早稲田大学大学院
GRADUATE SCHOOL OF WASEDA UNIVERSITY

PEP WISE Program

Graduate Program for Power Energy Professionals

AY 2022 Program Handbook

(Appendix of Handbook for Graduate Program)

Graduate School of Fundamental Science and Engineering
(Applied Mechanics and Aerospace Engineering / Electric and Physical Systems)

Graduate School of Advanced Science and Engineering
(Applied Chemistry / Electrical Engineering and Bioscience / Nano Science and Engineering / Advanced Science and Engineering)

Graduate School of Environment and Energy Engineering
(Environment and Energy Engineering)

PEP WISE Program policy

Diploma policy: Completion certificates and the awarding of degrees

The program fosters human resources with deep expertise in electric power and energy science and technology in areas ranging from energy-related materials to systems. They will master the comprehensive perspective with integration of the humanities and science/engineering knowledge and skills necessary for the design and creation of society with next-generation energy system reform (including economics and systems). Specifically, the program aims to produce doctoral human resources, advanced knowledge professionals for society who (a) are capable of pioneering work in new fusion fields, from the cooperative optimization of various energy resources to the creation of new fusion knowledge and value; and (b) can provide leadership in innovation and the solution of electric power and energy problems faced by human society.

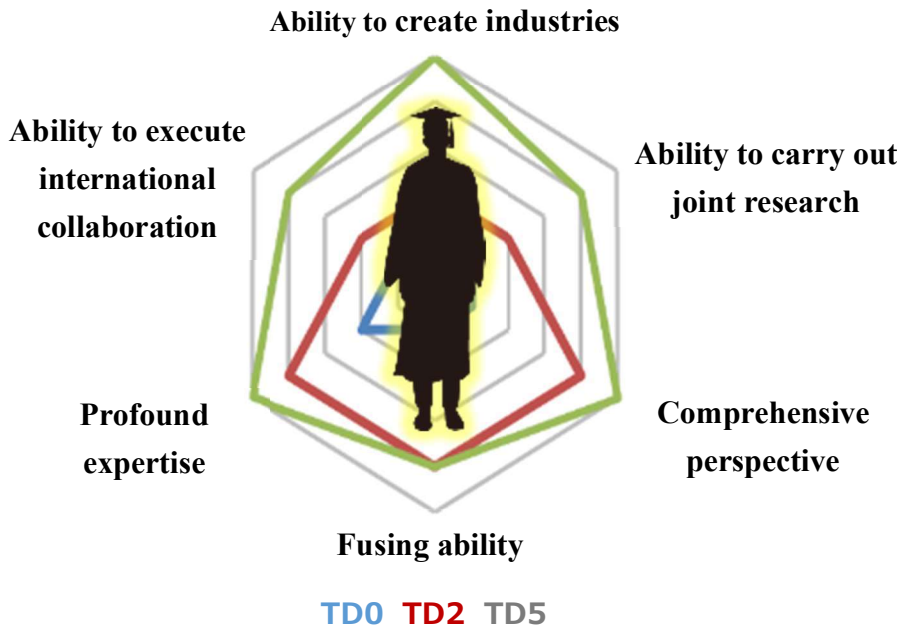
Curriculum policy: Organization and implementation

Lectures and seminars will be provided to develop the following six capabilities.

- The **profound expertise** required by specialists in electricity/energy science and technology
- The **fusing ability** necessary for the creation of new value through multidisciplinary cooperation and resource cooperation
- The **comprehensive perspective** necessary for communication, negotiation, and cooperation with government, society, and industry
- The **ability to carry out joint research** with companies
- The **ability to execute international collaboration** needed to develop research results in international scenarios, working from the perspective of international standardization
- The **ability to create industries** with the potential for development of research results into business creations

Admissions policy: Admission of program participants

- Based on the results of the PEP Selective Examination (SE), we accept students from Japan and overseas who have excellent basic professional skills and language skills, and who are motivated to contribute to the identification and solution of problems faced by human society in the field of electric power and energy.
- In addition to the admissions procedure, we will accept students who have a comprehensive perspective based on substantial work experience.



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I. Overview and features of the PEP Training Program

1. Program overview

Power Energy Professionals (PEP) Training Program is **a five-year integrated professional doctoral program** delivered by the 13 partner universities (Hokkaido University, Tohoku University, University of Fukui, University of Yamanashi, Tokyo Metropolitan University, Yokohama National University, Nagoya University, Osaka University, Hiroshima University, Tokushima University, Kyushu University, University of the Ryukyus, and Waseda University).

The objective of the program is to produce knowledge professionals who will lead the creation of new industrial entities in various sectors by optimizing the energy value chain, which constitutes the core of Society 5.0.

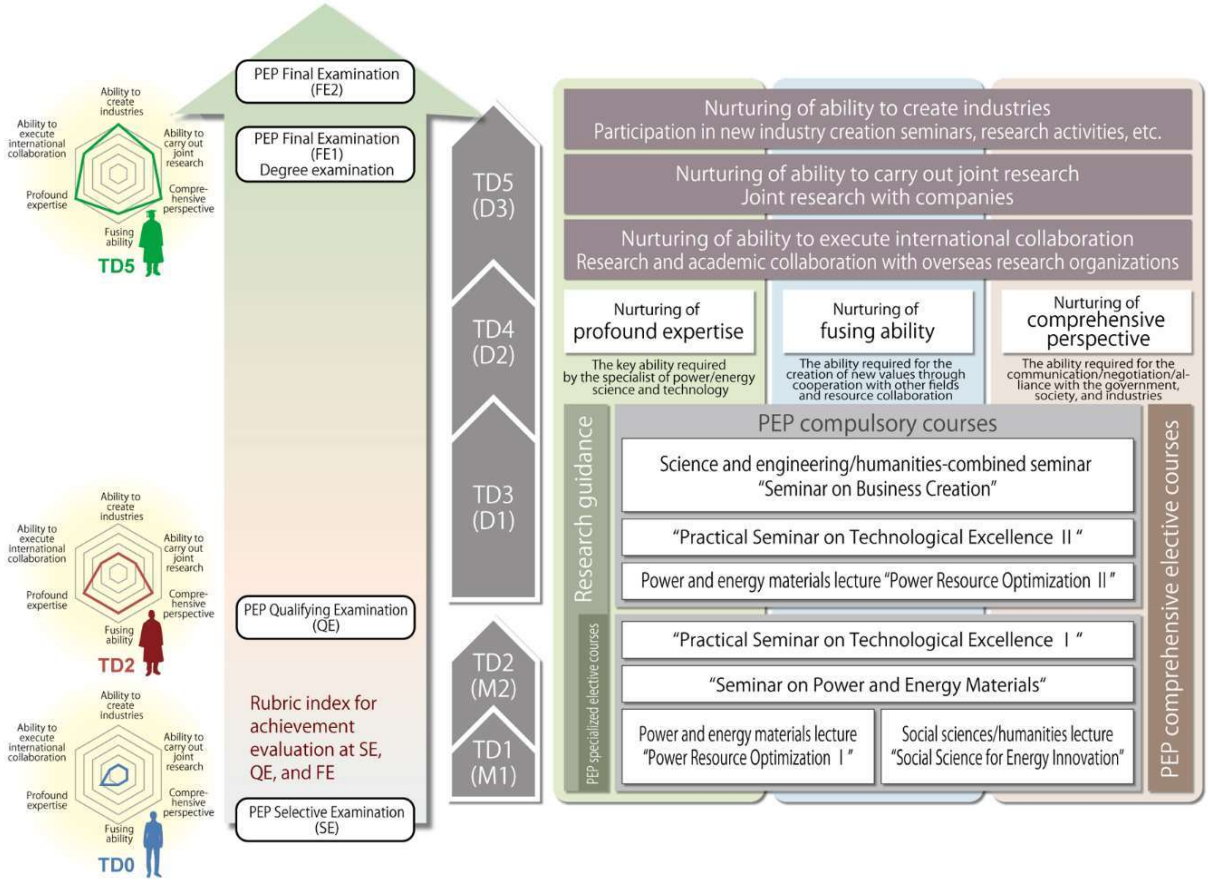
Through a single end-to-end course that provides education in a spectrum of fields ranging from energy materials to power, we provide a systematic education and research program based on power resource optimization, a new academic theory centered on two main objectives: technological innovation and social innovation with institutional design and unconventional added value, which can bring business to fruition.

