Graduate Major in Systems and Control Engineering

【Master's Degree Program】

1. Outline

Our lives, as well as the various equipment and infrastructure that support us are made up of different elements. However, it is shown that the ability to achieve these and the values that are conceived transcend the individual elements to make an overall system. In the Master's Degree Program, all things and matters in nature and society will be objectively analyzed as systems, and students will cultivate the ability to create systems that have value based on this knowledge. Namely, by learning developmental knowledge of measurement, control, planning, and systems science, this program trains talented people who can specifically apply this knowledge to new topics, are flexibly inventive, creative, and are bold and action-oriented individuals.

2. Competencies Developed

In the Master's Degree Program, students are trained in the following abilities.

1. Expert mathematical knowledge for modelling, computerizing, and analyzing actual systems
2. Expert mathematical knowledge for creating and controlling systems that have new value
3. Practical skills to utilize the expert knowledge that is learned
4. The ability to accurately recognize societal challenges, and the ability to identify and resolve these problems
5. Communication and presentation abilities based on logical thinking

3. Learning Goals

The Master's Degree Program has a curriculum that is designed for students to learn the skills in Competencies Developed in which the following seven categories are arranged in coordination.

A Courses that build expert knowledge of system mathematics
B Courses that build expert knowledge of Systems and Control Engineering
C Courses that build expert knowledge in the fields of information and sensing
D Courses that train expert abilities of system modelling
E Courses that build communication ability, as well as the abilities to identify and resolve problems
F Courses that build expert research abilities
G Courses that build expert abilities to view their own field and career from a comprehensive/ethical perspective

4. IGP Completion Requirements

The following requirements must be met to complete the Master's Degree Program of this major.

1. Attain a total of 30 credits or more from 400- and 500-level courses.
2. From the courses specified in Table M2,
   - a total of 8 credits acquired from Research Seminars;
   - a minimum of 20 credits acquired from Major Courses;
   - 3 credits acquired from Systems and Control Engineering Project;
3. A minimum of 5 credits acquired from Liberal Arts and Basic Science Courses
   (3 credits from Humanities and Social Science Courses of which 2 credits must be from 400-level courses and 1 credit from 500-level courses, and 2 credits from Career Development Courses).
4. Pass the master's thesis review and defense.

Note for research ethics

The department strongly expects that the students should take either:

1) the course of “Social and Business Rules and Ethics” at 500 level (these courses are given in Japanese)
2) e-Learning course for research ethics by APRIN
   3 (or more) modules among the total 7 modules including “Research Misconduct”, “Ethical Issues in the Management of Data in Engineering Research”, and “Whistleblowing and the Obligation to Protect the Public"

Table M1 shows course categories and the number of credits required to complete the Master's Degree Program of this major. It also shows the required minimum credits in each course category and points to be noted when selecting the required courses and electives.

The learning goals to be obtained by students through courses are listed as “Associated learning goals”. Prior to registering courses, students need to fully understand the learning goals.

Table M1. Graduate Major in Systems and Control Engineering Completion Requirements

Course category		<Required courses> Required credits	<Electives> Minimum credits required	Minimum credits required	Associated learning goals	Comments
Liberal Arts and Basic Science Courses	Humanities and Social Science Courses		•2 credits from 400-level •1 credit from 500-level	5 credits	G	
	Career Development Courses		2 credits		G	All Graduate Attributes (GA) should be acquired. (Refer to Section 7 for the definition of GA.)
	Other courses					
Core Courses	Research Seminars	Research Seminar in Systems and Control Engineering (SCE) S1 Research Seminar in SCE F1 Research Seminar in SCE S2 Research Seminar in SCE F2 A total of 8 credits, 2 credits each from the above courses.		20 credits	F	
	Research-Related Courses					
	Major Courses		3 credits		A,B,C,D,E	
	Major Courses and Research-Related Courses <u>outside</u> the Graduate Major in Systems and Control Engineering standard curriculum			2 credits		
Total required credits		A minimum of 30 credits including those attained according to the above conditions				

Note	**・Japanese Language and Culture Courses offered to international students can be recognized as equivalent to the Humanities and Social Science Courses of the corresponding course level.** **・For details of the Liberal Arts and Basic Science Courses, please refer to the relevant sections.**

5. IGP Courses

Table M2 shows the Core Courses of the Master's Degree Program in this major. Graduate Majors listed in the Comments column offer core courses that are recognized as equivalent to the corresponding Major Courses or Research-related Courses in the standard curriculum of this major.

