

# Course description

<b>Course abbreviation:</b>	KCH/VIBSP	<b>Page:</b>	1 / 2
<b>Course name:</b>	Vibrational Spectroscopy		
<b>Academic Year:</b>	2016/2017	<b>Printed:</b>	20.01.2018 15:42

<b>Department/Unit /</b>	KCH / VIBSP	<b>Academic Year</b>	2016/2017
<b>Title</b>	Vibrational Spectroscopy	<b>Type of completion</b>	Exam
<b>Accredited/Credits</b>	Yes, 5 Cred.	<b>Type of completion</b>	
<b>Number of hours</b>	Lecture 2 [Hours/Week] Seminar 1 [Hours/Week]		
<b>Occ/max</b>	Status A      Status B      Status C	<b>Course credit prior to</b>	NO
<b>Summer semester</b>	12 / -      0 / 0      0 / 0	<b>Counted into average</b>	YES
<b>Winter semester</b>	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>	Summer semester
<b>Substituted course</b>	None	<b>Internship duration</b>	0
<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:

Theoretical principles of vibrational spectroscopy, sensing techniques spectra. The infrared and Raman spectroscopy. Evaluation of spectra, practical use.

## Requirements on student

Test based on knowledge within the subject matter.

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

1. Theoretical bases of IR spectroscopy (rotation and vibration spectra, theory of molecular vibrations, rule of selection, symmetry of molecules).
2. Vibration of multiatomic molecules and groups of atoms (basic vibration, characteristic frequencies, finger print in spectrum).
3. Factors influencing characteristic vibrations and absorption maxima in spectra.
4. Analytical instrumentation of IR spectroscopy. Dispersive spectrometers. FTIR spectrometry, Michelson interferometer.
5. Measurement techniques of IR spectra, sample preparation. Transmission measurement, KBr technique, nujol techniques. ATR - Attenuated Total Reflectance), DRIFT- Diffuse Reflectance Infrared Fourier Transform Spectroscopy). FTIR microscopy.
6. Interpretation of IR spectra - absorption bands, characteristic vibrations, comparison with standard spectra, library of spectra. Identification of compound in the mixtures, structure identification.
7. IR spectra of organic compounds, characteristic vibration of function groups.
8. IR spectra of inorganic compounds, characteristic vibrations.
9. Application of IR spectra in the quantitative analysis. Lambert-Beer law.
10. Application of IR spectroscopy in the middle range of IR.
11. Application of IR spectroscopy in the near and far range of IR.
12. Raman spectroscopy, principle and character of Raman spectra. Instrumentation, techniques and application.

## Prerequisites - other information about course preconditions

none

## Competences acquired

Theoretical principles of vibrational spectroscopy, sensing techniques spectra. The infrared and Raman spectroscopy. Evaluation

of spectra, practical use.

## Fields of study

## Guarantors and lecturers

- **Guarantors:** Ing. Lenka Vaculíková, Ph.D.
- **Lecturer:** Ing. Lenka Vaculíková, Ph.D.
- **Seminar lecturer:** Ing. Lenka Vaculíková, Ph.D.

## Literature

- **Basic:** KSANDR Z., ADÁMEK P., JANEČKOVÁ E. *Infračervená spektroskopie. Skripta pro posluchače VŠCHT v Praze.* SNTL Praha, 1970.

## 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
<b>Total:</b>	<b>125</b>

## assessment methods

### professional knowledge

Oral examination

## teaching methods

### professional knowledge

Dialogic (discussion, dialogue, brainstorming)

Monologic (explanation, lecture, briefing)

## learning outcomes

### professional knowledge - knowledge resulting from the course:

Theoretical principles of vibrational spectroscopy, sensing techniques spectra. The infrared and Raman spectroscopy. Evaluation of spectra, practical use.

## 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	1	LS
Chemistry	Postgraduate Master	Full-time	Analytical Chemistry of Solid Phase	1	2013	2016	Povinné předměty	A	1	LS