The 13 collaborating domestic universities bring together front-line faculty members, and through industry-academia collaboration with various institutions and partnerships with overseas universities, offer the five-year PEP WISE Program (Doctoral Program for World-leading Innovative & Smart Education), integrating master's courses and doctoral courses with world-class quality assurance.

PEP Program Certificates of Completion will be issued to students who complete both the requirements of the program and the courses required by departments of graduate schools with which they are affiliated (hereinafter referred to as the "the affiliated department"). In this program, the PEP compulsory courses (7 courses, 10 credits) will be offered at Waseda University, and the PEP specialized elective courses will be offered at each affiliated department. The PEP compulsory courses at Waseda University, which will be offered in the form of on-demand courses; intensive residential sessions; and practical seminars at partner institutions outside the university, are tailored to the needs of the students of the 12 partner universities.

Note: Since completion of the program is a prerequisite for enrollment in and completion of studies at each affiliated department, it is necessary to check the enrollment and completion requirements of each affiliated department.

The outline of the program is presented below.



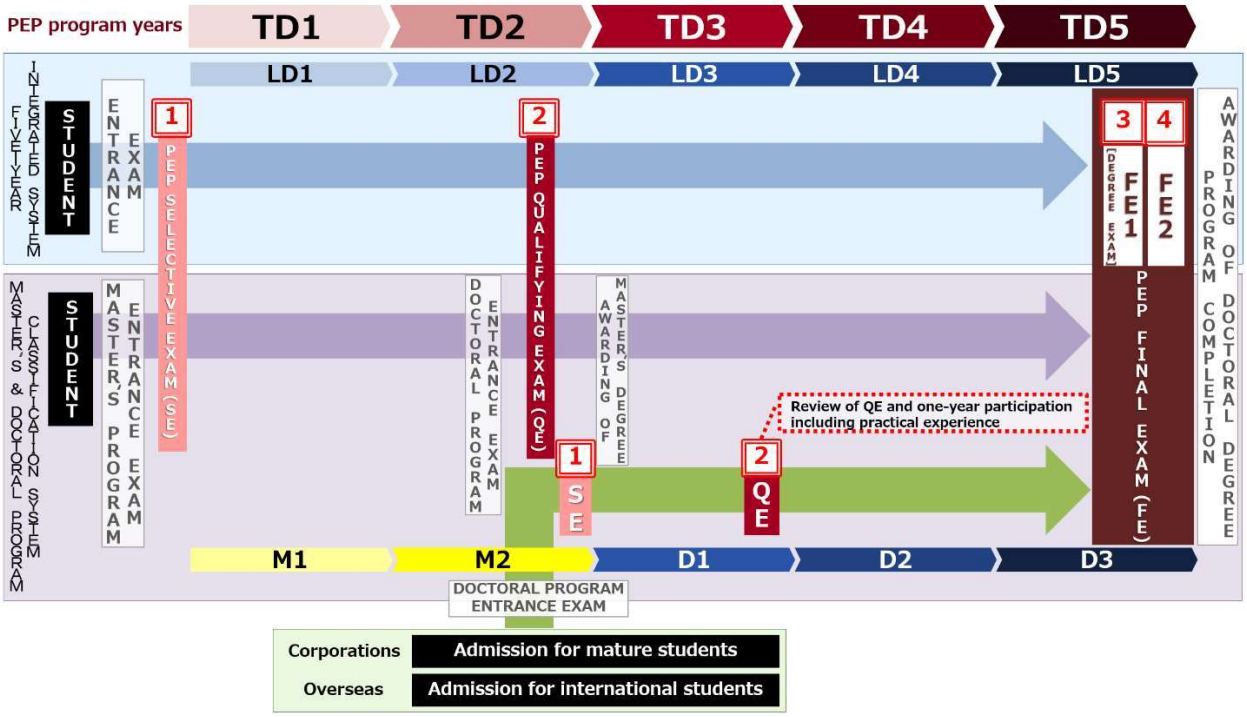
2. Features of the program

- Five-year integrated curriculum
- Students in the program are categorized as TD1 to TD5. TD1 corresponds to the first year of the master's program; TD3 corresponds to the first year of the doctoral program.
- Students in the program who are not affiliated with Waseda University will be registered as graduate school exchange students at Waseda University.
- Each affiliated university supports stipends for RAs engaged in joint research with partner institutions and companies.
- The quality of the program is ensured by the multiple guidance system, operated by the principal advisor; the deputy advisor(s) from Waseda University and from partner universities; and consulting personnel from outside.
- After evaluation by means of a strict Qualifying Examination (hereinafter referred to as “QE”) based on precisely specified evaluation criteria, and Final Examinations (hereinafter referred to as “FE”) including degree examination, approximately twenty Power Energy Professionals are produced each year.
- The degree examination in each affiliated department is designated FE1, and PEP’s own completion examination is designated FE2. Students must pass both examinations to complete the program.
- Graduates of the program will also receive a PEP Program Certificate of Completion, jointly issued by the 13 affiliated universities.

