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

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

5. Courses

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

C ca	ourse tegory	Subject area	Course Number			Course	credits	Compete ncies	Learning goals	Comments
		1	MCS.T401.L	0	0	Analysis on Continuous Systems	2-0-0		А	
		1	MCS.T402.L	0		Mathematical Optimization: Theory and Algorithms	2-0-0		В	
	400	1	MCS.T410.L	0	Е	Applied Probability	2-0-0		В	
\mathbf{Z}	level	1	MCS.T411.L	0		Computational Complexity Theory	2-0-0		С	
ajor c		1	MCS.T412.L	0	Е	Special Lecture on Mathematical and Information Science A	2-0-0		A,B,C,D	
ourses		1	MCS.T413.L	0	Е	Special Lecture on Mathematical and Information Science B	2-0-0		A,B,C,D	
•		1	MCS.T502.L	0		Functional Programming	2-0-0		С	
	500 Javal	1	MCS.T510.L	0	0	Special Lecture on Mathematical and Information Science C	2-0-0		A,B,C,D	
	level	1	MCS.T511.L		0	Special Lecture on Mathematical and Information Science D	2-0-0		A,B,C,D	
		Note :								
		• : Re	equired course, \circ :	Restric	ted e	lective, O : odd academic years, E : even	academic y	years		
		• 🗆 : Co	urse is recognized a	s an Aca	ıdem	y for Co-creative Education of Environment a	nd Energy	Science, Lead	ling Graduate	
		Sc	chool (ACEEES) co	urse.						
	• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;									

p 5;

- 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)

C ca	ourse tegory	Subject area	Course Number			Course	credits	Compete ncies	Learning goals	Comments	
		2	CSC.T406.A	0		Distributed Algorithms	2-0-0		А		
		3	CSC.T425.B	0		Concurrent System Theory	2-0-0	3,4,5	А		
7		5	CSC.T421.D	0		Human Computer Interaction	2-0-0	3,4,5	Α		
ſaj	400	3	CSC.T404.B	0	0	Logical Foundations of Computing	2-0-0		А		
or	level	3	CSC.T426.B	0	Е	Software Design Methodology	2-0-0	2,3,4,5	А		
COU		3	CSC.T431.A	0		Advanced System Software	2-0-0	3	А		
rses			CSC.T434.B	0		International Project for System Development	0-2-0	1,2,3	B,E		
	500 level	2	CSC.T523.D	0		Advanced Data Engineering	2-0-0	3,5	А		
		Note :									
		• © : Re	equired course, o	: Restric	ted e	lective, O: odd academic years, E: even	academic y	years			
		• □: Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate									
		Sc	hool (ACEEES) co	ourse.							
		Compete	encies: 1 = Intercul	tural ski	lls; 2	= Communication skills; 3 = Specialist skills	4 = Critica	al thinking sk	ills;		
		5 = Pra	ctical and/or proble	em-solvi	ng sk	ills					
		• [] Course offered under another graduate major									

C ca	course tegory	Subject area	Course Number		Course			Compete ncies	Learning goals	Comments
		4	ART.T458.L	0		Machine Learning	2-0-0	3	А	
Major	400 level	5	ART.T460.L	0		Speech Information Processing	2-0-0	3,5	А	
		4	ART.T462.L	0	0	Complex Networks	2-0-0	3,5	А	
		Note :								
		• © : Re	equired course,	0:1	Resti	icted elective, O: odd academic years, E: even	academic y	years		
		• □: Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate								
		School (ACEEES) course.								
		Compete	encies: 1 = Interc	ultu	ral sl	kills; 2 = Communication skills; 3 = Specialist skills	; 4 = Critica	al thinking ski	ills;	
		5 = Pra	ctical and/or prol	olem	n-sol	ving skills				
• [] Course offered under another graduate major										

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

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

C ca	ourse tegory	Subject area	Course Number			Course	credits	Compet encies	Learning goals	Comments
		6	SCE.A404.L	0		Nonlinear Dynamics	1-0-0	3	А	
	400	7	SCE.I401.L	0		Advanced course of Measurement and Signal Processing	1-0-0	3	Ι	
Maj	400	7	SCE.M402.L	0		Modeling of Bio-Systems I	1-0-0	35	М	
or		6	SCE.Z401.A	0	Α	Systems and Control Engineering Project	0-3-0	245	Р	
course		6	SCE.A501.L	0		Complex Networks (Complex Network Theory (調整中))	1-0-0	3	А	
8	500	7	SCE.A504.L	0		Advanced course of Computational Mechanics	1-0-0	3	А	
		7	SCE.A505.L	0		Inverse Problems and Data Assimilation	1-0-0	345	Α	
		6	SCE.C502.L	0		Hybrid Systems Control	1-0-0	35	С	
		6	SCE.C531.L	0		Nonlinear and Adaptive Control	1-0-0	3	С	
 · ◎: 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 Scient School (ACEEES) course. · Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thing 5 = Practical and/or problem-solving skills · □: Course offered under another graduate major 							urs vience, Leadi thinking skill	ng Graduate Is;		

