Subject (English)	Electricity and Magnetism A	Semester	Fall	Day/Slot	Wed. / 1st 8:50-10:20
科目名 (日本語)	電磁気学 A				
Course Code	VJ231F72	Course Numbering	TEI-ELM303	Period	Oct. 9, 2019 – Jan. 22, 2020
Instructors (Post)	Taiichi Otsuji (Prof.) Takumi Fujiwara (Prof.)			Campus	Aobayama
				Building	Electrical, Information and Physics Building No.2
Faculty	School of Engineering	Credits	2	Class Room	#2-413

Class subject	Electricity and Magnetism

Object 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.

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.

Contents and progress schedule of class

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.

No.	Date	Instructor	Contents
1	10/9	Prof. T. Fujiwara	1: Introduction and outline 2: Vector Analysis 2.1: Vector Algebra
2	10/16		2.2: Differential Calculus
3	10/23		2.3: Integral Calculus -1
4	10/30		2.4: Integral Calculus -2
5	11/6		2.5: Curvilinear Coordinates
6	11/13	Prof. T. Otsuji	3: Electro-Statics 3.1: The Electric Field 3.2: Divergence and Curl (Rotation) of Electrostatic Field
7	11/27		3.3: Electric Potential 3.4: Work and Energy in Electrostatics
8	12/4		3.5: Conductors
9	12/11		4: Special Techniques 4.1: Laplace's Equation
10	12/18		4.2: The Method of Images
11	12/25		4.3: Separation of Variables
12	1/8	Prof. T. Fujiwara	5: Magneto-Statics 5.1: The Biot-Savart Law
13	1/15		5.2: Applications of Ampere's Law
14	1/22		6: Final Exam.

Preparation	Nothing special
Record and evaluation method	Practices: 50%, final exam.: 50%
Textbook and references	No textbook, print+handout will be served by each professor. Reference: Introduction to Electrodynamics, written by David J. Griffiths, Prenticw Hall, NJ, USA, 1999.
Self study	Nothing special except for home works in case of incompletion of the practices within the time slot of the lecture.
In addition	(None)