Education Program of Advanced Information Technology Leaders

【Master's degree program】

1. IGP（A） Outline

Japan is a world leader in both research and practical application in many areas of information science and technology. This program offers overseas students enrollment in master's and doctoral programs that educate them to be a leader of research and development in information science and technology. To this end, the program includes practice-oriented courses in addition to the classroom lectures. Students study using advanced computing environments, and are able to participate in industrial internships. This program is offered to the student majoring in the following four graduate majors:

- ・ Graduate major in Mathematical and Computing Science
- ・ Graduate major in Computer Science
- ・ Graduate major in Artificial Intelligence
- ・ Graduate major in Systems and Control Engineering

2. Competencies Developed

Students will acquire advanced knowledge of information science and technology including practical applications, and communication skills.

3. Learning Goals

Refer to the guide to International Graduate Program (C) for the learning goals. The categories of learning goals shown in Table M1-1~M1-7 are defined in the guide to IGP (C).

4. IGP（A） Completion Requirements

Under this program, in addition to the following requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). Please refer to the relevant IGP (C) pages for completion requirements of your Graduate Major.

The following requirements must be met to complete this program.

1. The credits that students took for fulfilling the IGP(C) completion requirements must cover at least three subject areas out of the eight subject areas defined below. Refer to Table M1-1~M1-7 for the subject area of each course.

2. The students of Graduate major in Mathematical and Computing Science, Computer Science and Artificial Intelligence must take the credit of System Development International Project. The students of Graduate major in Systems and Control Engineering must take the credit of Systems and Control Engineering Project. These credits can be used for fulfilling the IGP(C) completion requirements as well.

Subject Area

1. Mathematical and Computing Sciences
2. Computer System
3. Software
4. Artificial Intelligence
5. Cognitive Engineering
6. System Control
7. Measuring/Monitoring/Modeling
8. Socio-Environmental Informatics

5. Courses

Table M1-1. Core Courses of the Mathematical and Computing Science Graduate Major (Master)

Course category		Subject area	Course Number			Course	credits	Competencies	Learning goals	Comments
Major courses	400 level	1	MCS.T401.L	○	O	Analysis on Continuous Systems	2-0-0		A	
		1	MCS.T402.L	○		Mathematical Optimization: Theory and Algorithms	2-0-0		B	
		1	MCS.T410.L	○	E	Applied Probability	2-0-0		B	
		1	MCS.T411.L	○		Computational Complexity Theory	2-0-0		C	
		1	MCS.T412.L	○	E	Special Lecture on Mathematical and Information Science A	2-0-0		A,B,C,D	
		1	MCS.T413.L	○	E	Special Lecture on Mathematical and Information Science B	2-0-0		A,B,C,D	
	500 level	1	MCS.T502.L	○		Functional Programming	2-0-0		C	
		1	MCS.T510.L	○	O	Special Lecture on Mathematical and Information Science C	2-0-0		A,B,C,D	
		1	MCS.T511.L		O	Special Lecture on Mathematical and Information Science D	2-0-0		A,B,C,D	
	Note : ・◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years ・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course. • Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills; 5 = Practical and/or problem-solving skills •【　】Course offered under another graduate major										

Table M1-2. Core Courses of the Computer Science Graduate Major (Master)

Course category		Subject area	Course Number			Course	credits	Competencies	Learning goals	Comments
Major courses	400 level	2	CSC.T406.A	○		Distributed Algorithms	2-0-0		A	
		3	CSC.T425.B	○		Concurrent System Theory	2-0-0	3,4,5	A	
		5	CSC.T421.D	○		Human Computer Interaction	2-0-0	3,4,5	A	
		3	CSC.T404.B	○	O	Logical Foundations of Computing	2-0-0		A	
		3	CSC.T426.B	○	E	Software Design Methodology	2-0-0	2,3,4,5	A	
		3	CSC.T431.A	○		Advanced System Software	2-0-0	3	A	
			CSC.T434.B	◎		International Project for System Development	0-2-0	1,2,3	B,E	
	500 level	2	CSC.T523.D	○		Advanced Data Engineering	2-0-0	3,5	A	
	Note : ・◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years ・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course. • Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills; 5 = Practical and/or problem-solving skills •【　】Course offered under another graduate major										

Table M1-3. Core Courses of the Artificial Intelligence Graduate Major (Master)