II. PEP Training program schedule and examination requirements

1. Year-by-year schedule

The program will be implemented on the premise of a five-year integrated education system that combines existing two-year master’s programs and a three-year doctoral program. A program flowchart is shown below.



2. Requirements for each examination

The program Qualifying Examination (QE) and Final Examination (FE2) will be conducted under the supervision of the Collaborative Program Committee of Graduate Program for Power Energy Professionals (PEP), as follows.

		Standard expected period	Eligibility	Examination items	Examiners and others
QE	General admission	TD2	30 credits or more (3 or more for PEP compulsory courses; 15 or more for PEP specialized elective courses; 12 or more for other courses (selected from PEP specialized elective courses or PEP comprehensive elective courses) One academic paper (including the paper being submitted)	Research background; results; and presentation of research plan for TD3 and subsequent	[Examiners] Principal advisor; Deputy advisor(s); Consulting personnel; Humanities faculty member
	- TD3 transfer (admissions for mature students and international students) - September TD2 transfer (April entry)	TD3	3 credits or more (2 or more for PEP compulsory courses; and one or more for either PEP specialized elective courses or PEP comprehensive elective courses) One academic paper (including the paper being submitted) or an academic paper proposal	Research background; results; and presentation of research plan for TD4 and subsequent	
FE	General admission	TD5	<FE1> In line with the rules of each affiliated department <FE2> 45 credits or more (10 or more for PEP compulsory courses; 15 or more for PEP specialized elective courses; 5 or more for PEP comprehensive elective courses. One or more joint paper with a collaborating institution at international academic meetings or the like.	<FE1> Degree examination; thesis defense; oral examination <FE2> Presentation on business potential and social significance	The dissertation must include consideration related to science and engineering/humanities-combined areas such as the business potential of the research and contribution to social reform [Examiners] <FE1> Examiners appointed by each affiliated department. However, faculty members from affiliated universities will participate as the deputy advisor(s). <FE2> Deputy advisor(s); Consulting personnel; Humanities faculty member
	TD3 transfer (admissions for mature students and international students)	TD5	<FE1> In line with the rules of each affiliated department <FE2> 15 credits or more (10 or more for PEP compulsory courses; 5 or more for either PEP specialized elective courses or PEP comprehensive elective courses) courses; 5 or more for PEP comprehensive elective courses One or more joint paper presented with a collaborating institution at an international academic meeting or the like.		

- The timing of each examination is December onward (for students enrolled in the fall semester at their affiliated department, June onward).
- The QE may be re-taken only once (For details, the students should check with the PEP Program Office at their affiliated universities).
- Students transferring to TD3 (admissions for mature students and international students) will be eligible to proceed from TD3 if they give a presentation and complete an oral examination of the same standard as QE at the time of the Selection Examination (SE). The QE will be conducted before the student proceeds to TD4.
- "Credits" includes credits currently being completed.
- The above table may not apply to students who transferred to TD1 or TD2, so the students should check with their affiliated departments.

III. PEP Training Program completion guide

1. Requirements for program completion

A total of 45 credits (15 credits for TD3 transfer students) are required for completion of the program. The curriculum is designed not just for meet the objectives of the program, but also to enable the students to acquire sufficient cultural knowledge to ensure that they will be refined graduates of the program. To that end, specialized elective courses and comprehensive elective courses vary by affiliated department.

(1) Common to all universities

The requirements for completion of the program are: (a) acquisition of the required credits (see (2) to (5) below for details); at least one paper co-authored with a partner institution in principle and presented at an international conference; and passing grades on the final examinations (FE1 and FE2). If the courses completed can be counted as both the required credits for completion of the affiliated department and the required credits for completion of the program, they will be accepted as valid for both completion requirements.

(2) Program students whose affiliated institution is not Waseda University [excluding TD3 transfer students (admissions for mature students and international students)]

At Waseda University, the students are required to take only 10 credits for PEP compulsory courses provided by Waseda, and the remaining 35 credits (at least 15 credits for PEP specialized elective courses and at least 5 credits for PEP comprehensive elective courses) must be taken from among the courses offered by each student's affiliated department. At Waseda University, in addition to the 10 credits for compulsory courses provided by the Faculty of Science and Engineering, the students may also take some open courses, i.e. Graduate School Common Courses offered by the Global Education Center; however, the credits for those open courses cannot be counted as required credits for completion of the program.

In addition to acquiring the credits required for completion of the program, students must acquire, by the time they complete TD2, the required number of credits for completion of the master's program as specified by their affiliated department. Similarly, during the period from TD3 to TD5, the students must have acquired the required number of credits for completion of the doctoral program, as specified by their affiliated department. The students should follow the guidelines of their affiliated department and consult with their principal advisor regarding satisfying the requirements of their specific program.

(3) Program students affiliated with Waseda University [excluding TD3 transfer students (admissions for mature students and international students)]

The 45 credits required for completion of the program must be acquired in accordance with the prescribed number of credits indicated in the table below.

[Prescribed number of credits]

	Master's program (TD1～TD2)	Master's and doctoral program Total required credits (TD1～TD5)	Remarks
PEP compulsory courses	3 credits	**10 credits**	
PEP specialized elective courses	15 credits	**15 credits**	In principle, courses provided by the master's program
PEP comprehensive elective courses*	N/A	**5 credits**	Graduate School Common Courses provided by the 3 Graduate Schools of Science and Engineering
Other (selected from specialized elective courses or comprehensive elective courses)	12 credits	**15 credits**	
Total required credits	30 credits	**45 credits**	

*Note: It is essential to ensure that the courses taken in the master's program are different from those taken in the doctoral program.

In addition to the credits required for completion of the program, the student must acquire the credits required for completion of the master's program as specified by their affiliated department, in the prescribed manner by the time they complete TD2. Similarly, during the period from TD3 to TD5, the students must have acquired the number of credits required for the doctoral program (including 5 credits for the doctoral program) as specified by their affiliated department. For the details of credit requirements, the students should conform to the requirements of their affiliated department.

(4) TD3 transfer students whose affiliated department is not Waseda University (admissions for mature students and international students)

At Waseda University, students are required to acquire only 10 credits for PEP compulsory courses provided by Waseda; the remaining 5 credits (for either PEP specialized elective courses or PEP comprehensive elective courses) must be selected from among those provided by their affiliated department. In addition to acquiring the credits required for completion of the program, the students must also acquire the credits required for completion of the doctoral program, as specified by their affiliated department, during the period from TD3 to TD5. Students are required to consult with their principal advisor about the credit requirements of their department.

(5) TD3 transfer students whose affiliation is Waseda University (admissions for mature students and international students)

The 15 credits required for completion of the program by students transferring from the doctoral program (TD3) (admissions for mature students and international students) must be acquired in accordance with the prescribed number of credits indicated in the table below.

