

◆Department of Electrical and Electronic Engineering

◆Department of Physical Electronics

1. Program Outline

Department of Electrical and Electronic Engineering and Department of Physical Electronics collaborate closely to conduct education and research. Both departments offer a broad range of advanced courses as well as fundamental subjects in the field of electrical and electronic engineering and physical electronics. The courses cover basic topics necessary for understanding electrical and electronic engineering and physical electronics, which provide the state-of-the-art results and techniques in the field: “electronic materials,” “electron devices,” “wave, photonics and communication,” “electronic circuit,” and “power, energy and environment” and pragmatical courses, in which students acquire practical skills of electrical and electronic engineering and physical electronics. Along with master’s and doctoral research activities, students are expected to enhance the abilities of problem identification and resolution.

2. Course Outlines

In this program, students are expected to acquire the following abilities on the basis of the outline described above.

- 1) Basic and cutting-edge expertise acquisition in various targeted areas to understand essentials in the field of electrical and electronic engineering and physical electronics.
- 2) Problem setting and solving ability in the interdisciplinary research fields.
- 3) Maneuvering ability to apply basic and expertise acquisition in the field of electrical and electronic engineering and physical electronics to solve problems and to propose creative proposals.
- 4) Ability to perform research projects with international viewpoints and future trends.
- 5) Ability for documentation of research process including the logical accountability and discussions with many professionals.

3. Guide to Study

In this program, each student is required to study the basis of the following contents, in order to obtain the abilities mentioned above.

A) Basic and cutting-edge expertise acquisition

Study necessary basics for understanding research fields of “electronic materials,” “electron devices,” “wave, photonics and communication,” “electronic circuit” and “power, energy and environment.” Also study on cutting-edge knowledge in research fields of electrical and electronic engineering and physical electronics.

B) Ability to solve problems in interdisciplinary research areas

To cultivate your ability to solve interdisciplinary research area around electrical and electronic engineering and physical electronics, broaden the knowledge of above research fields.

C) Problem setting and solving ability and master's thesis research

By performing research projects of master's thesis, you can acquire the ability for problem setting and solving. In addition to that, you acquire the ability for project management.

D) Research ability and presentation skills

Through the documentation of research process and the discussion with many professionals including a supervisor, obtain the basic research ability. In addition, obtain communication and presentation skills, which are necessary in the process of problem-finding/-setting/-solving.

E) Culture and international communication

Strengthen humanity and obtain adaptivity to different fields, through cultural and language subjects.

4. Graduation Requirements

[Master's degree]

For a Master's degree each student must satisfy the following requirements:

- (1) 30 credits or more from the Graduate school courses.
- (2) 8 credits from the Seminar Courses (講究科目群).
- (3) 18 credits or more from the Courses by Departments (専門科目群). 16 credits in 18 must be from the Departmental Courses (専攻専門科目群).
- (4) 2 credits or more from the Liberal Arts and General Education (G) (大学院教養・共通科目群).
- (5) The student must complete a master thesis research, submit a thesis for the degree and take and pass the final examination given after the submission of her/his thesis for the qualification.

[Doctoral degree]

For a Doctoral degree a doctoral candidate must satisfy the following requirements:

- (1) 30 credits or more from the Graduate school courses while you are graduate course student.
- (2) Seminar Course in each term must be taken.
- (3) Objective evidence to assure the sufficient ability to perform research works.
- (4) English communication skills (TOEIC score equal or higher than 650).
- (5) Complete a thesis for the degree and pass the final examination.

The candidate who satisfies the above requirements is awarded the doctoral degree. Note that the above requirements are minimal and some additional requirements may be conditioned. All students are strongly advised to consult with their own supervisors about the study plan.

5. Tables of Course Subjects

Table 1 Seminar Courses(講究科目群)

Course Number	Remarks* (See footnotes)	Course	Department Offering course**	Credit	Chair	Semester S: Spring A: Autumn	Opening year a: Annually e: Even o: Odd
54705 54706 54707 54708	R, MP	Seminar I-IV on Electrical and Electronic Engineering	EE	0-2-0	Academic Adviser	S A S A	a
54801 54802 54803 54804 54805 54806	R, DP	Seminar V-X on Electrical and Electronic Engineering	EE	0-2-0	Academic Adviser	S A S A S A	a
55705 55706 55707 55708	R, MP	Seminar I-IV on Physical Electronics	PE	0-2-0	Academic Adviser	S A S A	a
55801 55802 55803 55804 55805 55806	R, DP	Seminar V-X on Physical Electronics	PE	0-2-0	Academic Adviser	S A S A S A	a

* R: Required, MP: Master's Program, DP: Doctoral Program,

**EE: Dept. of Electrical and Electronic Engineering

**PE: Dept. of Physical Electronics

Table 2 Courses by Departments(専門科目群)

