**Level**: bachelor/master

**Course title:** NMR spectroscopy IHO-305

**Status**: elective

**ECTS**: 6

**Requirements**: none

**Learning objectives**

To introduce students to the modern methods of nuclear magnetic resonance spectroscopy. Introduction to the NMR spectrometer and some experimental methods.

**Learning outcomes**

Trained students will able to record basic proton and carbon-13 NMR spectra. Students will learn a wide range of applications of magnetic resonance imaging in chemistry and medicine. Students will be able to determine the structure of organic compounds based on one and multidimensional spectra.

**Syllabus**

*Theoretical instruction*

Basics of nuclear magnetic resonance. Experimental methods. Proton NMR. Dynamic NMR. Carbon-13 NMR. Edited spectra. Nuclear Overhauser effect. NMR of other nuclei (fluorine-19, P-31, nitrogen-14, oxygen-17, aluminium-27, silcon-29). Newer multipulse methods. Correlation Spectroscopy. Two-dimensional NMR methods. Diffusion NMR. Basics of NMR imaging. Application of NMR in structural analysis, in medicine and in the various branches of chemistry.

*Practical instruction*

The exercises follow the lecture material. Basic parts of the NMR instrument. Recording NMR spectra. Determination of 90 degree pulse. Determining the length of relaxation time T1. Structure determination of organic compounds on the basis of proton and carbon NMR spectra. Structure elucidation of organic compounds on the basis of one and two-dimensional spectra ($^{1}$H and $^{13}$C nmr spectra, DEPT, 2D- COSY, HETCOR, HMBC, HSQC, TOCSY, ROESY).

| **Weekly teaching load** | | | | Other: |
|---|---|---|---|---|
| Lectures: 2 | Exercises: 2 | Other forms of teaching: | Student research: | |