[Prescribed number of credits]

	Doctoral program (TD3)	Doctoral program Total required credits (TD3～TD5)	Remarks
PEP compulsory courses	2 credits	**10 credits**	
PEP comprehensive elective courses*	1 credits	**5 credits**	Graduate School Common Courses provided by the 3 Graduate Schools of Science and Engineering
Total required credits	3 credits	**15 credits**	

*Note: It is essential to ensure that the courses taken in the master's program are different from those taken in the doctoral program.

During the period from TD3 to TD5, the students must have completed the number of credits required for the doctoral program (including 5 doctoral credits) as specified by their affiliated department. Regarding the credit requirements of their course, the students should conform to the requirements of their affiliated department.

2. Year-skipping and early completion

[Year-skipping]
In the first year of the PEP master's program (TD1), students who have completed at least 36 credits of PEP courses delivered for TD1 and TD2 (at least 6 credits for PEP compulsory courses; at least 15 credits for PEP specialized elective courses; and at least 5 credits for PEP comprehensive elective courses), and have achieved outstanding results in their master's thesis research, may advance to the doctoral program (TD3) in the second year of the master's program, provided that Collaborative Program Committee of Graduate Program for Power Energy Professionals (PEP) gives its approval, based on the recommendation of the academic advisor.

[Early completion]
Students who have earned all the credits required for completion of the program by the end of TD4, and who have achieved excellent results in their doctoral dissertation research, may take both the degree examination (FE1) of their affiliated department and PEP's own completion examination (FE2), provided that (a) the Collaborative Program Committee of Graduate Program for Power Energy Professionals (PEP) gives its approval, based on the recommendation of their academic advisor and (b) they successfully complete the program in TD4 by passing both exams.

3. List of PEP courses

Course descriptions may change due to certain circumstances. Students should refer to the syllabus for information including faculty members in charge, class format, and timing.
For Waseda University students, items (2) and (3) below include some courses that are only offered every other year, so please check with your affiliated department about the availability of each course before drawing up a completion plan.
Program students whose affiliated institution is not Waseda University should check with their affiliated university every year regarding information on the PEP specialized elective courses and the PEP comprehensive elective courses.

(1) PEP compulsory courses (courses set at Waseda University, common to all 13 partner universities)

For program students from Waseda University, the 10 credits for the 7 PEP compulsory courses will NOT be counted as credits required for completion of the master's program or doctoral program in their affiliated department.
For program students from other than Waseda University, the treatment of the 10 credits from among the 7 PEP compulsory courses as credits required for completion of the master's program or doctoral program differs depending on the affiliated department, so students are required to check with their affiliated departments.

Course title	Term	Credits	Scheduled course period
Power Resource Optimization I	Intensive	2	TD1 or higher
Social Science for Energy Innovation	On-demand	2	TD1 or higher
Seminar on Power and Energy Materials	Intensive	1	TD1 or higher
Practical Seminar on Technological Excellence I (Electrical Power Class / Energy Material Class)	Intensive	1	TD1 or higher
Seminar on Business Creation	Intensive	1	TD1 or higher
Power Resource Optimization II	Intensive	2	TD3 or higher
Practical Seminar on Technological Excellence II (Electrical Power Class / Energy Material Class)	Intensive	1	TD3 or higher

[Note]
- Students with TD2 or higher at the time of entry into the program should take courses giving priority to those with TD1 or higher.
- If a course is divided into a basic course or an advanced course, students should start with the basic course.

- The *Practical seminar on technological excellence* class is divided into the Electric Power Class and the Energy Materials Class, so students should take the specialty that they chose at the time of the PEP Selective Examination (SE).
- Although *Seminar on business creation* is designated for TD1 or higher, students are recommended to take the seminar in TD3.
- Students who have completed ("I" : basic course) in TD1 and have achieved particularly excellent results may take ("II" : advanced course) in TD2 promptly. Students who wish to take this course are required to contact their affiliated university office before registering for it.
- When registering for courses which are for TD3 students or higher, those who are required to take QE re-examination must pass QE beforehand (except for students who transferred to TD3 and students who transferred to TD2 in September [after admission in April]).

(2) PEP specialized elective courses

Note: Program students from other than Waseda University should check the specialized elective courses of their affiliated universities.
Note: Be sure to check the syllabus regarding the language of instruction for each course.

(I) Research guidance (common to both master's and doctoral programs)

Major	Course title
Applied Mechanics and Aerospace Engineering	Research on Fluid Engineering
Applied Mechanics and Aerospace Engineering	Research on Dynamics and Control of Mechanical Systems
Applied Mechanics and Aerospace Engineering	Research on Energy and Systems Engineering
Electric and Physical Systems	Research on Nano-device
Electric and Physical Systems	Research on Nano and Microsystem
Electric and Physical Systems	Research on Nano Materials Informatics
Electric and Physical Systems	Research on Functional Photonics
Electric and Physical Systems	Research on Integrated System Design
Electric and Physical Systems	Research on Radio and Optical Converged Systems
Applied Chemistry	Research on Inorganic Synthetic Chemistry
Applied Chemistry	Research on Polymer Chemistry
Applied Chemistry	Research on Catalytic Chemistry
Applied Chemistry	Research on Applied Biochemistry
Applied Chemistry	Research on Applied Electrochemistry
Applied Chemistry	Research on Functional Surface Chemistry
Applied Chemistry	Research on Chemical Engineering
Applied Chemistry	Research on Synthetic Organic Chemistry
Applied Chemistry	Research on Energy Materials
Electrical Engineering and Bioscience	Research on Applications of Superconductivity
Electrical Engineering and Bioscience	Research on Computer Aided Electromagnetics
Electrical Engineering and Bioscience	Research on Optical Properties of Condensed Matter
Electrical Engineering and Bioscience	Research on Electronic and Photonic Materials
Electrical Engineering and Bioscience	Research on Quantum Materials Science
Electrical Engineering and Bioscience	Research on Semiconductor Engineering
Electrical Engineering and Bioscience	Research on Next-Generation Electrical Energy Systems
Electrical Engineering and Bioscience	Research on Bioinformatics
Electrical Engineering and Bioscience	Research on Synthetic Biology
Electrical Engineering and Bioscience	Research on Electromobility system
Nano Science and Engineering	Research on Nanodevices
Nano Science and Engineering	Research on Microsystems
Nano Science and Engineering	Research on Nanomaterials Informatics
Nano Science and Engineering	Research on Surface Chemistry of Nanostructured Materials
Nano Science and Engineering	Research on Electrochemical Nano-Systems