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

C ca	ourse tegory	Subject area	Course Number		Course	credits	Compe tencies	Learning goals	Comments
Ma	400	5	HCB.M463.B	0	Introduction to Biomedical Instrumentation	1-0-0	3	А	
ijor rses	Ievel 7 HCB.M464.B 0 Introduction to Neural Engineering 1-0-0 3 A							А	
		Note : • ◎ : Rec • □ : Coun Sch • Competer 5 = Prac • [] Co	uired course, \circ : Re rse is recognized as an lool (ACEEES) course ncies: 1 = Intercultural tical and/or problem-s purse offered under and	strict Aca l skil olvin other	ed elective, O : odd academic years, E : even a demy for Co-creative Education of Environment an s; 2 = Communication skills; 3 = Specialist skills; 4 g skills graduate major	cademic ye d Energy S 4 = Critical	ars cience, Lea thinking sk	ding Graduate ills;	

C ca	ourse tegory	Subject area	Course Number			Course	credits	Compet encies	Learning goals	Comments
Ma	400	8	ARC.P441	А	0	Theories in Urban Analysis and Planning I	2-0-0	12345	AB	
jor rses	level	8	ARC.E423	А	0	Air Quality Engineering	2-0-0	345	AB	
		Note : • ◎ : Req • □ : Cour Sch • Competer 5 = Pract • 【 】 Co	uired course, se is recognized ool (ACEEES) ncies: 1 = Interc tical and/or prol ourse offered un	• : Res d as an course oultural olem-so der and	stricto Acac skill olving other	ed elective, O : odd academic years, E : even ad demy for Co-creative Education of Environment and s; 2 = Communication skills; 3 = Specialist skills; 4 g skills graduate major	cademic yea d Energy Sc = Critical t	irs ience, Leadi hinking skill	ng Graduate s;	

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

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

C ca	ourse tegory	Subject area	Course Number			Course	credits	Compete ncies	Learning goals	Comments
Major courses	400 level	8	CVE.A403	A	0	Analysis of Vibrations and Elastic Waves	2-0-0	3	В	
	 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; 									
	• [] 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

C ca	ourse tegory	Course Number		Course	credits	Compe tencies	Learning goals	Comments
		MCS.U681	0	Forum on Mathematical and Computing Science S3	0-0-1	1,2,4,5	B,C,D	
7		MCS.U682	0	Forum on Mathematical and Computing Science F3	0-0-1	1,2,4,5	B,C,D	
fajor (600	MCS.U683	0	Forum on Mathematical and Computing Science S4	0-0-1	1,2,4,5	B,C,D	
course	level	MCS.U684	0	Forum on Mathematical and Computing Science F4	0-0-1	1,2,4,5	B,C,D	
š		MCS.U685	0	Forum on Mathematical and Computing Science S5	0-0-1	1,2,4,5	B,C,D	
		MCS.U686	0	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 Graduat 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 D1-1 Core	Courses of the	Mathematica	l and Comm	iting Science	Graduate	Maior	(Doctor)
Table D1-1. Core	Courses of the	, mainemanca	n anu Compu	ung science	Grauuale	wajui	

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

C	ourse	Course	Cou	rse	credits	Compete	Learning	Comments		
cat	tegory	Number				ncies	goals			
7		CSC.U681	0	Forum on Computer Science S3	0-0-1	1,2,4,5	B,C,D			
DescriptionCSC.U682oForum on Computer Science F30-0-1							B,C,D			
9 600 CSC.U683 • Forum on Computer Science S4 0-0-1 1,2,4,5 H										
E level CSC.U684 o 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							B,C,D			
ŝ		CSC.U686	0	Forum on Computer Science F5	0-0-1	1,2,4,5	B,C,D			
		Note :								
		• 🔘 : Require	d cour	se, \circ : Restricted elective, O : odd academic	years, E	: even acader	nic years			
		• \square : Course is	recog	nized as an Academy for Co-creative Education	of Enviror	ment and Ene	ergy Science, Lo	eading Graduate		
		School (ACEEES) course.								
		• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills;								
		5 = Practical	and/o	r problem-solving skills						
	Course offered under another graduate major									

Table D1-3.	Core Courses	of the Artificial	Intelligence	Graduate Ma	ior (Doctor)
					Je- (- e)

C ca	'ourse tegory	Course Number		Course	credits	Compete ncies	Learning goals	Comments		
7		ART.U681	0	Forum on Artificial Intelligence S3	0-0-1	1,2,4,5	B,C,D			
ſaj		ART.U682	0	Forum on Artificial Intelligence F3	0-0-1	1,2,4,5	B,C,D,			
or	600	ART.U683	0	Forum on Artificial Intelligence S4	0-0-1	1,2,4,5	B,C,D			
cou	Ievel ART.U684 • Forum on Artificial Intelligence F4 0-0-1 1,2,4,5 B,C,D									
ırse	ART.U685•Forum on Artificial Intelligence S50-0-11,2,4,5B,C,D									
ART.U686 • Forum on Artificial Intelligence F5 0-0-1 1,2,4,5 B,C,D										
		Note : • ⊚ : Require • □ : Course is School (• Competencies 5 = Practical • 【 】 Course	d cor reco ACI : 1 = and/ offe	Irse, \circ : Restricted elective, O : odd academic ognized as an Academy for Co-creative Education EEES) course. Intercultural skills; 2 = Communication skills; 3 or problem-solving skills red under another graduate major	years, E of Enviror = Specialis	: even acader ment and Ene t skills; 4 = Cu	nic years ergy Science, Le ritical thinking :	eading Graduate skills;		

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

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