

# Course description

<b>Course abbreviation:</b>	KCH/STRPL	<b>Page:</b>	1 / 3
<b>Course name:</b>	Structure of Solid Substances		
<b>Academic Year:</b>	2016/2017	<b>Printed:</b>	23.09.2017 20:15

<b>Department/Unit /</b>	KCH / STRPL	<b>Academic Year</b>	2016/2017
<b>Title</b>	Structure of Solid Substances	<b>Type of completion</b>	Exam
<b>Accredited/Credits</b>	Yes, 4 Cred.	<b>Type of completion</b>	Oral
<b>Number of hours</b>	Přednáška 2 [Hours/Week] Seminář 1 [Hours/Week]		
<b>Occ/max</b>	Status A      Status B      Status C	<b>Course credit prior to</b>	NO
<b>Summer semester</b>	0 / -      0 / -      0 / -	<b>Counted into average</b>	YES
<b>Winter semester</b>	2 / -      0 / -      0 / 0	<b>Min. (B+C) students</b>	not determined
<b>Timetable</b>	Yes	<b>Repeated registration</b>	NO
<b>Language of instruction</b>	Czech	<b>Semester taught</b>	Winter semester
<b>Substituted course</b>	None		
<b>Preclusive courses</b>	N/A		
<b>Prerequisite</b>	N/A		
<b>Informally recommended courses</b>	N/A		
<b>Courses depending on this Course</b>	N/A		

## Course objectives:

### Aims

The students familiarize with basic experimental techniques for the structure parameters study of solids (X-ray diffraction, IR, NMR, mass spectrometry). An attention is also given to the determination methods of the solids texture indicators (adsorption methods, mercury porosimetry).

## 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. Elementary analysis of sample - OEA, empirical and summary formula, elementary analysis of the inorganic and organic compounds, CHNO analyser - principle, scheme.
- 2-4. IR spectrometry - principle, theory of rotational and vibrational states, spectrum record, characteristic vibrations. Instrumentation - dispersive, interferometers, techniques of the solids spectra scanning, interpretation of spectra, basic rules, fingerprint, the inorganic compounds spectra, the selected organic compounds spectra.
- 5-7. NMR spectrometry - principle, basic theory. Instrumentation - pulse and continuous method, the measured samples, standards, <sup>1</sup>H and <sup>13</sup>C NMR; Spectrum, chemical shift, multiplets, the solids analysis, methods of double resonance, MAS NMR;
8. Adsorption, adsorption strength, isotherms, classification of pores, the experimental methods of the isotherms determination.
9. Langmuir adsorption theory, calculation of the internal surface area. BET theory, calculation of the internal surface area.
10. Capillary condensation, Kelvin equation, calculation of the pores distribution.
11. Theory of the volume filling of micropores, DR isotherm. High-pressure mercury porosimetry, instrumentation, Washburn equation, intrusion curves.
12. Calorimetry, types of calorimeters, principle of isothermal, adiabatic calorimeters, Calvet calorimeter, method of pulse flow calorimetry.
13. The time reserve

## Prerequisites - other information about course preconditions

none

**Competences acquired**

## Competences

The students acquire knowledge about basic experimental approaches to understanding of the solids structure and textures. They can interpret and understand reports from the experimental methods used to recognition of the solids structure and texture. They understand and deepen their knowledge about the experimental approaches to understanding of the solids structure and textures, they become conscious about relation of these experimental approaches.

**Studijní opory****Guarantors and lecturers**

- **Guarantors:** prof. Ing. Boleslav Taraba, CSc.
- **Lecturer:** prof. Ing. Boleslav Taraba, CSc.
- **Seminar lecturer:** prof. Ing. Boleslav Taraba, CSc.

**Literature**

- **Basic:** Silverstein,R.M., Bassler,G.C., Morrill,T.C.:. *Spectrometric Identification of Organic Compounds. 5th edition, J.Wiley & Sons, New York 1991.*

**Time requirements**

Activities	Time requirements for activity [h]
Being present in classes	26
Preparation for test	26
Preparation for an exam	45
Consultation of work with the teacher/tutor (incl. electronic)	3
<b>Total:</b>	<b>100</b>

**assessment methods****professional knowledge**

- Continuous analysis of student's achievements
- Dialogue
- Oral examination
- Written examination

**prerequisite****professional knowledge**

none

**teaching methods****professional knowledge**

- Demonstration
- Dialogic (discussion, dialogue, brainstorming)
- Individual tutoring
- Monologic (explanation, lecture, briefing)

**learning outcomes****professional knowledge**

Competences

The students acquire knowledge about basic experimental approaches to understanding of the solids structure and textures.

They can interpret and understand reports from the experimental methods used to recognition of the solids structure and texture. They understand and deepen their knowledge about the experimental approaches to understanding of the solids structure and textures, they become conscious about relation of these experimental approaches.

**Course is included in study programmes:**

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Single-Specialization Chemistry	1	2015	2016	Povinné předměty	A	1	ZS
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Single-Specialization Chemistry	1	2	2016	Povinné předměty	A	1	ZS
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Chemistry, Didactic Specializations	1	2	2016	Povinně volitelné předměty	B	1	ZS
Chemistry	Postgraduate Master	Full-time	Učitelství chemie pro 2. stupeň základních škol a střední školy (dvouoborové)	1	2015	2016	Výběrové předměty	C		ZS