Major	Course title
Nano Science and Engineering	Research on Nano-Chiral Science
Nano Science and Engineering	Research on Physical Chemistry of Surfaces and Interfaces
Advanced Science and Engineering	Research on Physics and Applied Physics A
Advanced Science and Engineering	Research on Physics and Applied Physics B
Advanced Science and Engineering	Research on Chemistry and Biochemistry
Advanced Science and Engineering	Research on Applied Chemistry A
Advanced Science and Engineering	Research on Applied Chemistry B
Advanced Science and Engineering	Research on Life Science and Medical Bioscience
Advanced Science and Engineering	Research on Electrical Engineering and Bioscience A
Advanced Science and Engineering	Research on Electrical Engineering and Bioscience B
Environment and Energy Engineering	Environment - Energy Network Research A
Environment and Energy Engineering	Environment - Energy Network Research B
Environment and Energy Engineering	Environment - Energy Network Research C
Environment and Energy Engineering	Environment - Energy Network Research D
Environment and Energy Engineering	Environment - Energy Network Research E
Environment and Energy Engineering	Environment - Energy Network Research F
Environment and Energy Engineering	Environment and Power System A
Environment and Energy Engineering	Environment and Power System B
Environment and Energy Engineering	Environment and Power System C
Environment and Energy Engineering	Environment and Power System D
Environment and Energy Engineering	Environment and Power System E
Environment and Energy Engineering	Environment and Power System F
Environment and Energy Engineering	Environmental and Exergy Engineering Research A
Environment and Energy Engineering	Environmental and Exergy Engineering Research B
Environment and Energy Engineering	Environmental and Exergy Engineering Research C
Environment and Energy Engineering	Environmental and Exergy Engineering Research D
Environment and Energy Engineering	Environmental and Exergy Engineering Research E
Environment and Energy Engineering	Environmental and Exergy Engineering Research F
Environment and Energy Engineering	Energy and Sustainable System for Environment A
Environment and Energy Engineering	Energy and Sustainable System for Environment B
Environment and Energy Engineering	Energy and Sustainable System for Environment C
Environment and Energy Engineering	Energy and Sustainable System for Environment D
Environment and Energy Engineering	Energy and Sustainable System for Environment E
Environment and Energy Engineering	Energy and Sustainable System for Environment F

(II) Lecture courses

Note: All courses can be taken as PEP specialized elective courses regardless of the student's affiliated department.

Major	Course title	Term	Credits
Applied Mechanics and Aerospace Engineering	Advanced Dynamics and Control of Mechanical Systems	Fall semester	2
Applied Mechanics and Aerospace Engineering	Advanced Energy and Systems Engineering	Fall semester	2
Applied Mechanics and Aerospace Engineering	Advanced fluid machinery	Fall semester	2
Electric and Physical Systems	Topics on Photonics	Spring semester	2
Electric and Physical Systems	Introduction to Molecular Nano-engineering	Fall semester	2
Electric and Physical Systems	Nano-device Engineering	Spring semester	2
Electric and Physical Systems	MEMS	Spring semester	2
Electric and Physical Systems	Energy Electronics	Spring semester	2
Electric and Physical Systems	System LSI design and CAD	Fall semester	2
Electric and Physical Systems	Physics and Engineering of Semiconductor Nano Devices	Fall semester	2
Electric and Physical Systems	Ultra-Large-Scale-Integration (ULSI) technology	Spring semester	2
Applied Chemistry	Advanced Inorganic Chemistry	Spring semester	2

Major	Course title	Term	Credits
Applied Chemistry	Advanced Organic Chemistry A	Spring semester	2
Applied Chemistry	Advanced Organic Chemistry B	Spring semester	2
Applied Chemistry	Advanced Physical Chemistry A	Spring semester	2
Applied Chemistry	Advanced Physical Chemistry B	Spring semester	2
Applied Chemistry	Advanced Chemical Engineering A	Spring semester	2
Applied Chemistry	Advanced Chemical Engineering B	Spring semester	2
Applied Chemistry	Advanced Biochemistry	Spring semester	2
Applied Chemistry	Inorganic Instrumental Analysis	Fall semester	2
Applied Chemistry	Nanospace Chemistry	Winter quarter	1
Applied Chemistry	Hybrid Materials Chemistry	Fall quarter	1
Applied Chemistry	Advanced Physical Chemistry of Polymeric Materials	Fall quarter	1
Applied Chemistry	Advanced Biopolymer Chemistry	Winter quarter	1
Applied Chemistry	Functional Polymers	Winter quarter	1
Applied Chemistry	Chemistry of Catalytic Processes	Spring quarter	1
Applied Chemistry	Catalytic Reaction Engineering	Fall quarter	1
Applied Chemistry	Advanced Catalysis A	Spring semester	2
Applied Chemistry	Advanced Catalysis B	Fall semester	2
Applied Chemistry	Advanced Biotechnology	Spring semester	2
Applied Chemistry	Advanced Microbial Biotechnology	Spring semester	2
Applied Chemistry	Separation Process Engineering	Fall semester	2
Applied Chemistry	Process Dynamics	Intensive (Spring)	2
Applied Chemistry	Chemical Engineering Research A	Fall semester	2
Applied Chemistry	Chemical Engineering Research B	Fall semester	2
Applied Chemistry	Advanced Synthetic Organic Chemistry	Summer quarter	1
Applied Chemistry	Advanced Bio-Organic Chemistry	Spring quarter	1
Applied Chemistry	Advanced Organometallic Reaction	Winter quarter	1
Applied Chemistry	Applied Electrochemistry A	Fall quarter	1
Applied Chemistry	Applied Electrochemistry B	Winter quarter	1
Applied Chemistry	Advanced Material Process Engineering	Fall semester	2
Applied Chemistry	Advanced Energy Materials A	Fall quarter	1
Applied Chemistry	Advanced Energy Materials B	Winter quarter	1
Electrical Engineering and Bioscience	Advanced Applied Superconductivity	Spring semester	2
Electrical Engineering and Bioscience	Optical properties of matters	Spring semester	2
Electrical Engineering and Bioscience	Information-based Learning	Spring semester	2
Electrical Engineering and Bioscience	Modeling and Control	Spring semester	2
Electrical Engineering and Bioscience	Design Biology	Fall semester	2
Electrical Engineering and Bioscience	Topics on Probabilistic Information Processing	Spring semester	2
Electrical Engineering and Bioscience	Electronic and photonic materials	Fall semester	2
Electrical Engineering and Bioscience	Quantum Materials Science	Spring semester	2
Electrical Engineering and Bioscience	Alternative Energy and Photovoltaics	Intensive (Spring)	2
Electrical Engineering and Bioscience	Advanced Electrical Energy Systems	Fall semester	2
Electrical Engineering and Bioscience	Advanced Semiconductor Engineering	Fall semester	2
Electrical Engineering and Bioscience	Topics on Bioinformatics	Spring semester	2
Electrical Engineering and Bioscience	Topics on Molecular Sensors and Devices	Spring semester	2
Electrical Engineering and Bioscience	Advanced Power Electronics	Fall semester	2
Nano Science and Engineering	Integrative Nano-Science and Nano-Engineering	Spring semester	2
Nano Science and Engineering	Nano- & Biotechnology Fusion Systems	Fall semester	2
Nano Science and Engineering	Advanced Physical Chemistry A	Spring semester	2

