

Course title	Functional Biomolecular Science		
Term	後期 2nd Half		
Credit(s)	2		
The main day		The main period	
School/Program	School of Physical Sciences		
Department/Program	Department of Functional Molecular Science		
Category	Functional Molecular Science		
Lecturers	Ryota IINO, Koichi KATO, Katsuyuki NISHIMURA		

Instructor
Full name
* IINO RYOTA
KATO KOICHI
NISHIMURA KATSUYUKI

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	
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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	次回の授業範囲を予習し、専門用語の意味等を理解しておくこと Prepare the topic of next class and understand technical terms 基礎生体分子科学 Fundamentals of Biomolecular Science
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