Education Program of Advanced Information Technology Leaders

【Master's degree program】

1. International Graduate Program (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.

1-1. Graduate Major(s) Available to IGP (A) Students

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 relevant Graduate Major pages in "Guide to Graduate Majors (for IGP)" for the learning goals. The categories of learning goals shown in Table M1-1~M1-7 are defined in the relevant Graduate Major pages in "Guide to Graduate Majors (for IGP)".

4. IGP (A) Completion Requirements and Courses

【1.】 IGP (A) Completion Requirements

The following requirements must be met to complete this program.

1. The credits that students take for fulfilling the IGP (A) 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 International Project for System Development. 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 completion requirements of their departments (degree completion requirements) as well.

Subject Area

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

Under this program, in addition to the above-mentioned requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). For completion requirements of your Graduate Major, please refer to the relevant Graduate Major pages in "Guide to Graduate Majors (for IGP)".

【2.】 IGP (A) Courses

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

Course category	Subject area	Course number		Course title	Credits
Major courses	**400 level**	1	MCS.T401	O	Analysis on Continuous Systems	2-0-0
		1	MCS.T402		Mathematical Optimization: Theory and Algorithms	2-0-0
		1	MCS.T405	O	Theory of Algorithms	2-0-0
		1	MCS.T407	O	High Performance Computing	2-0-0
		1	MCS.T408	E	Discrete, Algebraic and Geometric Structures I	2-0-0
		1	MCS.T409	O	Applied Functional Analysis	2-0-0
		1	MCS.T410	E	Applied Probability	2-0-0
		1	MCS.T411		Computational Complexity Theory	2-0-0
	500 level	1	MCS.T501	O	Practical Parallel Computing	2-0-0
		1	MCS.T502		Functional Programming	2-0-0
		1	MCS.T503	O	Programming Language Design	2-0-0
		1	MCS.T504	E	Topics in Geometry	2-0-0
		1	MCS.T509	O	Software Verification	2-0-0
	Note : • O : odd academic years, E : even academic years					

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

Course category	Subject area	Course number		Course title	Credits
Major courses	400 level	2	CSC.T406	E	Distributed Systems	2-0-0
		3	CSC.T425		Concurrent System Theory	2-0-0
		5	CSC.T421		Human Computer Interaction	2-0-0
		3	CSC.T404	E	Logical Foundations of Computing	2-0-0
		3	CSC.T426	O	Software Design Methodology	2-0-0
		3	CSC.T431		Advanced System Software	2-0-0
		2	CSC.T438		Distributed Algorithms	2-0-0
		-	CSC.T434		International Project for System Development	0-0-2
	500 level	2	CSC.T523		Advanced Data Engineering	2-0-0
Note : • O : odd academic years, E : even academic years					

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

Course category	Subject area	Course number		Course title	Credits
Major courses	400 level	4	ART.T458		Machine Learning	2-0-0
		5	ART.T460		Speech Information Processing	2-0-0
		4	ART.T462	O	Complex Networks	2-0-0
Note : • O : odd academic years, E : even academic years					

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

Course category	Subject area	Course number		Course title	Credits
Major courses	400 level	6	SCE.A404		Nonlinear Dynamics	1-0-0
		7	SCE.I401		Advanced course of Measurement and Signal Processing	1-0-0
		7	SCE.M402		Modeling of Bio-Systems I	1-0-0
		6	SCE.Z401		Systems and Control Engineering Project	0-3-0
	500 level	6	SCE.A501		Theory of Complex Networks	1-0-0
		7	SCE.A504		Advanced course of Computational Mechanics	1-0-0
		7	SCE.A505		Inverse Problems and Data Assimilation	1-0-0
		6	SCE.C502		Hybrid Systems Control	1-0-0
		6	SCE.C531		Nonlinear and Adaptive Control	1-0-0
Note : • O : odd academic years, E : even academic years					

Table M1-5. Core Courses of the Graduate Major in Human Centered Science and Biomedical Engineering (Master's Level)

Course category		Subject area	Course number		Course title	Credits
Major courses	400 level	5	HCB.M463	O	Introduction to Biomedical Instrumentation	1-0-0
		7	HCB.M464	E	Introduction to Neural Engineering	1-0-0
	Note : • O : odd academic years,　E : even academic years					

Table M1-6. Core Courses of the Graduate Major in Civil Engineering (Master's Level)

Course category		Subject area	Course number		Course title	Credits
Major courses	400 level	8	CVE.A403		Analysis of Vibrations and Elastic Waves	2-0-0
	Note : • O : odd academic years,　E : even academic years					

