

Course Numbering					
Year	First semester 2026				
Subject (J)	Electricity and Magnetism				
Subject	【JYPE】 Electricity and Magnetism				
Credit(s)	2Credits				
Instructor	HIROYASU SATO				
Media Class Subjects					
Essential Subjects					
Language of Instruction	English				
Course Objectives and Summary/ Learning Goals (J)					
Course Objectives and Summary/ Learning Goals	<p>Objective:</p> <ul style="list-style-type: none"> <li>· Students will learn basic principles and analysis methods for electromagnetic induction and radiation.</li> </ul> <p>Summary of class:</p> <ul style="list-style-type: none"> <li>· Basic theories and analysis methods for electromagnetic fields in vacuum and dielectric/magnetic media: Maxwell's equations, plane wave and its reflection/transmission, dielectric/magnetic media and their boundary conditions etc.</li> <li>· Basic principles and analysis methods for electromagnetic induction and radiation: Faraday's law, radiation from electric dipole etc.</li> </ul> <p>Students are expected to develop following skills and views after completion of the class.</p> <ul style="list-style-type: none"> <li>· Mathematical skills for dealing with electric/magnetic fields in vacuum and dielectric/magnetic media.</li> <li>· Mathematical skills for dealing with electromagnetic induction and radiation.</li> <li>· Understanding of basic electromagnetic phenomena from physical point of view.</li> </ul>				
Relevance to Other Subjects/Considerations for Taking the Class (J)					
Relevance to Other Subjects/Considerations for Taking the Class					
Course Description (J)					
Course Description	<ol style="list-style-type: none"> <li>1. Review of Electricity and Magnetism, I</li> <li>2. Review of Electricity and Magnetism, II</li> <li>3. Maxwell's equations and electromagnetic plane wave in vacuum</li> <li>4. Electromagnetic plane waves in vacuum and matter</li> <li>5. Reflection and transmission of plane wave at planar boundary between two media</li> <li>6. Radiation of electromagnetic wave</li> <li>7. Radiation of electromagnetic wave by an electric dipole</li> <li>8. Electromagnetic induction (Faraday's law)</li> <li>9. Dielectric materials and electric dipole moment</li> <li>10. Polarization, dielectric constant and capacitors</li> <li>11. Boundary conditions at two different dielectric media</li> <li>12. Boundary conditions at two different magnetic media</li> <li>13. Nonlinear media; ferromagnetism and magnetic circuit</li> <li>14. Magnetic dipole and magnetization current</li> <li>15. Final Exam</li> </ol>				
Preparation and Review(J)					
Preparation and Review	<p>Self-directed learning is necessary.</p> <p>Students are required to be ready for each class by reading the handouts and references in advance of the class.</p> <p>Review of the lecture is strongly recommended after the class.</p>				
Evaluation methods and criteria (J)					
Evaluation methods and criteria	<p>Students are graded on their submitted reports (30 %) and final exam (70%).</p> <p>Makeup exam is unavailable.</p>				
Textbooks and references					
Title	Author	Publisher	Year	ISBN/ISSN	Classification

Electricity and Magnetism	E. M. Purcell	Berkeley			
Introduction to Electrodynamics (2nded.)	D. J. Griffiths				
The Feynman Lectures on Physics (Volume 2)	R. P. Feynman				
Classical Electrodynamics (2nded.)	J. D. Jackson				
Electromagnetics (2nded.)	J. A. Edminister				
URL					
Attached File					
Office Hours(J)					
Office Hours					
Contact : Please insert '@' in the email address.	研究科Webサイトに掲載されている連絡先一覧から確認すること。 Please check with the contact list posted on the Graduate School website.				
Notes					
Practical Skill/Hands-on Class					
Other Comments/Instructions	<p>1. The lecture will be delivered in real time and in person. Announcement on the lecture such as switching the lecture style from in person to online will be delivered via Google Classroom.</p> <p>2. This class is for students who has learned basic of electromagnetics such as Coulomb's law, Gauss's law, Biot-Savart law, Ampere's law and Faraday's law. Although the knowledge will be reviewed at the first one or two times of this classes, students are recommended to join this class after they have studied the basic of electromagnetics.</p> <p>3. Handouts are used in this class, which can be downloaded via Google Classroom.</p> <p>4. Preparation and review are strongly recommended.</p> <p>5. Office hours are TBD by an appointment in advance via e-mail or other approach. The contact information for the instructor will be given in the class.</p>				
Last Update					

One-credit courses require 45 hours of study. In lecture and exercise-based classes, one credit consists of 15-30 hours of class time and 30-15 hours of preparation and review outside of class. In laboratory, practical skill classes, one credit consists of 30-45 hours of class time and 15-0 hours of preparation and review outside of class.