Major	Course title	Term	Credits
Nano Science and Engineering	Advanced Physical Chemistry B	Spring semester	2
Nano Science and Engineering	Nanomaterial Analysis	Fall semester	2
Nano Science and Engineering	Nanochemistry	Winter quarter	1
Nano Science and Engineering	Advanced Nanochemical Systems	Fall quarter	1
Nano Science and Engineering	Nanospace Chemistry	Winter quarter	1
Nano Science and Engineering	Advanced Nano-Electrochemistry	Spring semester	2
Nano Science and Engineering	Introduction to Nano-Chiral Science	Intensive (Spring)	2
Nano Science and Engineering	Special Lecture on Nano-Structured High Temperature Materials	Fall quarter	2
Advanced Science and Engineering	Energy Next Problem-Solving Practice	Spring semester	2
Advanced Science and Engineering	Advanced Physics A: Soft Matter Physics	Spring quarter	2
Advanced Science and Engineering	Advanced Physics B: Solid State Physics	Winter quarter	2
Advanced Science and Engineering	Advanced Chemistry A: Functional Organic Material Chemistry	Spring quarter	2
Advanced Science and Engineering	Advanced Chemistry B: Energy resources chemistry	Spring quarter	2
Advanced Science and Engineering	Advanced Electrical Engineering and Electronic Science A: Organic Electronics	Summer quarter	2
Advanced Science and Engineering	Advanced Electrical Engineering and Electronic Science B: Electrical Energy	Fall quarter	2
Advanced Science and Engineering	Advanced Lifescience : Bio-Solid State Physics	Fall quarter	2
Advanced Science and Engineering	Energy Next Systems and Devices	Spring semester	2
Advanced Science and Engineering	Materials Informatics α	Fall quarter	1
Advanced Science and Engineering	Materials Informatics β	Intensive (Fall)	1
Environment and Energy Engineering	Power system - Environment	Fall semester	2
Environment and Energy Engineering	Advanced Topics in Thermal Energy Conversion Engineering	Fall semester	2
Environment and Energy Engineering	Advanced Topics in Thermal Energy and Reaction Engineering	Spring semester	2
Environment and Energy Engineering	Environmental and Exergy Engineering	Spring semester	2
Environment and Energy Engineering	Energy and Sustainable System for Environment	Fall semester	2
Environment and Energy Engineering	Environment and Energy Business Practical Lecture	Spring semester	2
Environment and Energy Engineering	Business strategy of sustainable company	Fall semester	2
Environment and Energy Engineering	Frontiers of Energy Resource and Petroleum Technology	Fall semester	2
Environment and Energy Engineering	Automobile Engineering A	Spring semester	2

(III) Seminars

Major	Course title	Term	Credits
Applied Mechanics and Aerospace Engineering	Seminar on Dynamics and Control of Mechanical Systems A	Spring semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Dynamics and Control of Mechanical Systems B	Fall semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Dynamics and Control of Mechanical Systems C	Spring semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Dynamics and Control of Mechanical Systems D	Fall semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Energy and Systems Engineering A	Spring semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Energy and Systems Engineering B	Fall semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Energy and Systems Engineering C	Spring semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Energy and Systems Engineering D	Fall semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Fluid machinery A	Spring semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Fluid machinery B	Fall semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Fluid machinery C	Spring semester	3
Applied Mechanics and Aerospace Engineering	Seminar on Fluid machinery D	Fall semester	3
Electric and Physical Systems	Seminar on Nano-electronics A	Spring semester	3

Major	Course title	Term	Credits
Electric and Physical Systems	Seminar on Nano-electronics B	Fall semester	3
Electric and Physical Systems	Seminar on Nano-electronics C	Spring semester	3
Electric and Physical Systems	Seminar on Nano-electronics D	Fall semester	3
Electric and Physical Systems	Seminar on Microsystem Technology A	Spring semester	3
Electric and Physical Systems	Seminar on Microsystem Technology B	Fall semester	3
Electric and Physical Systems	Seminar on Microsystem Technology C	Spring semester	3
Electric and Physical Systems	Seminar on Microsystem Technology D	Fall semester	3
Electric and Physical Systems	Seminar on Nano Materials Informatics A	Spring semester	3
Electric and Physical Systems	Seminar on Nano Materials Informatics B	Fall semester	3
Electric and Physical Systems	Seminar on Nano Materials Informatics C	Spring semester	3
Electric and Physical Systems	Seminar on Nano Materials Informatics D	Fall semester	3
Electric and Physical Systems	Seminar on Functional Photonics A	Spring semester	3
Electric and Physical Systems	Seminar on Functional Photonics B	Fall semester	3
Electric and Physical Systems	Seminar on Functional Photonics C	Spring semester	3
Electric and Physical Systems	Seminar on Functional Photonics D	Fall semester	3
Electric and Physical Systems	Seminar on Integrated System Design A	Spring semester	3
Electric and Physical Systems	Seminar on Integrated System Design B	Fall semester	3
Electric and Physical Systems	Seminar on Integrated System Design C	Spring semester	3
Electric and Physical Systems	Seminar on Integrated System Design D	Fall semester	3
Electric and Physical Systems	Seminar on Radio and Optical Converged Systems A	Spring semester	3
Electric and Physical Systems	Seminar on Radio and Optical Converged Systems B	Fall semester	3
Electric and Physical Systems	Seminar on Radio and Optical Converged Systems C	Spring semester	3
Electric and Physical Systems	Seminar on Radio and Optical Converged Systems D	Fall semester	3
Applied Chemistry	Seminar on Inorganic Reaction Mechanisms A	Spring semester	3
Applied Chemistry	Seminar on Inorganic Reaction Mechanisms B	Fall semester	3
Applied Chemistry	Inorganic Solid-State Chemistry A:Seminar	Spring semester	3
Applied Chemistry	Inorganic Solid-State Chemistry B:Seminar	Fall semester	3
Applied Chemistry	Inorganic Materials Chemistry A:Seminar	Spring semester	3
Applied Chemistry	Inorganic Materials Chemistry B:Seminar	Fall semester	3
Applied Chemistry	Seminar on Hybrid Materials Chemistry A	Spring semester	3
Applied Chemistry	Seminar on Hybrid Materials Chemistry B	Fall semester	3
Applied Chemistry	Seminar on Physical Chemistry of Polymers A	Spring semester	3
Applied Chemistry	Seminar on Physical Chemistry of Polymers B	Fall semester	3
Applied Chemistry	Seminar on Polymer Materials A	Spring semester	3
Applied Chemistry	Seminar on Polymer Materials B	Fall semester	3
Applied Chemistry	Seminar on Polymer Synthesis A	Spring semester	3
Applied Chemistry	Seminar on Polymer Synthesis B	Fall semester	3
Applied Chemistry	Seminar on Biopolymers A	Spring semester	3
Applied Chemistry	Seminar on Biopolymers B	Fall semester	3
Applied Chemistry	Seminar on Catalytic Processes A	Spring semester	3
Applied Chemistry	Seminar on Catalytic Processes B	Fall semester	3
Applied Chemistry	Seminar on Energy and Fuel A	Spring semester	3
Applied Chemistry	Seminar on Energy and Fuel B	Fall semester	3
Applied Chemistry	Seminar on Catalytic Chemistry A	Spring semester	3
Applied Chemistry	Seminar on Catalytic Chemistry B	Fall semester	3
Applied Chemistry	Seminar on Organic Catalytic Reactions A	Spring semester	3
Applied Chemistry	Seminar on Organic Catalytic Reactions B	Fall semester	3
Applied Chemistry	Seminar on Biochemical Mechanics A	Spring semester	3
Applied Chemistry	Seminar on Biochemical Mechanics B	Fall semester	3
Applied Chemistry	Seminar on Applied Biochemistry A	Spring semester	3

