

# Structural Analysis of Biomolecules

Special Subjects  
Elective 2 credit

UCHIDA, Kenichi

## 1. Course Description

This course deals with the fundamentals of Nuclear Magnetic Resonance Spectroscopy (NMR), which is essential to elucidate structures of organic compounds. In order to learn the principle of NMR, it is necessary to understand the quantum mechanics. We will, however, focus on the techniques of structural determination which can be achieved by analyzing a set of 1D- and 2D-NMR spectra with minimum using mathematics.

## 2. Course Objectives

At the end of the course, students are expected to elucidate the structure of small organic molecules by using NMR spectra.

## 3. Grading Policy

Grading will be decided based on a lab report.

## 4. Textbook and Reference

Textbook

Nothing to use, but some optional documents may be provided.

## 5. Requirements(Assignments)

Nothing special.

## 6. Note

## 7. Schedule

- [1] Structures of molecule and Instrumental Analysis
- [2] 1H-NMR 1: Interaction between nuclei and radio wave
- [3] 1H-NMR 2: Chemical Shifts, Spin-spin interactions, Integral and Peak areas
- [4] 1H-NMR 3: Spin systems
- [5] 1H-NMR: Analysis of Spin systems
- [6] 13C-NMR: FT-NMR
- [7] 2D-NMR 1: COSY
- [8] 2D-NMR 2: CH-COSY
- [9] 2D-NMR 3: HMQC
- [10] 2D-NMR 4: HMBC
- [11] Nuclear Overhauser Effect (NOE)
- [12] Structural determination 1: Method of structural determination using NMR
- [13] Structural determination 2: Example of a simple molecule
- [14] Structural determination 3: Example of a little bit complex molecule
- [15] Summary and Examination