

基本情報

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| 時間割コード / Course Code | |
| 開講区分(開講学期) / Semester | Fall and Winter Term |
| 曜日・時間 / Day and Period | Mon4 |
| 開講科目名 / Course Name (Japanese) | 21世紀の電気工学 |
| 開講科目名(英) / Course Name | Electrical Engineering in the 21st Century |
| 教室 / Room | |
| 定員 / Capacity | |
| ナンバリング / Course Numbering Code | |
| 必修・選択 / Required/Optional | |
| 授業形態 / Type of Class | 講義科目 |
| 単位数 / Credits | 2 |
| 年次 / Student Year | |
| 分野 / Field | |
| 担当教員 / Instructor | 舟木剛 / Tsuyoshi FUNAKI |
| メディア授業科目 / Course of Media Class | |

※メディア授業科目について

授業回数の半数以上を、多様なメディアを高度に利用して教室等以外の場所で行う授業を「メディア授業科目」としています。

学部学生が「メディア授業科目」を卒業要件に算入できるのは60単位が上限です。

なお、非該当の場合であっても、メディアを利用した授業を実施する場合があります。

詳細情報

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| 授業サブタイトル / Course Subtitle | Electrical Engineering in the 21st Century |
| 開講言語 / Language of the Course | English |
| 学習方法 / Learning Method | 聴講・視聴 |
| 授業の目的と概要 / Course Objective | This course explores two categories of electrical engineering in the 21st century, that is, 1) systems, control and power engineering, and 2) electromagnetic energy engineering. In this course, professors and associate professors of the Department of Electrical and Electronic Systems, Division of Electrical, Electronic and Information Engineering, Graduate School of Engineering, Osaka University will give lectures to the students every week about topics of present research, so that they will be exposed to wide areas of electrical engineering in the 21st century. |
| 履修条件・受講条件 / Requirement / Prerequisite | 電気工学に興味のある者 / Students who're interested in Electrical Engineering |
| 出欠席及び受講に関するルール / Attendance and Student Conduct Policy | |
| 教科書・指定教材 / Textbooks | None |
| 参考図書・参考教材 / Reference | None |
| 成績評価に関する補足情報 / Additional Information on Grading | |
| 合理的配慮 / Reasonable Accommodation | |
| 特記事項 / Special Note | |
| オフィスアワー / Office Hour | |
| 実務経験のある教員による授業科目 / Course conducted by instructors with practical experience | |

成績評価詳細情報

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| 学習目標(1) / Learning Goal(1) | The students acquire the fundamental knowledge of the recent electrical engineering trends. |
| 学習目標(2) / Learning Goal(2) | |
| 学習目標(3) / Learning Goal(3) | |
| 学習目標(4) / Learning Goal(4) | |
| 学習目標(5) / Learning Goal(5) | |

| 学習目標 / Learning Goal | 評価方法 | | | | |
|----------------------------|---------|---|---|---|---|
| | レポート・論文 | | | | |
| 学習目標(1) / Learning Goal(1) | ○ | | | | |
| 学習目標(2) / Learning Goal(2) | | | | | |
| 学習目標(3) / Learning Goal(3) | | | | | |
| 学習目標(4) / Learning Goal(4) | | | | | |
| 学習目標(5) / Learning Goal(5) | | | | | |
| 評価割合(%) / Grade Breakdown | 100% | % | % | % | % |

授業計画

| 回 / Time | 題目 / Title | 内容 / Content | 授業時間外学習 / Independent Study Outside of Class |
|----------|---|---|--|
| 第1回 | Intelligent Systems Part 1: Discrete Event Systems (Prof. Shigemasa Takai) | A discrete event system is an event-driven dynamical system. A manufacturing system is a typical example that can be regarded as a discrete event system. In this lecture, modeling frameworks for discrete event systems are introduced. | Review using the lecture materials. |
| 第2回 | Intelligent Systems Part 2: Machine Learning (Associate prof. Kazumune Hashimoto) | Machine learning (ML) has become indispensable in fields such as robotics, control, and electrical engineering. This lecture introduces fundamental concepts of deep neural networks (DNNs), a prominent ML technology. | Review using the lecture materials. |

