Special Subjects of the Department of Space and Astronautical Science

Field	Subject Code	Subject	Credit	Content of subject	
Space Observation Science	20DSA001	Space Observation Science	2	Fundamental methods of mission analysis and design for space-science experiments are lectured from the understanding of background physics and its methods.	Tsuneo Kii Keiichi Matsuzaki
	20DSA002	Space Systems Engineering Ⅰ	2	Basic theories, technologies and project management of the space system including the satellites and the scientific balloons will be lectured, and their applications, current subjects and future prospecs will be discussed.	Shujiro Sawai Tetsuya Yoshida
	20DSA003	Space Systems Engineering Ⅱ	2	The rocket science associated with launch and reentry of space vehicles is thoroughly lectured. Flight dynamics, guidance and control, thermal protection, and recovery systems etc. are reviewed in some detail. The lecture is extended to entry systems for planetary missions. Special topics involving applications and future prospects are also discussed.	Yasuhiro Morita Tetsuya Yamada
	20DSA004	Space Systems Engineering Ⅲ	2	The orbit calculation and the orbit design/determination of solar system bodies and man-made space probes (artificial satellites and spacecraft) are lectured. Various dynamical features are known for solar system bodies. The origins of such features and the methods of analysis will be discussed. As for the man-made space probes, the basic knowledge and methods for the orbit planning/determination will be discussed.	Makoto Yoshikawa Yasuhiro Kawakatsu
	20DSA005	Space Systems Engineering Ⅳ	2	Space power systems and subsystems including power generation, storage, transmission, and management are lectured. The lecture covers basic and advanced power technologies, and future space energy systems for Solar Power Satellite and planetary exploration mission.	Yoshitsugu Sone Koji Tanaka
	20DSA006	Space Environment Physics	2	High-energy plasma phenomena in the solar corona, such as flares and coronal mass ejections (CMEs), affect the space environment of the solar system. The lecture reviews observational aspects and mechanisms of such high-energy phenomena in the solar atmosphere, and discusses their effects on the near-Earth space environment.	Taro Sakao
Space Systems Engineering	20DSA007	Introduction to Space Astronomy	2	This lecture gives an overview of the new view of the universe revealed with radio, infrared/optical, and X-ray observations. Observational technology is also reviewed with emphasis on that specific to the space missions. In the lecture, it is explained how various phenomena in the universe are understood based on the laws of physics, together with the telescope technology and the data analysis methods.	Toru Yamada Yutaro Sekimoto
	20DSA008	Space Astronomy Ⅰ	2	Give a lecture on various high-energy phenomena revealed through X-ray and Gamma-ray observations from satellites, and study the background physics behind the phenomena.Also given is a lecture on the principle and the actual configuration of X-ray and Gamma-ray instruments and the analysis methods of their data.	Manabu Ishida Motohide Kokubun
	20DSA009	Space Astronomy Ⅱ	2	The lecture gives an overview of the recent picture of the Universe, especially the early Universe, the large scale structure, and formation and evolution of galaxies, stars, and planets, which have been revealed by infrared and submillimeter observations from space. Also gives brief descriptions of detection principle of infrared light from space, and the unique techniques used in the observational instrumentation and the data analysis.	Hideo Matsuhara Issei Yamamura
	20DSA010	Space Astronomy Ⅲ	2	The lecture gives radio astronomy observations from satellites, especially space-VLBI obseravations and its results. The lecture also includes basics of the radio interferometry and ground interferomers and its results to understand the space-VLBI observation.	Yasuhiro Murata Akihiro Doi

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Solar System	20DSA011	Introduction to Exploring the Solar System	2	The lecture treats origin and evolution of the planetary bodies and thier environment on a basis of the scientific results of recent planetary explorations, observation techniques, and the scientific instruments onboard spacecraft.	Hajime Hayakawa Masanao Abe
	20DSA012	Science of Planetary Exploration	2	The lecture gives an introduction of the area of solid planetary science, Especially, we discuss the practical methods of investigation of the surface and the internal structure of the solid planets by the space exploration. The goal of this lecutre is to understand how the obtained data are related to the origin and evolution of the planets.	Takahiro Iwata Satoshi Tanaka
	20DSA013	Physics of Planetary Atmospheres	2	The lecture gives the basic physics of planetary atmospheres and the overview of atmospheric structures and physical processes observed so far. Unsolved problems to be addressed in future spacecraft missions will also be discussed.	Takehiko Satoh Takumi Abe
	20DSA014	Solar System Plasma Physics	2	The solar system is a laboratory where dynamics of energetic plasma in the universe can be studied in situ by state-of- the-art instruments on board spacecraft. This lecture provides basic knowledge of physical processes occurring in the plasma environment of the solar system, including the solar wind, ionospheres, and magnetospheres around the planets. Scientific objectives of space missions both for magnetized and unmagnetized planets are described, with the reference to the innovative techniques for the plasma measurements in space.	Iku Shinohara Takeshi Takashima
Astronautics	20DSA015	Spacecraft Propulsion Ⅰ	2	The lecture describes theories and experimental methods on thermo-fluid engineering for space transportation system. It includes specific examples as well as basic technology.	Shinichiro Tokudome Hiroaki Kobayashi
	20DSA016	Spacecraft Propulsion Ⅱ	2	Starting from the basic concepts of both chemical and advanced propulsion systems, practical application of these concepts to space transportations and space probes are provided. Topics include state-of-the-art rocket motors, air breathing engines, propulsive method for orbital transfer vehicles, as well as in-space electric and other advanced propulsion systems.	Ikkoh Funaki
	20DSA017	Space Structures and Materials Ⅰ	2	The lecture firstly gives strengthening and toughening methods, forming methods and reliability evaluation techniques of various materials which construct space crafts and launchers. Afterward, the lecture describes how to develope rocket and spacecraft structures and mechanisms.	Ken Goto Hiroaki Kobayashi
	20DSA018	Space Structures and Materials Ⅱ	2	The lecture gives strengthening and toughening methods, forming methods and reliability evaluation techniques of various materials which construct spacecrafts.	Shinsuke Takeuchi
	20DSA019	Space Applied Physical Chemistry	2	The purpose of the lecture is to deepen the knowledge of materials which have been used for the spacecraft from the aspect of chemistry. With the basic lecture of chemistry, the film material, chemical propellant and other materials will be described from the view point of chemistry. The malfunctions of the spacecraft caused by the chemical reaction will also be discussed. Furthermore, the special material chemistry using the special space environment like microgravity conditions is also described as the future aspects of chemistry and material engineering.The background of the thermodinamics and thermochemistry will also discussed.	Takehiko Ishikawa Yoshitsugu Sone
	20DSA020	Introduction to electronics and information for space applications	2	The course includes onboard and ground telecommunication techonologies of spacecraft for understanding fundamentals of technologies supporting information society.	Zen-ichi Yamamoto Tomoaki Toda

