

**Common Specialized Basic Subjects of the School of Physical Sciences**

The Lectures of this year are framed in red.

Course Code	Subject	Credit	Content of subject	Instructor
10SPS001**	Introduction to Observational Astronomy I	2	We will give a contemporary view of the Universe, obtained from optical, infrared, and radio observations on stars, interstellar matter, galaxy and cluster of galaxies.	R. Kawabe M. Tanaka K. Nakanishi
10SPS002**	Introduction to Observational Astronomy II	2	Structure, origin and evolution of solar system bodies such as planets and satellites.	E. Kokubo
10SPS003**	Introduction to Theoretical Astronomy	2	We will discuss contemporary view of theoretical astronomy and astrophysics. Subjects include the big-bang cosmology, the formation and evolution of stars and galaxies, the origin of the Solar system, and others.	H. Nomura M. Machida
10SPS004**	Space Science	2	Reviews of the development of astrophysics and solar system sciences are given. Scientific issues are discussed and possible future plans are introduced. Methods of investigation using satellite, spacecraft and sounding rocket are also explained.	Dept. Space and Astronautical Science All the staff
10SPS005**	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
10SPS008**	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. The objective is to obtain the overall understanding of fusion science, introducing the most advanced issues in large plasma experiments, large-scale simulation studies, and reactor engineerings.	Members of dept. of fusion science
10SPS024**	Basic digital circuit design and development for measurement and control systems	1	Learn the basic digital circuit design technology for developing measurement control systems applied in actual experimental researches. Interactive instructions through the lecture practices effectively help the trainee acquiring adequate knowledges and skills.	Hideya Nakanishi Manobu Tanaka
10SPS028**	Introduction to Project Management	1	Project is an individual or collaborative enterprise for achieving a particular aim. In order to complete the project within the deadline, tasks, the process, works, costs and risks should be carefully managed. This lecture provides the fundamental knowledge on the project management and examples of big projects in the world, so as to improve your ability for problem solution and management.	Satoru Sakakibara Hideo Matsubara Yuko Inatomi Taro Sakao Takehiko Ishikawa Shoji Uno
10SPS010**	Space and Astronautical 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.	Tadayasu Dotani Hideo Matsuhara Yasuhiro Morita Takumi Abe Masanao Abe Ikkoh Funaki Takahide Mizuno Issei Yamamura Makoto Yoshikawa

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10SPS011**	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 astronomical science
10SPS012**	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 astronomical science
10SPS013**	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.	Members of each dept., visiting lecturers
10SPS014**	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.	Hisashi Okumura Keiichi Okazaki
10SPS025**	Fundamental Physical Chemistry I	2	This course gives an introductory overview of fundamental theories of quantum chemistry and statistical mechanics. A special emphasis is placed on understanding basic ideas of electronic structure theories of molecular properties and of static and dynamics properties in (non) equilibrium state.	Masahiro Ehara Shinji Saito
10SPS026**	Fundamental Physical Chemistry II	2	This course gives an introductory overview of fundamental theories in physical chemistry with a focus on quantum mechanics and statistical mechanics. A special emphasis is placed on the fundamental understanding of dynamical processes in molecular systems and light-matter interaction.	Akihito Ishizaki Emi Minamitani
10SPS016**	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.	Satoshi Kera Toshiki Sugimoto
10SPS017**	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.	Toshihiko Yokoyama Hiroshi Yamamoto
10SPS018**	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, chemical kinetics, enzyme kinetics, and molecular dynamics.	Shuji Akiyama Ryota Iino Nobuyasu Koga

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10SPS019**	Introduction to Coordination Chemistry	2	Structure and bonding of transition metal complexes including organometallic complexes, with emphasis on electronic structures, spectroscopy, and elementary reactions.	Shigetoshi Aono Yasutomo Segawa
10SPS020**	Measurement and control technology for experimental physics	2	The basics and applications of measurement and control technologies in physics experiments are presented by researchers in both schools of accelerator and physical sciences. The course makes clear the similarity and difference of experimental technologies in both science field, and introduces ideas for interdisciplinary collaboration.	Hiroshi Matsuo Tetsuo Yoshimitsu
10SPS027**	Fundamentals of Spectroscopy	1	Spectroscopy is widely used in various research fields. This course gives overviews of fundamentals of spectroscopy, synchrotron radiation, plasma spectroscopy, visible light spectroscopy, infrared spectroscopy, and microwave spectroscopy. An exercise of quantum chemical calculation is also provided for the theoretical analysis of various problems in spectroscopy. This course focuses on the fundamentals of spectroscopy to utilize these methodologies in the researches.	Masahiro Ehara Wako Aoki Masatoshi Ohishi Hideo Matsuhara Motoshi Goto Takashi Kamiyama

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