Major	Course title	Term	Credits
Applied Chemistry	Seminar on Applied Biochemistry B	Fall semester	3
Applied Chemistry	Seminar on Applied Bioscience A	Spring semester	3
Applied Chemistry	Seminar on Applied Bioscience B	Fall semester	3
Applied Chemistry	Seminar on Genetic Engineering A	Spring semester	3
Applied Chemistry	Seminar on Genetic Engineering B	Fall semester	3
Applied Chemistry	Seminar on Reaction Engineering A	Spring semester	3
Applied Chemistry	Seminar on Reaction Engineering B	Fall semester	3
Applied Chemistry	Seminar on Chemical Process Engineering A	Spring semester	3
Applied Chemistry	Seminar on Chemical Process Engineering B	Fall semester	3
Applied Chemistry	Seminar on Separation Engineering A	Spring semester	3
Applied Chemistry	Seminar on Separation Engineering B	Fall semester	3
Applied Chemistry	Seminar on Synthetic Organic Chemistry A	Spring semester	3
Applied Chemistry	Seminar on Synthetic Organic Chemistry B	Fall semester	3
Applied Chemistry	Seminar on Advanced Molecular Design A	Spring semester	3
Applied Chemistry	Seminar on Advanced Molecular Design B	Fall semester	3
Applied Chemistry	Seminar on Advanced Molecular Synthesis A	Spring semester	3
Applied Chemistry	Seminar on Advanced Molecular Synthesis B	Fall semester	3
Applied Chemistry	Seminar on Electronic Materials Chemistry A	Spring semester	3
Applied Chemistry	Seminar on Electronic Materials Chemistry B	Fall semester	3
Applied Chemistry	Seminar on Applied Physical Chemistry A	Spring semester	3
Applied Chemistry	Seminar on Applied Physical Chemistry B	Fall semester	3
Applied Chemistry	Seminar on Physical Electrochemistry A	Spring semester	3
Applied Chemistry	Seminar on Physical Electrochemistry B	Fall semester	3
Applied Chemistry	Seminar on Functional Surface Chemistry A	Spring semester	3
Applied Chemistry	Seminar on Functional Surface Chemistry B	Fall semester	3
Applied Chemistry	Seminar on Material Process Engineering A	Spring semester	3
Applied Chemistry	Seminar on Material Process Engineering B	Fall semester	3
Applied Chemistry	Seminar on Energy Materials A	Spring semester	3
Applied Chemistry	Seminar on Energy Materials B	Fall semester	3
Applied Chemistry	Seminar on Energy Physical Chemistry A	Spring semester	3
Applied Chemistry	Seminar on Energy Physical Chemistry B	Fall semester	3
Electrical Engineering and Bioscience	Advanced Seminar A	Spring semester	1
Electrical Engineering and Bioscience	Advanced Seminar B	Fall semester	1
Electrical Engineering and Bioscience	Seminar on Applications of Superconductivity A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Applications of Superconductivity B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Applications of Superconductivity C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Applications of Superconductivity D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Computer-Aided Electromagnetics A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Computer-Aided Electromagnetics B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Computer-Aided Electromagnetics C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Computer-Aided Electromagnetics D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Optical Properties of Condensed Matter A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Optical Properties of Condensed Matter B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Optical Properties of Condensed Matter C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Optical Properties of Condensed Matter D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Electronic and Photonic Materials A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Electronic and Photonic Materials B	Fall semester	3

Major	Course title	Term	Credits
Electrical Engineering and Bioscience	Seminar on Electronic and Photonic Materials C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Electronic and Photonic Materials D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Quantum Materials Science A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Quantum Materials Science B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Quantum Materials Science C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Quantum Materials Science D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Semiconductor Engineering A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Semiconductor Engineering B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Semiconductor Engineering C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Semiconductor Engineering D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Next-Generation Electrical Energy Systems A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Next-Generation Electrical Energy Systems B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Next-Generation Electrical Energy Systems C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Next-Generation Electrical Energy Systems D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Bioinformatics A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Bioinformatics B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Bioinformatics C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Bioinformatics D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Synthetic Biology A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Synthetic Biology B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Synthetic Biology C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Synthetic Biology D	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Electromobility system A	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Electromobility system B	Fall semester	3
Electrical Engineering and Bioscience	Seminar on Electromobility system C	Spring semester	3
Electrical Engineering and Bioscience	Seminar on Electromobility system D	Fall semester	3
Nano Science and Engineering	Seminar on Nanoelectronics A	Spring semester	3
Nano Science and Engineering	Seminar on Nanoelectronics B	Fall semester	3
Nano Science and Engineering	Seminar on Nanoelectronics C	Spring semester	3
Nano Science and Engineering	Seminar on Nanoelectronics D	Fall semester	3
Nano Science and Engineering	Seminar on Microsystem Engineering A	Spring semester	3
Nano Science and Engineering	Seminar on Microsystem Engineering B	Fall semester	3
Nano Science and Engineering	Seminar on Microsystem Engineering C	Spring semester	3
Nano Science and Engineering	Seminar on Microsystem Engineering D	Fall semester	3
Nano Science and Engineering	Seminar on Nanomaterials for Informatics A	Spring semester	3
Nano Science and Engineering	Seminar on Nanomaterials for Informatics B	Fall semester	3
Nano Science and Engineering	Seminar on Nanomaterials for Informatics C	Spring semester	3
Nano Science and Engineering	Seminar on Nanomaterials for Informatics D	Fall semester	3
Nano Science and Engineering	Seminar on Nanofunctional Surface Chemistry A	Spring semester	3
Nano Science and Engineering	Seminar on Nanofunctional Surface Chemistry B	Fall semester	3
Nano Science and Engineering	Seminar on Nanofunctional Surface Chemistry C	Spring semester	3
Nano Science and Engineering	Seminar on Nanofunctional Surface Chemistry D	Fall semester	3
Nano Science and Engineering	Seminar on Nano-Electrochemistry A	Spring semester	3
Nano Science and Engineering	Seminar on Nano-Electrochemistry B	Fall semester	3
Nano Science and Engineering	Seminar on Nano-Electrochemistry C	Spring semester	3
Nano Science and Engineering	Seminar on Nano-Electrochemistry D	Fall semester	3

