Study program: Master	
Module title: Vibrational Spectroscopy	
Module status: **Optional**	
ECTS: 8	
Requirements: **none**	

Learning objectives: Gaining theoretical knowledge related to vibrational spectra of molecules and applying the theory by processing experimental results in IR and Raman spectroscopy.

Learning outcomes
Students should develop:
- General abilities: After completing the course and mastering the material the student is able to perform the synthesis of theoretical and experimental knowledge.
- Course specific abilities: Analysis of problems related to infrared and Raman spectroscopy.

Syllabus:
The absorption of electromagnetic radiation, infrared absorption. Molecular spectra, types of vibration, vibrations of diatomic molecules, vibrations of polyatomic molecules. Normal mode of vibration. Harmonic oscillator model. IR spectra and their interpretation. IR spectrophotometers, dispersive IR spectrophotometers. Fourier Transform Infrared Spectroscopy-FTIR. Single-beam FTIR, Double-beam FTIR spectrophotometers. Advantages and application of FTIR spectroscopy. Spectral analysis (organic and inorganic molecules, polymers, biological applications, or applications in the industry and ecology). The history of Raman scattering. Raman effect. The selection rules in infrared spectroscopy and Raman spectroscopy. Raman spectrophotometers. Preparation of samples for Raman Spectroscopy. Raman vs. IR spectroscopy. The application of Raman spectroscopy.

Literature:
1. Introductory Raman Spectroscopy, (second edition), Elsevier, 2003., John R. Ferraro, Kazuo Nakamoto, Chris W. Brown
2. Infrared and Raman Spectra of Inorganic and Coordination Compaunds, Theory and Applications in Inorganic Chemistry, John Willey & Sons, 2008., Kazuo Nakamoto
3. Infrared Spectroscopy: Fundamentals and Applications, John Willey & Sons, 2004.,Barbara H. Stuart
4. Infrared and Raman Spectroscopy, Methods and Applications, VCH, New York, 1995, Edited by Bernhard Schrader
5. Handbook of Applied Solid State Spectroscopy, Springer, 2006.,D. R. Vij

Weekly teaching load				Other:
Lectures: 3	Exercises: 1	Other forms of teaching:	Student research: 2	