<table>
<thead>
<tr>
<th>Course title</th>
<th>Functional Biomolecular Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
<td>後期 2nd Half</td>
</tr>
<tr>
<td>Credit(s)</td>
<td>2</td>
</tr>
<tr>
<td>School/Program</td>
<td>School of Physical Sciences</td>
</tr>
<tr>
<td>Department/Program</td>
<td>Department of Functional Molecular Science</td>
</tr>
<tr>
<td>Category</td>
<td>Functional Molecular Science</td>
</tr>
<tr>
<td>Lecturers</td>
<td>Ryota IINO, Koichi KATO, Katsuyuki NISHIMURA</td>
</tr>
</tbody>
</table>

**Outline**
The principles and applications of physicochemical techniques to understand biological phenomena at the molecular level will be outlined with practical examples. In particular, nuclear magnetic resonance (NMR) spectroscopy which provides information on the conformations, dynamics, and interactions of biomolecules with atomic resolutions, and single-molecule methods which directly reveal the elementary processes of biomolecular dynamics at the single molecule level, will be discussed. The lecture will focus on the structures and functions of glycoproteins, membrane proteins, and motor proteins to understand life phenomena from physicochemical viewpoints, aiming to develop knowledge and thought in molecular science, which is the basis of integrated life science.

**Goal**
Learn principles and applications of the physicochemical methods to understand biological phenomena at the molecular level.

**Grading system**
01:Four-grade evaluation (A,B,C,D)

**Grading policy**
Scores of mini-examinations during the lecture and reports

**Lecture Plan**
1. Basics and applications of solution and solid-state NMR spectroscopy in structural analyses of biomolecules
2. Introduction of protein folding. Combined use of experiments and simulation. Conformational diseases and protein folding
3. Basics and applications of single-molecule measurements of biomolecules based on optical microscopy and atomic force microscopy

**Location**
Zoom Online

**Language**
English

**Textbooks and references**
No specific textbooks and references

**Others**
Prepare the topic of next class and understand technical terms

**Keyword**
Solution NMR, Solid-state NMR, Optical microscopy, Single-molecule imaging, Optical tweezers, Magnetic tweezers, Super resolution microscopy, High-speed atomic force microscopy, Glycoproteins, Membrane proteins, Protein complex, Self assembly, Conformational dynamics, Energy conversion