Table M2. Core Courses of the Graduate Major in Systems and Control Engineering

Course Category		Course Number	Course Title			Credits	Competencies	Learning goals	Comments
Research Seminars	**400 level**	SCE.Z491.R	◎		Seminar in Systems and Control Engineering S1	0-2-0	1,3,5	F	
		SCE.Z492.R	◎		Seminar in Systems and Control Engineering F1	0-2-0	1,3,5	F	
	500 level	SCE.Z591.R	◎		Seminar in Systems and Control Engineering S2	0-2-0	1,3,5	F	
		SCE.Z592.R	◎		Seminar in Systems and Control Engineering F2	0-2-0	1,3,5	F	
Major Courses	**400 level**	SCE.A404.L			Nonlinear Dynamics	1-0-0	1	A	
		SCE.A405.L			Inverse Problems and Data Assimilation	1-0-0	1,4,5	A	
		SCE.C401.L			System Identification and Estimation	1-0-0	1,5	B	
		SCE.C451.L			Optimal Control	1-0-0	1	B	
		SCE.C452.L			Nonlinear and Adaptive Control	1-0-0	1	B	
		SCE.C453.L			Network Control Systems	1-0-0	1	B	
		SCE.I401.L			Advanced Course of Measurement and Signal Processing	1-0-0	1	C	
		SCE.I402.L			Advanced Course of Sensing System Theory	1-0-0	1,5	C	
		SCE.I404.L			Automobile Transportation System and Environmental Impact	1-0-0	1,4,5	C, D	
		SCE.I433.L			Intelligent Communication and Social Interaction	1-0-0	1,2,4	B,C,D, G	

		SCE.I434.L			Robot Audition and Scene Analysis	1-0-0	1,4,5	C	
		SCE.I435.L			Visual and Knowledge Information Processing	1-0-0	1,4,5	C	
		SCE.M401.L			Numerical Analysis of Heat Transfer and Fluid Flow	1-0-0	1,5	D	
		SCE.M402.L			Modeling of Bio-Systems I	1-0-0	1,5	D	
		SCE.S402.L			Fluid Robotics	1-0-0	1,5	D	
		SCE.Z401.A	○		Cyber-Physical Innovation	0-3-0	3,4,5	E	Required for IGP students
		SCE.Z402.A	○		International Dispatch Project A	0-3-0	2,3,4,5	E	
		SCE.Z403.A	○		International Dispatch Project B	0-3-0	2,3,4,5	E	
		SCE.Z410.L			Ota City Start-up Experience Off-Campus Project	0.5-0-0.5	3,4,5	E,G	Offered by Academy for Super Smart Society (SSS.S433)
		SCE.U431.L			Automotive Structural System Engineering A	3-0-0	1,2,3,4	D	【Mechanical Engineering】 (MEC.U431)
		SCE.U432.L			Automotive Comfort Mechanics Engineering A	3-0-0	1,2,3	D	【Mechanical Engineering】 (MEC.U432)
		SCE.U433.L			Advanced Production Engineering A	3-0-0	1,2,3	D	【Mechanical Engineering】 (MEC.U433)
		SCE.U434.L			Advanced Internal Combustion Engine Engineering and Future Power Train A	3-0-0	1,2,3	D	【Mechanical Engineering】 (MEC.U434)
		SCE.S403.L			Materials Simulation	2-0-0	1,5	D	(TCM.A402)
		SCE.S405.L			Materials Informatics	2-0-0	1,5	D	(TCM.A404)
	500 level	SCE.A503.L			Planning Algorithm	1-0-0	1	A	
		SCE.A504.L			Advanced Course of Computational Mechanics	1-0-0	1	A	