Major	Course title	Term	Credits
Nano Science and Engineering	Seminar on Nano-Chiral Science A	Spring semester	3
Nano Science and Engineering	Seminar on Nano-Chiral Science B	Fall semester	3
Nano Science and Engineering	Nano-Chiral Science C :Seminar	Spring semester	3
Nano Science and Engineering	Nano-Chiral Science D :Seminar	Fall semester	3
Nano Science and Engineering	Seminar on surface and interface research A	Spring semester	3
Nano Science and Engineering	Seminar on surface and interface research B	Fall semester	3
Nano Science and Engineering	Seminar on surface and interface research C	Spring semester	3
Nano Science and Engineering	Seminar on surface and interface research D	Fall semester	3
Environment and Energy Engineering	Environment - Energy Network A:Seminar	Spring semester	3
Environment and Energy Engineering	Environment - Energy Network B:Seminar	Fall semester	3
Environment and Energy Engineering	Environment and Power System A:Seminar	Spring semester	3
Environment and Energy Engineering	Environment and Power System B:Seminar	Fall semester	3
Environment and Energy Engineering	Environmental and Exergy Engineering A :Seminar	Spring semester	3
Environment and Energy Engineering	Environmental and Exergy Engineering B :Seminar	Fall semester	3
Environment and Energy Engineering	Energy and Sustainable System for Environment A:Seminar	Spring semester	3
Environment and Energy Engineering	Energy and Sustainable System for Environment B:Seminar	Fall semester	3
Environment and Energy Engineering	Environment and Energy Engineering A:Seminar	Spring semester	3
Environment and Energy Engineering	Advanced Environment and Energy Engineering A:Seminar	Spring semester	3
Environment and Energy Engineering	Advanced Environment and Energy Engineering B:Seminar	Fall semester	3

(3) PEP comprehensive elective courses

Note: Program students from other than Waseda University should check the specialized elective courses of their affiliated university.

The PEP comprehensive elective courses are common to all three graduate schools of the Faculty of Science and Engineering, Waseda University. Please refer to *13.共通科目の学科目配当表 (Course list of Common Courses) on 大学院基幹/先進理工学研究科要項 (Student Handbook for Graduate School of Fundamental/Advanced Science and Engineering) and 7. Course List of Common Doctoral Courses* in Waseda University's *Student Handbook for the English-based Graduate Program in Science and Engineering*.

Students of the Graduate School of Environment and Energy Engineering are advised to check the Graduate School website.
Students in the departments of Applied Chemistry, Nano Science and Engineering, and Advanced Science and Engineering can take the courses listed in the table below.

Course Title	Term	Credits
Only for students from the departments of Applied Chemistry and Nano Science and Engineering		
Research Ethics in Applied Chemistry	Intensive (spring)	1
Only for students from the department of Advanced Science and Engineering		
Laboratory Rotation A	Full year	1
Laboratory Rotation B	Full year	1
Academic Research Practice and Industrial Internship A	Full year	3
Academic Research Practice and Industrial Internship B	Full year	3
Introduction to Energy Next	Fall quarter	1

(4) Doctoral program credit system

Students must complete courses and earn credits in accordance with the regulations of their affiliated department.

4. Credits for courses completed in advance

If a student has completed the courses listed in (2) and (3) of Section 3 of this Program Handbook before entering the program, the credits can be counted as credits earned in the program.

IV. PEP Training program RA stipends

1. PEP Training program RA stipends

Students participating in a joint research project with partner institutions or companies are eligible to receive PEP Training program RA stipends via their academic advisor (the principal investigator of the project). Note: those admitted as mature students and those who have extended their program are not eligible.

2. Receipt of PEP Training program RA stipends

When you receive PEP Training program RA stipends, please follow the regulations of your affiliated university. Waseda University students must follow the procedures and payment amount stipulations (unit price standard) specified in *Procedures for the Employment of Research Assistants (RA) and Research Support Staff* in Waseda University's *Research Funds Manual* (details provided by the PEP Program Office).

V. Student ID Number

In the case of program students of Waseda University, a student ID number will be issued at the time of admission to the master's program and the doctoral program (i.e., at the time of entering TD1 and TD3), and will be used until the completion of the relevant program. In the case where students enter the program by transferring at TD1 and TD2, their existing student ID number will remain the same.

	First to second digits	Third to fourth digits	Fifth digit	Sixth to Eighth digits
	Graduate school code	Year of admission	Code for major	Sequential serial number
Graduate School of Fundamental Science and Engineering	51	22	C	001～（TD1）
			D	501～（TD3）
Graduate School of Advanced Science and Engineering	53	22	C E G	001～（TD1） 501～（TD3）
			N	501～（TD1）

	First to second digits	Third to fourth digits	Fifth to Eighth digits
	Graduate school code	Year of admission	Sequential serial number
Graduate School of Environment and Energy Engineering	54	22	0001～（TD1） 0501～（TD3）

For program students who are affiliated with other universities, student ID numbers will be issued by the Department of Advanced Science and Engineering, Graduate School of Advanced Science and Engineering, which serves as the host institution. That student ID number will remain the same throughout the student's entire period of enrollment at Waseda University.

	First to second digits	Third to fourth digits	Fifth digit	Sixth to Eighth digits
	Graduate school code	Year of admission	Code for major	Sequential serial number
Students affiliated with other universities	53	22	N	951～（TD1） 851～（TD3）