Course category		Subject area	Course Number			Course	credits	Competencies	Learning goals	Comments
Major courses	400 level	4	ART.T458.L	○		Machine Learning	2-0-0	3	A	
		5	ART.T460.L	○		Speech Information Processing	2-0-0	3,5	A	
		4	ART.T462.L	○	O	Complex Networks	2-0-0	3,5	A	

Note :
・◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years
・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course.
• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;
  5 = Practical and/or problem-solving skills
• 【　】 Course offered under another graduate major

Table M1-4. Core Courses of the Systems and Control Engineering Graduate Major (Master)

Course category		Subject area	Course Number			Course	credits	Competencies	Learning goals	Comments
Major courses	400	6	SCE.A404.L	○		Nonlinear Dynamics	1-0-0	3	A	
		7	SCE.I401.L	○		Advanced course of Measurement and Signal Processing	1-0-0	3	I	
		7	SCE.M402.L	○		Modeling of Bio-Systems I	1-0-0	35	M	
		6	SCE.Z401.A	◎	A	Systems and Control Engineering Project	0-3-0	245	P	
	500	6	SCE.A501.L	○		Complex Networks (Complex Network Theory (調整中))	1-0-0	3	A	
		7	SCE.A504.L	○		Advanced course of Computational Mechanics	1-0-0	3	A	
		7	SCE.A505.L	○		Inverse Problems and Data Assimilation	1-0-0	345	A	
		6	SCE.C502.L	○		Hybrid Systems Control	1-0-0	35	C	
		6	SCE.C531.L	○		Nonlinear and Adaptive Control	1-0-0	3	C	

Note :
・◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years
・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course.
• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;
  5 = Practical and/or problem-solving skills
• 【　】 Course offered under another graduate major

Table M1-5. Core Courses of the Life Engineering Graduate Major (Master)

Course category		Subject area	Course Number			Course	credits	Competencies	Learning goals	Comments
Major courses	400 level	5	HCB.M463.B	○		Introduction to Biomedical Instrumentation	1-0-0	3	A	
		7	HCB.M464.B	○		Introduction to Neural Engineering	1-0-0	3	A	

Note :
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・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course.
• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;
  5 = Practical and/or problem-solving skills
• 【　】 Course offered under another graduate major

Table M1-6. Core Courses of the Architecture and Building Engineering Graduate Major (Master)

Course category		Subject area	Course Number	Course				credits	Competencies	Learning goals	Comments
Major courses	400 level	8	ARC.P441	A	○	Theories in Urban Analysis and Planning I		2-0-0	12345	AB	
		8	ARC.E423	A	○	Air Quality Engineering		2-0-0	345	AB	
	Note : ・◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years ・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course. • Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills; 5 = Practical and/or problem-solving skills • 【　】 Course offered under another graduate major											

Table M1-7. Core Courses of the Civil Engineering Graduate Major (Master)

Course category		Subject area	Course Number	Course			credits	Competencies	Learning goals	Comments
Major courses	400 level	8	CVE.A403	A	○	Analysis of Vibrations and Elastic Waves	2-0-0	3	B	
	Note : ・◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years ・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course. • Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills; 5 = Practical and/or problem-solving skills • 【　】 Course offered under another graduate major										

【Doctoral degree program】

1. IGP（A） Outline

Japan is a world leader in both research and practical application in many areas of information science and technology. This program offers overseas students enrollment in master's and doctoral programs that educate them to be a leader of research and development in information science and technology. To this end, the program includes practice-oriented courses in addition to the classroom lectures. Students study using advanced computing environments, and are able to participate in industrial internships. This program is offered to the student majoring in the following four graduate majors:

・ Graduate major in Mathematical and Computing Science
・ Graduate major in Computer Science
・ Graduate major in Artificial Intelligence
・ Graduate major in Systems and Control Engineering

2. Competencies Developed

Students will acquire advanced knowledge of information science and technology including practical applications, and communication skills.

3. Learning Goals

Refer to the guide to International Graduate Program (C) for the learning goals.

4. IGP（A） Completion Requirements

・ The students of Graduate major in Mathematical and Computing Science must take two credits from Forum on Mathematical and Computing Science S3, F3, S4, F4, S5, F5.

・ The students of Graduate major in Computer Science must take two credits from Forum on Computer Science S3, F3, S4, F4, S5, F5.

・ The students of Graduate major in Artificial Intelligence must take two credits from Forum on Artificial Intelligence S3, F3, S4, F4, S5, F5.