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Astronautics	20DSA021	Electronics and information for space applications Ⅰ	2	The lecture gives basic circuit design and semiconductor device technologies with special emphasis on scientific foundations locating underneath the technologies. Special interest is put on low-noise radiation measurement in a space environment, reliability issues associated with space radiation and/or high temperature and RF integrated circxuits and small antennas for space communication.	Shigeo Kawasaki Maoko Mita
	20DSA022	Electronics and information for space applications Ⅱ	2	The lecture gives the methods of attitude determination, attitude control, navigation and guidance of spacecraft, including sensors and actuators technologies.	Shin-ichiro Sakai Tetsuo Yoshimitsu
	20DSA023	Introduction to Radiowave Engineering for Space Applications	2	We can find many radiowave applications in spacecraft systems, for example, a rocket tracking, a R&RR for trajectry determination, GPS, remote sensing. The lecture gives principles, hardware and signal processings of radar systems. It includes latest informations of space radars and a laser ranging technology for spacecrafts.	Takahide Mizuno
	20DSA024	Computational engineering and science	2	Computational science based on the numerical simulation technologies stands with theory and experiments, being an important research and developping tool in the ace science field. This lecture introduces the leading edge technologies in numerical simulation and design exploration from the engineering perspective. Also the high performance computing and related topics, which support computational engineering and science are introduced.	Ryoji Takaki Akira Miura
	20DSA025	Fundamental Sciences in Microgravity (The lecture is closed in this year)	2	Fundamental physics and fundamental biology in microgravity will be mainly lectured. In fundamental physics, we will explain the latest experimental resutls of complex plasmas in microgravity and on the earth. The data analyses of these results will be also explained. To understand these topics, basics fo plasmas physics, classical statistical mechanics, and solid state physics will be introduced. In fundamental biology, we will explain the influence for microbe, plant, animal, and human being under under an extreme environment such as the space. Origin of life and future of life are also lectured.	Hirofumi Hashimoto
	20DSA026	Space Life Science	2	The effects of space environment (microgravity in the main) on various life activities (embryogenesis, cell differentiation, posture control, behavior, and so on) will be lectured on each biological hierarchical level, from a cell to an organism, through the past space and ground experiments. Astrobiology will also be discussed.	Hirobumi Hashimoto Akemi Izumi-Kurotani
	20DSA027	Materials Engineering in Space	2	This program explains the materials science research under the microgravity offered by orbital space platforms where buoyancy convections are fully suppressed and containerless conditions (levitation-positioning) can be easily obtained. Previous experiments, including their research facilities and experimental techniques, are also described. For containerless processing, electrostatic levitation techniques and related studies that include thermophysical property measurements and synthesis of metastable materials will be discussed in details. In addition, research in crystal growth mechanism and production of high quality crystals of semiconductor in microgravity are introduced.	Takehiko Ishikawa Yuko Inatomi

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Common cources	90DSA001	Space science colloquium Ⅰ	4	In depth insight into various fields of space science though discussion of colloquium type lectures.	Dept.Space and Astronautical Science All the staff
	90DSA002	Space science colloquium Ⅱ	4		
	90DSA003	Space science colloquium Ⅲ	4		
	90DSA004	Space science colloquium Ⅳ	4		
	90DSA005	Space science colloquium Ⅴ	4		
	90DSA006	Thesis Progress Report Ⅰ	2	Student makes a written progress report on his/her thesis-related research that he/she has pursued in the first and second years. Oral presentation of the report is also required.	Chair of Department of Space and Astronautical Science
	90DSA007	Thesis Progress Report Ⅱ	2	Student makes a written progress report on his/her thesis-related research that he/she has pursued in the third and fourth years. Oral presentation of the report is also required.	Chair of Department of Space and Astronautical Science
	10DSA001	Scientific writing Ⅰ	2	This class explicates "how to compose and write scientific articles expressed in Japanese" in a short course, followed by the main part of this class, i.e. lectures on scientific presentation and presentation practice.	Tadayasu Dotani Takahiro Iwata
	10DSA002	Scientific writing Ⅱ	2	Learn the basics of writing academic papers in English mainly through exercises. Lecture is given by a native English lecturer in addition to a Soken-dai Professor. (for students of English as a second language)	Tadayasu Dotani Takahiro Iwata
	20DSA034	Field works	2	The credit of the field work is given to students for external studies voluntary planned by the students carried over a total period longer than 2 weeks. The credit is given through examination based on the plan and resulting report by course committee members.	Chair of Department of Space and Astronautical Science