

シラバス参照

科目名/Subject	【JYPE】Electricity and Magnetism A
科目群/Categories	Engineering
曜日・講時/Day/Period	Wednesday 1st (8:50-10:20)
開講年度/Year	2023
セメスター/Semester	Fall Semester
単位数/Credit(s)	2
担当教員(所属) /Instructor (Position)	TAIICHI OTSUJI (Prof.), and TAKUMI FUJIWARA (Prof.)
対象/Eligibility	JYPE
使用言語/Language	English
備考/Notes	

授業題目 /Class Subject	Electricity and Magnetism						
授業の 目的と 概要 /Objectives and Summary of Class	Electricity and Magnetism (EM) is a branch of physics and one of the fundamental and key studies in the engineering. This course object is to study the fundamental idea and theory of the static characteristics of EM. Two professors will give the lectures weekly. The students will practice solving basic EM problems after each lecture.  Keywords: Vector analysis, Electro-statics, Electric field, Electric potential, Magneto-statics.						
学修の 到達目標 /Goal of Study	For the first step, students will obtain perfect knowledge of the laws and principles of EM. For the second step, they will obtain practical skills for solving basic EM problems by choosing pertinent laws and principles of EM. The basis of EM is the knowledge of electrons in free space and substances. Electrons behave as charge-carrier particles and waves with characteristic kinetic energy and wave numbers. The fundamental physical properties of solids depend upon the static distributions and dynamic motions of electrons, which is governed by well-known Coulomb's law in electro-statics, Ampere's Law in magneto-statics, and Faraday's law in electro-magnetic dynamics. This course covers the electro-statics and magneto-statics, which will be followed by the consecutive course Electricity and Magnetism B. The motions of electrons such as velocity and angular momentum are described with vectors. Therefore, the vector analysis is indispensable to understand the EM, which will be studied first as the fundamental Mathematical basis.						
授業内容 ・方法と 進度予定 /Contents and Class Schedule	Oct. 04 Prof. T. Fujiwara	1: Introduction and outline					
		2: Vector Analysis					
		2.1: Vector Algebra					
	Oct. 11 Prof. T. Fujiwara	2.2: Differential Calculus					
	Oct. 18 Prof. T. Fujiwara	2.3: Integral Calculus -1					
	Oct. 25 Prof. T. Fujiwara	2.4: Integral Calculus -2					
	Nov. 01 Prof. T. Fujiwara	2.5: Curvilinear Coordinates					
	Nov. 08 Prof. T. Otsuji	3: Electro-Statics					
		3.1: The Electric Field					
		3.2: Divergence and Curl (Rotation) of Electrostatic Field					
	Nov. 15 Prof. T. Otsuji	3.3: Electric Potential					
	Nov. 22 Prof. T. Otsuji	3.4: Work and Energy in Electrostatics					
	Nov. 29 Prof. T. Otsuji	3.5: Conductors					
	Dec. 06 Prof. T. Otsuji	4: Special Techniques					
		4.1: Laplace's Equation					
	Dec. 13 Prof. T. Otsuji	4.2: The Method of Images					
	Dec. 20 Prof. T. Otsuji	4.3: Separation of Variables					
	Jan. 10 Prof. T. Fujiwara	5: Magneto-Statics					
		5.1: The Biot-Savart Law					
	Jan. 17 Prof. T. Fujiwara	5.2: Applications of Ampere's Law					
	Jan. 24	6: Final Exam.					
成績評価 方法 /Evaluation Method	Practices: 50%, final exam.: 50%						
教科書 および 参考書 /Textbook and references	No	書名	著者名	出版社	出版年	ISBN/ISSN	資料種別
	1.	『Introduction to Electrodynamics』	David J. Griffiths	Prentice Hall, NJ, USA	1999		Reference
関連 URL /URL							

授業時間外  
学修  
/Preparation  
and Review

その他      There is no textbook.  
/In addition    Lecturers' original text notes will be served to the registered students at the classroom.

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1単位の授業科目は、45時間の学修を必要とする内容をもって構成することを標準としています。1単位の修得に必要な学修時間の目安は、「講義・演習」については15～30時間に授業および授業時間外学修(予習・復習など)30～15時間、「実験、実習及び実技」については30～45時間の授業および授業時間外学修(予習・復習など)15～0時間です。

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.