・ The students of Graduate major in Systems and Control Engineering must take two credits from Research Process A1, A2, A3, B1, B2, B3, B4, B5, B6.

These credits can be used for fulfilling the IGP(C) completion requirements as well.

5. Courses

Table D1-1. Core Courses of the Mathematical and Computing Science Graduate Major (Doctor)

Course category		Course Number	Course			credits	Compe tencies	Learning goals	Comments
Major courses	600 level	MCS.U681	○		Forum on Mathematical and Computing Science S3	0-0-1	1,2,4,5	B,C,D	
		MCS.U682	○		Forum on Mathematical and Computing Science F3	0-0-1	1,2,4,5	B,C,D	
		MCS.U683	○		Forum on Mathematical and Computing Science S4	0-0-1	1,2,4,5	B,C,D	
		MCS.U684	○		Forum on Mathematical and Computing Science F4	0-0-1	1,2,4,5	B,C,D	
		MCS.U685	○		Forum on Mathematical and Computing Science S5	0-0-1	1,2,4,5	B,C,D	
		MCS.U686	○		Forum on Mathematical and Computing Science F5	0-0-1	1,2,4,5	B,C,D	

Note :
・ ◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years
・ □ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course.
• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;
 5 = Practical and/or problem-solving skills
• 【 】Course offered under another graduate major

Table D1-2. Core Courses of the Computer Science Graduate Major (Doctor)

Course category		Course Number	Course		credits	Compe ncies	Learning goals	Comments
Major courses	600 level	CSC.U681	○	Forum on Computer Science S3	0-0-1	1,2,4,5	B,C,D	
		CSC.U682	○	Forum on Computer Science F3	0-0-1	1,2,4,5	B,C,D	
		CSC.U683	○	Forum on Computer Science S4	0-0-1	1,2,4,5	B,C,D	
		CSC.U684	○	Forum on Computer Science F4	0-0-1	1,2,4,5	B,C,D	
		CSC.U685	○	Forum on Computer Science S5	0-0-1	1,2,4,5	B,C,D	
		CSC.U686	○	Forum on Computer Science F5	0-0-1	1,2,4,5	B,C,D	

Note :
・ ◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years
・ □ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course.
• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;
 5 = Practical and/or problem-solving skills
• 【 】Course offered under another graduate major

Table D1-3. Core Courses of the Artificial Intelligence Graduate Major (Doctor)

Course category		Course Number	Course		credits	Compe ncies	Learning goals	Comments
Major courses	600 level	ART.U681	○	Forum on Artificial Intelligence S3	0-0-1	1,2,4,5	B,C,D	
		ART.U682	○	Forum on Artificial Intelligence F3	0-0-1	1,2,4,5	B,C,D,	
		ART.U683	○	Forum on Artificial Intelligence S4	0-0-1	1,2,4,5	B,C,D	
		ART.U684	○	Forum on Artificial Intelligence F4	0-0-1	1,2,4,5	B,C,D	
		ART.U685	○	Forum on Artificial Intelligence S5	0-0-1	1,2,4,5	B,C,D	
		ART.U686	○	Forum on Artificial Intelligence F5	0-0-1	1,2,4,5	B,C,D	

Note :
・ ◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years
・ □ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course.
• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;
 5 = Practical and/or problem-solving skills
• 【 】Course offered under another graduate major

Table D1-4. Core Courses of the Systems and Control Engineering Graduate Major (Doctor)

Course category		Course Number			Course	credits	Competencies	Learning goals	Comments
Major courses	600 level	SCE.Z681.B	○		Research processA1	0-2-0	2345	Z	
		SCE.Z682.B	○		Research processA2	0-2-0	2345	Z	
		SCE.Z683.B	○		Research processA3	0-2-0	2345	Z	
		SCE.Z684.B	○		Research processB1	0-1-0	2345	Z	
		SCE.Z685.B	○		Research processB2	0-1-0	2345	Z	
		SCE.Z686.B	○		Research processB3	0-1-0	2345	Z	
		SCE.Z687.B	○		Research processB4	0-1-0	2345	Z	
		SCE.Z688.B	○		Research processB5	0-1-0	2345	Z	
		SCE.Z689.B	○		Research processB6	0-1-0	2345	Z	
Note : ・◎ : Required course, ○ : Restricted elective, O : odd academic years, E : even academic years ・□ : Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course. • Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills; 5 = Practical and/or problem-solving skills • 【 】 Course offered under another graduate major									