

School of Physical Sciences Common Specialized Basic Subjects

Subject Code	Subject	Credit	Content of subject	Lecturer		Lecture Schedule
11120039	Introduction to Observational Astronomy I	2	Observations of the Galaxy and external galaxies in various wavelength are reviewed.			
11120040	Introduction to Observational Astronomy II	2	Structure, origin and evolution of solar system bodies such as planets and satellites.			
11120023	Introduction to Theoretical Astronomy	2	We will give a contemporary view of the Universe from a stand point of theoretical astronomy. Subjects includes galaxy formation and evolution, big-bang cosmology, formation and evolution of stars, and the origin of Solar system.			
11120014	Space Science	2	Reviews of the development of astrophysics and solar system physics are given. Scientific issues are discussed and possible future plans are introduced. Methods of investigation using satellites, spacecraft and sounding rockets are also explained.	Dept.Space and Astronautical Science All the staff		
11120015	Space Engineering	2	Technologies for space science, exploration, and utilization are overviewed. System design of launch vehicle and spacecraft, mission analysis of space systems, orbit control and determination, and project management are lectured by professional personnel in each field.	Dept.Space and Astronautical Science All the staff		
11120035	Quantum Molecular Science	2	This course covers quantum chemistry and spectroscopy. Topics include electronic structure theories, light-matter interactions, and spectroscopies which are essential to understand chemical bonds, molecular structures, and relaxation processes.	Prof.	Shinji Saito	e-Learning
				Prof.	Masahiro Ehara	
				Prof.	Nobuhiro Kosugi	
				Prof.	Yasuhiro Ohshima	
				Prof.	Kenji Ohmori	
				Assoc.Prof.	Katsuyuki Nobusada	
				Assoc.Prof.	Takeshi Yanai	
11120041	Introduction to Solid State Physics & Chemistry	2	Basic theories concerning solid state physics will be introduced: structures, thermal properties, electronic structures, transport properties, magnetism, superconductivity, etc.	Prof.	Toshihiko Yokoyama	e-Learning
				Prof.	Masahiro Hiramoto	
				Assoc.Prof.	Shinichi Kimura	
				Assoc.Prof.	Toshikazu Nakamura	
11120016	Fundamentals of Fusion Science	2	The lecture is an introduction to basic plasma physics and reactor system engineering for nuclear fusion describing the history and present status of the fusion research. Lectures are given in English to facilitate the understanding of foreign students. The objective is to obtain the overall understanding of fusion research.	Members of dept. of fusion science		
11120017	Overview of Simulation Science	2	History from the birth of numerical computation through the development of the latest simulation science is reviewed as well as research methodology of the simulation science based on super-computers and graphical visualization. Non-linear and complex plasma phenomena and self-organization dynamics are explained. Relation between theoretical models and simulation results is explored and comparison among different physical hierarchies is outlined.	Members of dept. of fusion science		
11120042	Space Science	1	This online lecture (E-learning) provides an overview of the researches and activities having conducted in the Department of Space and Astronautical Science, which includes scientific issues on astrophysics and solar system physics as well as technical issues on spacecraft and rocket.	Members from Dept. Space and Astronautical Science		
11120036	Overview of Control Engineering	1	In this lecture, it is kept in mind to do the control design in an actual system. Basic principles and their applications are lectured on the control engineering. Especially, applications are given with examples of the design in real situations.	Members of dept. of astronomical science, dept. of fusion science and dept. of space and astronautical science		
11120037	Overview of Signal Processing	1	Basic theories of digital signal processing are explained that are indispensable for digitized data analyses of physics measurements. Fundamental principles for analog-to-digital conversion, error handling, encoding, data mining, filtering, and telecommunication are also reviewed.	Members of dept. of astronomical science, dept. of fusion science and dept. of space and astronautical science		
11120038	Training of Presentation in English	1	In order to facilitate presentations in international conferences, presentation techniques are trained by specialists in English conversation. This class emphasizes practice on how to present and how to prepare presentation documents.			
11120043	Introduction to Integrative Bioscience	1	First, the educational program for Integrative bioscience will be introduced. Then, driving forces for rapid development of biology are reviewed from a historical point of view, and the features of contemporary life science are overviewed. Based on these reviews what the Integrative bioscience is and why it is necessary are discussed. Particularly, it is emphasized that a large volume of information on sequences and structures of genome, RNA, proteins, sugars, metabolites etc. and that of spacio-temporal expression of these molecules are integrated to understand their meaning at a cell, tissue, organ or organism level and to unravel the mechanisms of high order biological functions, diseases, environmental responses etc.			
11120044	Integrative Bioscience Series	1	To learn biological processes at various levels, covering molecular, cellular and individual processes, with broader perspective in an integrative manner, seven departments (Departments of Structural Molecular Science, Functional Molecular Science, Basic Biology, Physiological Sciences, Genetics, Evolutional Studies of Biosystems, and Statistical Science), which participate in the Integrative Bioscience Education Program, offer a series of the following lectures in an understandable manner for students in the first and second years.			
11120045	Introduction to biomolecular simulation	1	Basic theories and computational methods for molecular simulations for biomolecules will be introduced. For example, basic and various advanced methodologies for molecular simulations as well as fundamentals of analytical mechanics and statistical mechanics will be lectured.	Prof. Shinji Saito Assoc.Prof. Hisashi Okumura		2013 school year Intensive Course in 2nd semester
	Fundamental Theoretical Chemistry	2	This course gives an introductory overview of fundamental theory of quantum chemistry. A special emphasis is placed on understanding a basic idea of electronic structure calculations of molecular properties.	Assoc.Prof.	Katsuyuki Nobusada	2013 school year Intensive Course in 1st semester
				Assoc.Prof.	Takeshi Yanai	
	Fundamental Photo-science	2	Photoexcitation and photoionization processes can provide detailed information on the molecular properties and are in widespread use of the physical and chemical sciences. This lecture provides the student with a firm grounding in the basic principles and experimental techniques employed. Use of case studies illustrates how photoabsorption and photoelectron spectra are assigned and how information can be extracted.	Prof.	Nobuhiro Kosugi	2013 school year Intensive Course in 2nd semester
				Assoc.Prof.	Eiji Sigemasa	
	Fundamental Chemistry and Physics of Solids	2	To understand fundamental physical properties of solid materials, basic principles concerning solid state physics will be discussed. Structures, thermal properties, electronic structures, transport properties, magnetism, and superconductivity of solids will be introduced.	Prof.	Toshihiko Yokoyama	2014 school year
				Prof.	Hiroshi Yamamoto	
				Assoc.Prof.	Shinichi Kimura	
	Fundamentals of Biomolecular Science	2	Core aspects of biophysical chemistry will be overviewed with the life-science student in mind. This course aims at cultivating the fundamentals necessary to complete the advanced courses of Structural Biomolecular Science and of Functional Biomolecular Science. The lectures will be given with life-science examples using a textbook covering the laws of thermodynamics, biological standard state, chemical equilibrium and its temperature dependence, vibrational spectroscopy, and nuclear magnetic resonance.	Prof.	Shuji Akiyama	2013 school year 2nd semester
				Prof.	Koichi Kato	
				Assoc.Prof.	Katsuyuki Nishimura	
				Assoc. Prof.	Yuji Furutani	
	Introduction to Coordination Chemistry	2	Structure and bonding of transition metal complexes including organometallic complexes, with emphasis on electronic structures, spectroscopy, and elementary reactions.	Prof.	Tetsuro Murahashi	2014 school year
				Assoc.Prof.	Shigeyuki Masaoka	