		SCE.A506.L			Mathematical Models and Computer Science	2-0-0	1,5	A	【Mathematical and Computing Science】(MCS.T506)
		SCE.C532.L			Nonlinear Control: Geometric Approach	1-0-0	1	B	
		SCE.I501.L			Image Recognition	1-0-0	1,2,	C	
		SCE.M502.L			Modeling of Bio-Systems II	1-0-0	1,5	D	
		SCE.Z510.L			MC Internship (Systems & Control) A1	0-0-2	3,4,5	E,G	
		SCE.Z511.L			MC Internship (Systems & Control) A2	0-0-2	3,4,5	E,G	
		SCE.Z512.L			MC Internship (Systems & Control) B1	0-0-1	3,4,5	E,G	
		SCE.Z513.L			MC Internship (Systems & Control) B2	0-0-1	3,4,5	E,G	

Note：

• ◎：Required course，○：Restricted elective，O：odd academic years，E：even academic years

• Competencies: 1 = Specialist skills, 2 = Liberal arts skills, 3 = Communication skills, 4 = Applied skills (inquisitive thinking and/or problem-finding skills), 5 = Applied skills (practical and/or problem-solving skills)

•【 】Course offered by another graduate major

• The character preceding the three digits in the course number denotes the course's subdiscipline (i.e., "A" represents the subdiscipline code in the course number SCE.A400.L): A (Mathematics), C (Control), I (Information and Measurement), M (Modeling), S (Real System), P (Project), Z (Research and Practice).

• The contents of the courses “SCE.Z401.A: Cyber-Physical Innovation” and “SCE.I501.L: Image Recognition” are equivalent to those of “SCE.Z401.A: Systems and Control Engineering Project” and “SCE.I501.L: Computational Imaging”, respectively, which used to be offered until AY 2019. Those who have taken these courses in the old name cannot take them for acquiring new credits.

6. IGP Courses That Can Be Counted as Humanities and Social Science Courses

None

7. IGP Career Development Courses and IGP Courses That Can Be Counted as Career Development Courses

In order to fulfill the completion requirements for the master’s degree program, students must attain at least 2 credits in Career Development Courses, and should satisfy all of the Graduate Attributes (GA) specified in Table MA-1 of the “Career Development Courses” listed as one of the “Liberal Arts and Basic Science Courses” in the Guide to Graduate Education and International Graduate Program, as well as shown below. Students will be evaluated in regards to GA achievements at the time of their degree completion. As to the courses with two GAs, both GAs stipulated for the courses are considered to be acquired if students receive the corresponding credits for those courses.

Career Development Courses and Major Courses that enable students to acquire GA and that are recognized as equivalent to

Career Development Courses, offered by the Graduate Major, are listed in Table M3 below. Students can also acquire GA and credits by taking the Career Development Courses offered by Innovator and Inventor Development Platform (IIDP) listed as one of the “Liberal Arts and Basic Science Courses” in the Guide to Graduate Education and International Graduate Program.

However, it must be noted that credits attained from those courses that can be counted as Career Development Courses can be counted towards the completion requirements of master’s degree program, either for the Major Courses or for the Career Development Courses (i.e., not for both). Nevertheless, even in the cases from those mentioned above where attained credits pertaining to these courses are not considered as Career Development Courses, their associated GAs may be considered by the Graduate Major to have been acquired.

For Graduate Attributes, refer to the Guide to the Career Development Courses.
The Graduate Attributes of the Master's Degree Program are listed in Table MA-1 as follows:

GA0M: You can clearly plan your own career and recognize the abilities necessary for realizing it while considering ethics and relevance to societal problems.

GA1M: You can acquire the knowledge, skills, and ethics necessary for realizing your planned career and contribute to societal problem-solving while collaborating with other experts.