Course Number	Remarks* (See footnotes)	Course	Department Offering course**	Credit	Chair	Semester S: Spring A: Autumn	Opening year a: Annually e: Even o: Odd
Departmental Courses (専攻専門科目)							
54001	★□	Advanced Electromagnetic Waves	EE	2-0-0	M. Ando J. Hirokawa	S	a
54002	★□	Wireless Communication Engineering	EE	2-0-0	Not assigned	S	a
54004	□	Lightwave Communications	EE	2-0-0	S. Arai S. Akiba	A	a
54003	★□	Guided Wave Circuit Theory	EE	2-0-0	T. Mizumoto	S	a
54005	★□	Plasma Engineering	EE	2-0-0	N. Takeuchi	S	a
54016	□	Frontier Industry Application of Electrical Discharge and Plasma Technology	EE	2-0-0	Not assigned	A	a
54010	★□	Pulsed Power Technology	EE	1-0-1	K. Yasuoka	A	a
54013	★□	MIMO Communication Systems	EE	2-0-0	Not assigned	A	a
54015	★□	Magnetic Levitation and Magnetic Suspension	EE	2-0-0	A. Chiba	S	a
54007	★□	Electric Power and Motor Drive System Analysis	EE	2-0-0	H. Akagi	A	a
54006	★□	Advanced Course of Power Electronics	EE	2-0-0	H. Fujita	S	a
54009	□	Advanced Electric Power Engineering	EE	2-0-0	K. Yasuoka, et al.	A	a
54014	□	Environment and Electric Energy	EE	2-0-0	T. Nishimura S. Tominaga	A	a
54012		Advanced Power Semiconductor Devices	EE	2-0-0	G. Majumdar I. Takata	A	a
54021		Technology Management	EE	2-0-0	Not assigned	S	a
54020		Innovation Engineering and Management	EE	2-0-0	Not assigned	A	a
54017	★□	Technology Innovation and Standardization I	EE	2-0-0	T. Watanabe	S	a
54018	★□	Technology Innovation and Standardization II	EE	2-0-0	Y. Furuya	A	a
54019	★	Electromagnetic Field Measurement Course	EE	2-0-0	Not assigned	S	a
55001	★□	Electronic Materials A	PE	2-0-0	S. Nakagawa	S	a
55002	★□	Electronic Materials B	PE	2-0-0	T. Manaka	A	a
55003	□	Electronic Materials C	PE	2-0-0	A. Yamada	A	a
55004	★□	Electronic Materials D	PE	2-0-0	M. Iwamoto	S	a
55016	★□	Introduction to Photovoltaics	PE	2-0-0	Not assigned	A	a
55005	□	High-Tech Electronic Material	PE	2-0-0	M. Iwamoto, et al.	A	a
55006	★□	Physics and Engineering of CMOS Devices	PE	2-0-0	Not assigned	S	a
55007	□	Bipolar transistors, Compound semiconductor devices and semiconductor processes	PE	2-0-0	Y. Miyamoto	A	a
55008	★□	Advanced Electron Devices	PE	2-0-0	S. Oda	A	a
55018	★□	Thin Film Devices and Their Applications	PE	2-0-0	M. Hatano	S	a
55010	□	Optical and Quantum Electronics	PE	2-0-0	Not assigned	S	a

55019		VLSI Technology	PE	2-0-0	A. Matsuzawa, et al.	S	a
55009		Information Storage Engineering	PE	2-0-0	S. Matsunuma Y. Shiroishi	A	a
55012	★□	Mixed Signal Systems and Integrated Circuits	PE	2-0-0	A. Matsuzawa	A	a
55014	□	Nano-Materials Electronics	PE	2-0-0	M. Iwamoto S. Nakagawa	S	a
55029		Electrical Modeling and Simulation	PE	2-0-0	A. Matsuzawa, et al.	S	a
55030	★	Teaching skills in English for doctoral course students	PE	0-1-0	J. D. Morris	A	a
55031	★□	Materials and Processes for Microsystems	PE	1-0-0	W. I. Milne, A. J. Flewitt	S	a
56009		Analog Integrated Circuits	CC	2-0-0	S. Takagi	S	a
56007	★	Advanced Signal Processing	CC	2-0-0	A. Nishihara	S	a
56006		Advanced Topics in Mobile Communications	CC	2-0-0	H. Suzuki K. Fukawa	A	a
70020	★	Rural Telecommunications	ID	2-0-0	J. Takada T. Aoyagi	A	a
55020	☆	Specific Interdisciplinary Subject of Physical Electronics A	PE	0-2-0	A. Yamada S. Nakagawa	S	a
55021	☆	Specific Interdisciplinary Subject of Physical Electronics B	PE	0-2-0	M. Hatano S. Miyajima	A	a
Courses in Other Departments (他専攻科目)							
		Courses in other departments and academies, except above Departmental Courses					

*★: Lectured in English

*□ Acceptable for the credits of ACEEES: Academy for Co-creative Education of Environment and Energy Science.

*☆ Only the ACEEES students can take this course. In order to promote interdisciplinary research on campus, students are required to take/register courses provided by designated other majors/programs rather than their own majors/programs.

**EE: Dept. of Electrical and Electronic Engineering

**PE: Dept. of Physical Electronics

**CC: Dept. of Communications and Computer Engineering

**ID: Dept. of International Development Engineering

Table 3 Liberal Arts and General Education(G) (大学院教養・共通科目群)

	Remarks
International Communication (G) (大学院国際コミュニケーション科目)	Select the classes listed in left.
Interdisciplinary Courses (G) (大学院総合科目)	Only the international students can take the Courses for International Students.
Interdepartmental Courses (G) (大学院広域科目)	
Arts and Humanities (G) (大学院文教科目)	
Career Development Courses (G) (大学院キャリア科目)	
Courses for Developing Creativity (G) (大学院創造性育成科目)	
Courses for International Students (G) (大学院留学生科目)	