.
6. Introduction into the spectral methods - interactions of electromagnetic radiation with substances. Quantities and their relations.
7. Methods of atomic spectroscopy - absorption and emission spectroscopy. X-ray fluorescence spectroscopy. Principles, instrumentation, practical application.
8. Methods of spectrophotometry in UV/VIS region.
Principles, instrumentation, practical application.
9. IR and Raman spectroscopy. Principles, instrumentation, practical application.
10. NMR and EPR spectroscopy. Mass spectrometry. Principles, instrumentation, analytical application.
11. Chromatographic methods, basic concepts, basic theoretical relations, diversification of methods according to principle of separation process. Thin layer chromatography.
12. Gas chromatography. High performance liquid chromatography. The basic concepts, instrumentation, examples of the

analytical application.

13. Electromigration methods - electrophoresis, isotachophoresis. The basic concepts, instrumentation, examples of the analytical application.

Prerequisites - other information about course preconditions

none

Competences acquired

Competences

The student acquire knowledge of principles of the instrumental analytical methods, they orientate in practical use of the instrumental analytical methods and acquire ability of calculation in the field of the instrumental analysis.

Studijní opory

Guarantors and lecturers

- **Guarantors:** doc. Ing. Zuzana Navrátilová, CSc.
- **Lecturer:** doc. Ing. Zuzana Navrátilová, CSc.
- **Seminar lecturer:** doc. Ing. Zuzana Navrátilová, CSc.

Literature

- **Basic:** Štulík K., Barek J. *Elektrochemické analytické metody, SNP, Praha 1989.*
- **Basic:** Čůta F. a kol. *Instrumentální analýza. SNTL, Praha 1986.*
- **Recommended:** Holzbecher Z. a kol. *Analytická chemie. SNTL, Praha 1987.*
- **Recommended:** Churáček J. a kol. *Analytická separace látek, SNTL, Praha 1990.*
- **Recommended:** Kalous V. a kol. *Metody chemického výzkumu, SNTL Praha 1987.*
- **Recommended:** Churáček J. a kol. *Nové trendy v teorii a instrumentaci vybraných analytických metod, Academia, Praha 1993.*

Time requirements

Activities	Time requirements for activity [h]
Being present in classes	39
Self-tutoring	26
Preparation for an exam	45
Consultation of work with the teacher/tutor (incl. electronic)	15
Total:	125

assessment methods

professional knowledge

Oral examination

Written examination

teaching methods

professional knowledge

Dialogic (discussion, dialogue, brainstorming)

Monologic (explanation, lecture, briefing)

learning outcomes

professional knowledge - knowledge resulting from the course:

Competences

The student acquire knowledge of principles of the instrumental analytical methods, they orientate in practical use of the

instrumental analytical methods and acquire ability of calculation in the field of the instrumental analysis.

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan	v.	Year	Block	Status	R.year	R.
Applied Physics	Postgraduate Master	Full-time	Biophysics	1	2014		2016	Povinné předměty	A	2	ZS
Biology	Postgraduate Master	Full-time	Experimental Biology	1	2		2016	Povinné předměty	A	2	ZS
Chemistry	Bachelor	Full-time	Chemistry	1	2012		2016	Povinné předměty	A	3	ZS
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Single-Specialization Chemistry	1	2		2016	Povinné předměty	A	2	ZS
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Chemistry, Didactic Specializations	1	2		2016	Povinně volitelné předměty	B	2	ZS