Table M3. Courses of the Graduate Major in Systems and Control Engineering recognized as equivalent to Career Development Courses, and Career Development Courses

Course category	Course number	Course title			Credits	GA*	Learning goals	Comments
Courses that can be counted as Career Development Courses	SCE.Z410.L			Ota City Start-up Experience Off-Campus Project	0.5-0-0.5	GA0M	E,G	
	SCE.Z510.L			MC Internship (Systems & Control) A1	0-0-2	GA1M	E,G	
	SCE.Z511.L			MC Internship (Systems & Control) A2	0-0-2	GA1M	E,G	
	SCE.Z512.L			MC Internship (Systems & Control) B1	0-0-1	GA1M	E,G	
	SCE.Z513.L			MC Internship (Systems & Control) B2	0-0-1	GA1M	E,G	
Career Development Courses	SCE.G511			Master's Recurrent Program 1-1 of Systems and Control Engineering	0-0-1	GA0M GA1M		Career Development Course offered by the Graduate Major in Systems and Control Engineering. You cannot count for the Major Course.
	SCE.G512			Master's Recurrent Program 1-2 of Systems and Control Engineering	0-0-1	GA0M GA1M		
	SCE.G513			Master's Recurrent Program 2 of Systems and Control Engineering	0-0-2	GA0M GA1M		

Credits in Career Development Courses must be attained from among the above-listed courses and those listed as such in the Liberal Arts and Basic Science Courses Guide.

＊GA: Graduate Attributes

8. Research Related to the Completion of Master Theses

Students participating in this Program must submit an original master thesis to the institute. At Tokyo Tech, there is no credit for the master thesis. Students are expected to work for their master theses throughout the master course under supervisions of academic advisors. Students are requested to conduct (i) process memo, (ii) off-lab discussions, and (iii) interim presentation. The process memo is a report of research activities. Students will be requested to submit his/her report to his/her academic advisors by an indicated deadline. As off-lab discussions, students are required to make discussions with professors except his/her supervisor. Two times of discussions will be set for a student. An interim presentation is mandatory for all students. The type of presentation (poster or oral) and the date of interim presentation will be announced by the department.
At Tokyo Tech, the master's degree will be awarded according to the rules and regulations for the master's degree diploma. The decision of pass or fail will be made by a review board, which consists of 3 or more faculty members. The review board must be formed with 5 or more members if you continue your study to the doctoral course.

【Doctoral Degree Program】

1. Outline

In the Doctoral Degree Program, we train people to be leaders equipped with both academic knowledge and practical abilities, who can hold a highly systemic point of view while independently discovering topics for conducting their own research into various practical problems. Students are trained to be able to systemize and understand the flow of research and development from a highly systemic and international point of view, as well as to have the ability to freely apply their expert knowledge of Systems and Control Engineering in new creative proposals to return the fruits of their research to society.

2. Competencies Developed

The following abilities will be trained, based on the extensive academic abilities and systematic viewpoint learned before the Doctoral Degree Program.

- The ability to interpret and systemize problems in various fields from a s viewpoint of system engineering, and the ability to conceive and create new values
- The ability to independently establish research topics
- The ability to design and execute projects as a leader
- The ability to systemize and understand the flow of research and development with an international point of view
- The ability to return the fruits of one's research to society

3. Learning Goals

The following courses for the Doctoral Degree Program have been established in order to acquire the abilities in Competencies Developed. These courses are designed to allow students a great deal of freedom when planning their studies and students can independently design and complete their own curriculum.

(A) Research-Process Courses that train research practice and management of creative proposals, as well as presentation abilities
(B) Research Seminars that train the abilities to execute research as well as systemization
(C) Career Development Courses that cultivate societal connections

4. IGP Completion Requirements

The following requirements must be met to complete the Doctoral Degree Program of this major.

1. Attain a total of 24 credits or more from 600-level courses.
2. From the courses specified in Table D2,
    - a total of 12 credits acquired from Research Seminars;
    - a minimum of 2 credits acquired from Research Process;
    - a minimum of 14 credits acquired from Major Courses; and
    - a minimum of 6 credits acquired from Liberal Arts and Basic Science Courses

(2credits from Humanities and Social Science Courses, and 4 credits from Career Development Courses).