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| 第3回 | Power and Energy Systems 1(Prof. Tsuyoshi FUNAKI) | Power electronics is a technology for conversion of electrical energy. Its current and future applications are introduced in this lecture, including hot topics such as renewable power generation, wireless power transfer, electrical vehical, etc. | Review using the lecture materials. |
| 第4回 | Power and Energy Systems 2(Associate Prof. Takaaki IBUCHI) | Lectures focus on energy management technologies on the basis of electric power utilization. Basic principles of renewable energy, power storage, and energy-saving power conversion technologies based on power electronics will be explained. | Review using the lecture materials. |
| 第5回 | Remote Sensing of Precipitation (Prof. Tomoo Ushio) | Remote sensing technique of precipitation will be introduced, mainly focusing on radar technologies and satellite observation. | Review using the lecture materials. |
| 第6回 | High-energy Atmospheric Physics (Assistant Prof. Yuuki Wada) | Theory, sensing technology, and latest topics of high-energy atmospheric physics will be introduced. We investigate extreme plasmas from laboratories to the universe and develop the relevant fields of science and engineering, such as astrophysics, space physics, laser, and plasma physics. | Review using the lecture materials. |
| 第7回 | Extreme Plasma Science and Engineering I Laboratory Astrophysics (Prof. Yasuhiro Kuramitsu) | Based on these we develop technological innovations leading to medical and industrial applications. | Review using the lecture materials. |
| 第8回 | Extreme Plasma Science and Engineering II Nuclear Fusion Energy (Associate Prof. Hideaki Habara) | Nuclear fusion energy is attracting attention as a promising approach to solving environmental and energy problems. The fundamentals of nuclear reactions, including nuclear fusion, stars as a fusion plant in space, and the current and future development of fusion power generation are presented. | Review using the lecture materials. |
| 第9回 | Advanced Plasma Engineering (Associate prof. Heun Tae Lee) | In this lecture, we introduce topics arising from plasma-material interactions that are of technological and scientific interest, such as plasma processing of materials and magnetic fusion plasmas. We cover some basic physical principles, applications, and future outlook. | Review using the lecture materials. |
| 第10回 | TBD | | Review using the lecture materials. |
| 第11回 | TBD | | Review using the lecture materials. |
| 第12回 | Advanced Beam Systems Engineering (Associate Prof. Yuushi KATO) | Electron cyclotron resonance (ECR) ion sources have been widely used for production of high intensity multicharged ion beams for accelerators, heavy particle cancer radiotherapy, space propulsion, bio-nano materials, as well as implantation in industrial applications. With promoting basic and applied researches of ECR plasma, we are conducting research and development with respect to new beam source responsible for the next generation. | Review using the lecture materials. |

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| 第13回 | Power Laser Photonics (Ass. Prof. Yoshiki Nakata) | Laser is a key technology in the era of light, encompassing high-power lasers and their applications. In this lecture, technologies for developing high-power laser systems will be introduced. Additionally, various applications, such as material processing, will be discussed. | Review using the lecture materials. |
| 第14回 | Radiation-Hydrodynamics and Laser-Matter Interaction (Prof. M. MURAKAMI) | Recent activities on researches of laser-matter interaction physics are introduced. The lecture will be given so beginners can understand easily. | Review using the lecture materials. |
| 第15回 | High-Density Plasma Physics (Prof. M. YOSHIMURA) | TBD | Review using the lecture materials. |
| 第16回 | | | |

授業担当教員

| 教員氏名 / Instructor Name | ふりがな / Name (hiragana) | 所属・職名・講座名 / Affiliation, Title, Course | 居室 / Office | 内線 / Extension | e-mail / E-mail |
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| 舟木剛 / Tsuyoshi FUNAKI | ふなきつよし | 電気電子情報通信工学専攻・教授・システム制御工学講座 | E2-111 | 7709 | funaki@eei.eng.osaka-u.ac.jp |