Table M1-7. Advanced Topics in Computing (Master's Level)

Course category		Subject area	Course number		Course title	Credits
Major courses	400 level	TBA	XCO.T496		Advanced Topics in Computing AE	2-0-0
		TBA	XCO.T497		Advanced Topics in Computing AO	2-0-0
		TBA	XCO.T498		Advanced Topics in Computing BE	2-0-0
		TBA	XCO.T499		Advanced Topics in Computing BO	2-0-0
	Note : • The subject area is subject to the lecturer. • O : odd academic years,　E : even academic years					

Under this program, in addition to the above-mentioned requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). For core courses of your Graduate Major, please refer to the relevant Graduate Major pages in "Guide to Graduate Majors (for IGP)" .

【**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.

1-1. Graduate Major(s) Available to IGP (A) Students

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 relevant Graduate Major pages in "Guide to Graduate Majors (for IGP)" for the learning goals.

4. IGP (A) Completion Requirements and Courses

【1.】 IGP (A) Completion Requirements

The following requirements must be met to complete this program. Refer to Table D1-1~D1-5 for the subjects.

1. 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.

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

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

4. 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.

5. These credits can be used for fulfilling the completion requirements of their departments (degree completion requirements) as well.

Under this program, in addition to the above-mentioned requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). For completion requirements of your Graduate Major, please refer to the relevant Graduate Major pages in "Guide to Graduate Majors (for IGP)"s.

【2.】 IGP (A) Courses

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

Course category		Course number		Course title	Credits
Major courses	600 level	MCS.U681		Forum on Mathematical and Computing Science S3	0-0-1
		MCS.U682		Forum on Mathematical and Computing Science F3	0-0-1
		MCS.U683		Forum on Mathematical and Computing Science S4	0-0-1
		MCS.U684		Forum on Mathematical and Computing Science F4	0-0-1
		MCS.U685		Forum on Mathematical and Computing Science S5	0-0-1
		MCS.U686		Forum on Mathematical and Computing Science F5	0-0-1
	Note : • O : odd academic years, E : even academic years				

Table D1-2. Core Courses of the Graduate Major in Computer Science (Doctoral Level)

Course category		Course number		Course title	Credits
Major courses	600 level	CSC.U681		Forum on Computer Science S3	0-0-1
		CSC.U682		Forum on Computer Science F3	0-0-1
		CSC.U683		Forum on Computer Science S4	0-0-1
		CSC.U684		Forum on Computer Science F4	0-0-1
		CSC.U685		Forum on Computer Science S5	0-0-1
		CSC.U686		Forum on Computer Science F5	0-0-1
	Note : • O : odd academic years, E : even academic years				

Table D1-3. Core Courses of the Graduate Major in Artificial Intelligence (Doctoral Level)

Course category		Course number		Course title	Credits
Major courses	600 level	ART.U681		Forum on Artificial Intelligence S3	0-0-1
		ART.U682		Forum on Artificial Intelligence F3	0-0-1
		ART.U683		Forum on Artificial Intelligence S4	0-0-1
		ART.U684		Forum on Artificial Intelligence F4	0-0-1
		ART.U685		Forum on Artificial Intelligence S5	0-0-1
		ART.U686		Forum on Artificial Intelligence F5	0-0-1
	Note : • O：odd academic years,　E：even academic years				

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

Course category		Course number		Course title	Credits
Major courses	600 level	SCE.Z681		Research Process A1	0-2-0
		SCE.Z682		Research Process A2	0-2-0
		SCE.Z683		Research Process A3	0-2-0
		SCE.Z684		Research Process B1	0-1-0
		SCE.Z685		Research Process B2	0-1-0
		SCE.Z686		Research Process B3	0-1-0
		SCE.Z687		Research Process B4	0-1-0
		SCE.Z688		Research Process B5	0-1-0
		SCE.Z689		Research Process B6	0-1-0
	Note : • O：odd academic years,　E：even academic years				

Table D1-5. Advanced Topics in Computing (Doctoral Level)

Course category		Course number		Course title	Credits
Major courses	600 level	XCO.T673		Advanced Topics in Computing C	2-0-0
		XCO.T674		Advanced Topics in Computing D	2-0-0
	Note : • O：odd academic years,　E：even academic years				

Under this program, in addition to the above-mentioned requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). For core courses of your Graduate Major, please refer to the relevant Graduate Major pages in "Guide to Graduate Majors (for IGP)".