3. Pass the doctoral thesis review and defense.

Note for research ethics

The department strongly expects that the students should take either:

1) the course of “Ethics of Scientists and Engineers” at 600 level (this course is given in Japanese)

2) e-Learning course for research ethics by APRIN (all 7 modules)

Table D1 shows course categories and the number of credits required to complete the Doctoral Degree Program of this major. It also shows the required minimum credits in each course category and points to be noted when selecting the required courses and electives.

The learning goals to be obtained by students through courses are listed as “Associated learning goals”. Prior to registering courses, students need to fully understand the learning goals.

Table D1. Graduate Major in Systems and Control Engineering Completion Requirements

Course category		<Required courses> Required credits	<Electives> Minimum credits required	Minimum credits required	Associated learning goals	Comments
Liberal Arts and Basic Science Courses	Humanities and Social Science Courses		2 credits	6 credits	C	
	Career Development Courses		4 credits		C	All Graduate Attributes (GA) should be acquired. (Refer to Section 7 for the definition of GA.)
	Other courses					
Core Courses	Research Seminars	Research Seminar in Systems and Control Engineering S3 Research Seminar in Systems and Control Engineering F3 Research Seminar in Systems and Control Engineering S4 Research Seminar in Systems and Control Engineering F4 Research Seminar in Systems and Control Engineering S5 Research Seminar in Systems and Control Engineering F5 A total of 12 credits, 2 credits each from the above courses.		14 credits	B	
	Research-Related Courses	Research Process A1 Research Process A2 Research Process A3 Research Process B1 Research Process B2 Research Process B3 Research Process B4	2 credits		A	

		Research Process B5 Research Process B6				
	Major Courses					
	Major Courses and Research-Related Courses <u>outside</u> the Graduate Major in Systems and Control Engineering standard curriculum					
Total required credits		**A minimum of 24 credits including those attained according to the above conditions**				
Note		**・Japanese Language and Culture Courses offered to international students can be recognized as equivalent to the Humanities and Social Science Courses of the corresponding course level.** **・For details of the Liberal Arts and Basic Science Courses, please refer to the relevant sections.**				

5. IGP Courses

Table D2 shows the Core Courses of the Doctoral Degree Program of this major. Graduate Majors listed in the Comments column offer core courses that are recognized as equivalent to the corresponding Major Courses or Research-related Courses in the standard curriculum of this major.

Table D2. Core Courses of the Graduate Major in Systems and Control Engineering

Course Category		Course Number	Course Title			Credits	Competencies	Learning goals	Comments
Research Seminars	**600 level**	SCE.Z691.R	◎		Seminar in Systems and Control Engineering S3	0-2-0	1,2,3,4,5	B	
		SCE.Z692.R	◎		Seminar in Systems and Control Engineering F3	0-2-0	1,2,3,4,5	B	
		SCE.Z693.R	◎		Seminar in Systems and Control Engineering S4	0-2-0	1,2,3,4,5	B	
		SCE.Z694.R	◎		Seminar in Systems and Control Engineering F4	0-2-0	1,2,3,4,5	B	
		SCE.Z695.R	◎		Seminar in Systems and Control Engineering S5	0-2-0	1,2,3,4,5	B	
		SCE.Z696.R	◎		Seminar in Systems and Control Engineering F5	0-2-0	1,2,3,4,5	B	

Research-related courses	**600 level**	SCE.Z681.B	○		Research Process A1	0-2-0	1,3,4,5	A	
		SCE.Z682.B	○		Research Process A2	0-2-0	1,3,4,5	A	
		SCE.Z683.B	○		Research Process A3	0-2-0	1,3,4,5	A	
		SCE.Z684.B	○		Research Process B1	0-1-0	1,3,4,5	A	
		SCE.Z685.B	○		Research Process B2	0-1-0	1,3,4,5	A	
		SCE.Z686.B	○		Research Process B3	0-1-0	1,3,4,5	A	
		SCE.Z687.B	○		Research Process B4	0-1-0	1,3,4,5	A	
		SCE.Z688.B	○		Research Process B5	0-1-0	1,3,4,5	A	
		SCE.Z689.B	○		Research Process B6	0-1-0	1,3,4,5	A	
Major courses	**600 level**	SCE.Z610.L			DC Internship (Systems & Control) A1	0-0-2	3,4,5	C	
		SCE.Z611.L			DC Internship (Systems & Control) A2	0-0-2	3,4,5	C	
		SCE.Z612.L			DC Internship (Systems & Control) B1	0-0-1	3,4,5	C	
		SCE.Z613.L			DC Internship (Systems & Control) B2	0-0-1	3,4,5	C	
		SCE.Z614.L			Special Visiting Project	0-0-4	3,4,5	C	
		SCE.V602.L			InfoSyEnergy Product-Service Design	1-0-0	1,3,4,5	C	Students belongs to Graduate Major in Energy Science and Engineering, Tokyo Tech Academy of Energy and Informatics program are given higher priority
		SCE. V603.L			InfoSyEnergy Policy-Making Workshop	0-1-0	1,3,4,5	C	ditto
		SCE. V611.L			InfoSyEnergy-International Forum 1	0-0-2	1,2,3,4,5	C	ditto

