

## Special Subjects of the Department of Functional Molecular Science

Field	Course Code	Subject	Credit	Content of subject	Instructor
Theoretical Functional Molecular Science, Functional Biomolecular Science, Biomolecular Science, Complex Catalysis, Quantum dynamics, Photo-physics, Photochemistry, Molecular Functional Materials	20DFM001**	Functional Biomolecular Science	2	1. Basic and applications of solution and solid-state NMR spectroscopy in structural analyses of biomolecules 2. Basic of microscopy, Single-molecule imaging, Optical tweezers, Magnetic tweezers, Super resolution microscopy, High-speed atomic force microscopy 3. Functional mechanisms of biomacromolecules including glycoproteins, membrane proteins, and multidomain proteins, Working mechanisms of motor proteins, Molecular basis of protein assembly	Ryota Iino Koichi Kato Katsuyuki Nishimura
	20DFM002**	Complex Catalysis	2	Molecular structures and functions of complex catalysts will be overviewed based on the understanding the features of transition metal catalysis, Lewis acid-Lewis base catalysis, and organo catalysis in catalytic molecular transformations.	Yasuhiro Uozumi Norie Momiyama
	20DFM003**	Quantum dynamics	2	Lecture on principles of direct observation and control of ultrafast quantum dynamics of matter (in femto- and attosecond time scale) by using light and recent experimental trials in the relevant field.	Kenji Ohmori
	20DFM004**	Photo-physics	2	Synchrotron radiation is an important tool for elucidating the electronic and atomic structures that govern the properties and functions of matter. In the first half, we will give a lecture on electromagnetic radiation generation from relativistic electron beams (synchrotron radiation) and basic knowledge of optics. In the second half, we will summarize the interaction between light and matter, and outline the basic technology and application development of physical property analysis methods (photoelectron spectroscopy, X-ray absorption spectroscopy, etc.) using synchrotron radiation.	Fumihiko Matsui Yoshitaka Taira
	20DFM005**	Molecular Functional Materials	2	In this lecture, one of the following topics will be delivered : Solid state physics and fundamental knowledge of electronic properties measurement and device physics for molecular solids.	Masahiro Hiramoto Tetsuro Kusamoto
Common Courses	90DFM001**	Exercise on Functional Molecular Science I	4	Discussion, experimental instructions, and/or theoretical studies for the student to perform the individual fundamental and applied research in the field of functional molecular science. This program is provided by appropriate teaching stuffs based on the research subject of the individual student.	
	90DFM002**	Exercise on Functional Molecular Science II	4		
	90DFM003**	Exercise on Functional Molecular Science III	4		
	90DFM004**	Exercise on Functional Molecular Science IV	4		
	90DFM005**	Exercise on Functional Molecular Science V	4		
	90DFM006**	Seminar on Functional Molecular Science I	4	Small size seminar to gain scientific knowledge, competence for scientific consideration, discussion, and research performance, and original scientific conceptions in the field of fundamental and applied functional molecular science. This program is provided by appropriate teaching stuffs based on the research subject of the individual student.	
	90DFM007**	Seminar on Functional Molecular Science II	4		
	90DFM008**	Seminar on Functional Molecular Science III	4		
	90DFM009**	Seminar on Functional Molecular Science IV	4		
	90DFM010**	Seminar on Functional Molecular Science V	4		
Common Courses	10DFM001**	English for scientific research	2	The principal aim of this course is to improve academic reading, academic writing, listening, and speaking in English for scientific research.	Sechrist, Jeremiah S Members of dept. of functional molecular science

A two-digit number or letter will be entered to \*\* according to the semester or the lecturer in charge.