Electrical Engineering

Course title	Course description	Instructor
結合系解析論 Analytical Dynamics of Complex Systems	Lectured are simple and integrated methods for analyzing the behavior of complex but linear electro-mechanical coupling systems by making the most of some energy principles of analytical dynamics theory such as Hamilton's principles. First of all, the basics of the theory are to be concisely introduced, and then some practical applications of the theory to the analysis including the finite element method explained.	足立和成 Kazunari ADACHI
パルスパワー工学 Pulsed Power Engineering	Pulsed power technology is that can generate huge power corresponding to instantaneous consumption power in the world. That allows to realize new science and technology that couldn't realize by conventional power technology. The lecture introduces energy storage and switching for generating the pulsed power, transmission and measurement technologies, and newest applications for environment and biotechnology, etc. using the pulsed power.	南谷靖史 Yasushi MINAMITANI
高電界現象論 Phenomena in High Electric Field	This course teaches electrostatic phenomena and its governing equations for high voltage applications. Basic electromagnetic theories including Poisson's and Laplace's equations are introduced to analyze electric field and potential distributions. Application of corona discharge as a source of static charge and charge elimination system are also introduced.	杉本俊之 Toshiyuki SUGIMOTO
応用電磁気学 Applied Electromagnetics	Maxwell's equations are systematized as classical physics in electromagnetics. On the other hand, some numerical methods such as the finite difference method and the finite element method are applied to electromagnetic field analysis. In this lecture, we learn basic electromagnetics and show explicit examples of electromagnetic field analysis.	高山彰優 Teruou TAKAYAMA
高周波超伝導工学 High Frequency Superconductor Engineering	This course teaches the basics of high frequencies helpful in real-life applications and explains the basic components of high frequency circuits using concrete examples. Superconductive basic properties and typical theories will also be outlined.	齊藤　敦 Atsushi SAITO

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電気力学 Electromechanical Dynamics	This course teaches how to drive the motion equations and electric circuit equations using electro-dynamic expressions, analyzing the case in a small scale microphone and loud speaker. This course will start from Maxwell's equations, Newton's motion equation and other equations associated with electro circuit. Some electrostatic phenomena will also be introduced, such as electrostatic force and unexpected noise in displacement currents caused by electrostatic charge.	八 塚 京 子 Kyoko YATSUZUKA
半導体デバイス工学 Semiconductor Devices	In this course, operation mechanisms of pn junction diodes, bipolar and field effect transistors are lectured based on the knowledge of carrier transport in the semiconductor devices. This course of lecture also deals with state-of-art technologies enhancing high-speed operation on the transistors.	廣 瀬 文 彦 Fumihiko HIROSE
真空表面工学 Vacuum Science and Engineering	Since many electronic devices are fabricated under vacuum environment, understanding about vacuum is indispensable for manufacturing high-performance devices. This course teaches the theory and applications of vacuum technology. Surface science such as gas-solid reactions will be also outlined.	成 田 克 Yuzuru NARITA
超伝導工学 Superconducting Engineering	This course teaches basics of superconducting engineering including two fluids model thermodynamics, GL equations and BCS theory as well as cryogenics. Fundamental applications of Josephson junctions will be also introduced taking Superconducting Quantum Interference Device and Radiation Detector as example.	中 島 健 介 Kensuke NAKAJIMA
応用半導体物性 Applied Semiconductor Physics	In this course, fundamental semiconductor physics necessary for understanding operation principles and characteristics of semiconductor devices are lectured. We start quantum mechanics including Schrödinger equation and approximation method. Then, band theory of semiconductors is explained. Heterojunction and quantum structures based on alloy semiconductors are also introduced.	大 音 隆 男 Takao OTO

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光エレクトロニクス Optical Electronics	This course teaches basic characteristics, generation, transmission, detection and applications of lights. Features of natural lights, mechanisms of lasers, and light modulation using a nonlinear crystal are explained. Sensitive detection and optical coherence tomography will also be introduced as typical applications.	佐 藤　学 Manabu SATO
半導体光工学 Semiconductor Optical Devices	The lectures are presented on the material properties, device structures and functional mechanisms of semiconductor optical devices, focusing on the two widely used light-emitting devices; laser diodes (LD) and light-emitting diodes (LED).	高 橋　豊 Yutaka TAKAHASHI
磁気デバイス工学 Magnetic Devices	This course starts out by teaching fundamental properties of magnetic materials (exchange interaction, Curie-Weiss Law, magnetic anisotropy, etc.) and methods for measuring them. Afterward, applications for magnetic memory materials such as hard disk drives will be described.	稲 葉 信 幸 Nobuyuki INABA
ディジタル通信工学 Digital Communication	This lecture will cover fundamental technological aspects of digital communication networks. These include network topology, protocols, transmission technology, signal processing, and related standards. The lecture will also cover speech and data communication in recent communication networks, such as the Internet and wireless networks. The lecture will conclude with future trends in this fields.	近 藤 和 弘 Kazuhiro KONDO
光波工学 Photonics Engineering	This course teaches signal processing technologies with photonics. Based on the knowledge on generation, amplification of light and interference between light, students can acquire some advanced techniques for control of light with photonic waveguide such as optical fibers.	高 野 勝 美 Katsumi TAKANO
センサ工学 Sensing Devices	Various physical sensors and chemical sensors are used to automate machines and to know the appearance of the outside. This course focuses on sensors, covering basic principles, fabrication, and usage.	奥 山 澄 雄 Sumio OKUYAMA

Course title	Course description	Instructor
半導体ナノ材料工学 Semiconductor Nanomaterials	Semiconductor nanomaterials show unique physical and chemical properties that differ from their bulk materials. In the first half of this course, various synthesis-routes, properties and analytical methods of nanomaterials will be discussed. In the second half, the current status of applications, future trends and potentials of nanotechnology in solar energy conversation and storage devices (such as, solar cell, solar-hydrogen, photocatalysis etc.) will be discussed.	有馬 ボシール アハンマド Bashir Ahmmad ARIMA