		SCE. V612.L			InfoSyEnergy-International Forum 2	0-0-2	1,2,3,4,5	C	ditto
		SCE.V613.L			InfoSyEnergy-International Forum 3	0-0-2	1,2,3,4,5	C	ditto
		SCE.V614.L			InfoSyEnergy-Joint Research Projects 1	0-0-2	1,3,4,5	C	ditto
		SCE.V615.L			InfoSyEnergy-Joint Research Projects 2	0-0-4	1,3,4,5	C	ditto
		SCE.V616.L			InfoSyEnergy-International Field Work-short term	0-0-2	1,3,4,5	C	ditto
		SCE.V617.L			InfoSyEnergy-International Field Work-long term	0-0-4	1,3,4,5	C	ditto
		SCE.Z620			Cooperative Education through Research Internships (Systems and Control Engineering)	0-0-4	1,3,4,5	C	

Note：

• ◎：Required course，○：Restricted elective，O：odd academic years，E：even academic years

• Competencies: 1 = Specialist skills, 2 = Liberal arts skills, 3 = Communication skills, 4 = Applied skills (inquisitive thinking and/or problem-finding skills), 5 = Applied skills (practical and/or problem-solving skills)

•【 】Course offered by another graduate major

• The character preceding the three digits in the course number denotes the course's subdiscipline (i.e., "Z" represents the subdiscipline code in the course number SCE.Z600.R): Z (Research seminars).

6. IGP Courses That Can Be Counted as Humanities and Social Science Courses

None

7. IGP Career Development Courses and IGP Courses That Can Be Counted as Career Development Courses

In order to fulfill the completion requirements for the doctoral degree program, students must attain at least 4 credits in Career Development Courses, and should satisfy all of the Graduate Attributes (GA) specified in Table A-1 of the “Career Development Courses” listed as one of the “Liberal Arts and Basic Science Courses” in the Guide to Graduate Education and International Graduate Program, as well as shown below. Students will be evaluated in regards to GA achievements at the time of their degree completion. As to the courses with two GAs, both GAs stipulated for the courses are considered to be acquired if students receive the corresponding credits for those courses.

Career Development Courses and Major Courses that enable students to acquire GA and that are recognized as equivalent to Career Development Courses, offered by the Graduate Major, are listed in Tables D3 below. Students can also acquire GA and credits by taking the Career Development Courses offered by Innovator and Inventor Development Platform (IIDP) listed as one of the “Liberal Arts and Basic Science Courses” in the Guide to Graduate Education and International Graduate Program.

However, it must be noted that credits attained from those courses that can be counted as Career Development Courses can be counted towards the completion requirements of doctoral degree program, either for the Major Courses or for the Career Development Courses (i.e., not for both). Nevertheless, even in the cases from those mentioned above where attained credits pertaining to these courses are not considered as Career Development Courses, their associated GAs may be considered by the Graduate Major to have been acquired.

For Graduate Attributes, refer to the Guide to the Career Development Courses.

The Graduate Attributes of the Doctoral Degree Program are listed in Table A-1 as follows:

GA0D: You can clearly design your own career and contribute to realizing scientific, technological, or social innovation through a comprehensive understanding of the knowledge, skills, social responsibilities and ethics required to become an active member of academia and/or industry.

GA1D: You can lead in realizing scientific, technological, or social innovation by acquiring the advanced leadership skills, entrepreneurial skills, knowledge and expertise, and by developing social responsibility necessary for materializing your designed career.

Table D3. Courses of the Graduate Major in Systems and Control Engineering recognized as equivalent to Career Development Courses, and Career Development Courses

Course category	Course number	Course title			Credits	GA*	Learning goals	Comments
Courses that can be counted as Career Development Courses	SCE.Z610.L			DC Internship (Systems & Control) A1	0-0-2	GA0D, GA1D	C	
	SCE.Z611.L			DC Internship (Systems & Control) A2	0-0-2	GA0D, GA1D	C	
	SCE.Z612.L			DC Internship (Systems & Control) B1	0-0-1	GA0D, GA1D	C	
	SCE.Z613.L			DC Internship (Systems & Control) B2	0-0-1	GA0D, GA1D	C	
	SCE.V601			InfoSyEnergy-Outreach	0-0-1	GA0D, GA1D	C	Students belongs to Graduate Major in Energy Science and Engineering, Tokyo Tech Academy of Energy and Informatics program are given higher priority
	SCE.V611.L			InfoSyEnergy-International Forum 1	0-0-2	GA0D, GA1D	C	ditto
	SCE.V612.L			InfoSyEnergy-International Forum 2	0-0-2	GA0D, GA1D	C	ditto
	SCE.V613.L			InfoSyEnergy-International Forum 3	0-0-2	GA0D, GA1D	C	ditto
	SCE.V614.L			InfoSyEnergy-Joint Research Projects 1	0-0-2	GA0D, GA1D	C	ditto
	SCE.V615.L			InfoSyEnergy-Joint Research Projects 2	0-0-4	GA0D, GA1D	C	ditto

	SCE.V616.L			InfoSyEnergy-International Field Work-short term	0-0-4	GA0D, GA1D	C	ditto
	SCE.V617.L			InfoSyEnergy-International Field Work-long term	0-0-4	GA0D, GA1D	C	ditto
	SCE.Z620			Cooperative Education through Research Internships (Systems and Control Engineering)	0-0-4	GA1D	C	
Career Development Courses	SCE.G611			Doctoral Recurrent Program 1 of Systems and Control Engineering	0-0-1	GA0D GA1D		Career Development Course offered by the Graduate Major in Systems and Control Engineering. You cannot count for the Major Course.
	SCE.G612			Doctoral Recurrent Program 2-1 of Systems and Control Engineering	0-0-2	GA0D GA1D		
	SCE.G613			Doctoral Recurrent Program 2-2 of Systems and Control Engineering	0-0-2	GA0D GA1D		
	SCE.G614			Doctoral Recurrent Program 3 of Systems and Control Engineering	0-0-3	GA0D GA1D		
	SCE.G615			Doctoral Recurrent Program 4 of Systems and Control Engineering	0-0-4	GA0D GA1D		
Credits in Career Development Courses must be attained from among the above-listed courses and those listed as such in the Liberal Arts and Basic Science Courses Guide. **＊GA: Graduate Attributes**								

Students enrolled in the educational program for leading graduate schools, the Tokyo Tech Academy for Leadership (ToTAL) or WISE Programs may be offered courses recognized as equivalent to Career Development Courses besides those listed as such in the “Liberal Arts and Basic Science Courses” in the Guide to Graduate Education and International Graduate Program. For details about available courses or completion requirements, please refer to the Study Guide of the Academy that offers the relevant program.

8. Research Related to the Completion of Doctoral Theses

Students participating in this Program must submit an original doctoral thesis to the institute. The thesis must include qualified contents equivalent to academic journal articles. Main contributions of the doctoral thesis are expected to be published in international-level journals.

The decision of pass or fail will be made by a review board, which consists of 5 or more faculty members. The thesis must pass interim inspection and pre-defense prior to the submission to the institute. The procedure of examination for Ph.D. contains reviews of a doctoral thesis by members of a review board, interview, and final defense.