FGL Program Undergraduate Courses Curriculum 2015

Liberal Education Subjects

**Compulsory *Elective Compulsory No asterisk: Elective

(1) Core Subjects

Subject types	Subject Name: Course Title	Hrs./Wk. 1st year (2nd, 3rd Semester)	Hrs./Wk. 2nd year (4th,5th Semester)	Credits	Classes Offered
Human Studies	World of Fine Arts: History of Art in Ancient Eurasia: Diffusion of Classical Greek Art into Central Asia and India	2		2	*AMC,*IMAC-U,**AMB
Social Studies	History and Human Society: History of Tohoku University	2		2	*AMC,*IMAC-U,**AMB
Science Studies	Study of Nature: Structure of Nature	2		2	*AMC,*IMAC-U, AMB
	Life and Nature: Life and Nature	2		2	*AMC,*IMAC-U,**AMB

(2) Expansion Subjects

Subject types		Subject Name: Course Title	Hrs./Wk. 1st year (2nd, 3rd Semester)	Hrs./Wk. 2nd year (4th,5th Semester)	Credits	Classes Offered
Human Sciences		History: Japanese Art History	2		2	*AMC,*IMAC-U,*AMB
		Linguistics: Logic, Language and Thought	2		2	*AMC,*IMAC-U, *AMB
Social Sciences		Economics: Japanese Business and Economy A	2	(2)	2	**AMC,**IMAC-U
				2	2	**AMB
Natural Sciences	Mathematics	Foundations of Calculus: An elementary introduction to calculus for functions of one or two variables.	2		2	**AMB
		Calculus A: Calculus of functions of one variable	2		2	**AMC,**IMAC-U
		Calculus B: Calculus of function of two variables	2		2	*AMC,**IMAC-U
		Calculus C: Introduction to the theory of ordinary differential equations		2	2	*AMC,**IMAC-U
		Foundations of Linear Algebra: An elementary introduction to linear algebra	2		2	**AMB
		Linear Algebra A: Fundamentals of Linear Algebra	2		2	*AMC,**IMAC-U
		Linear Algebra B: Basics of Linear Algebra	2		2	**AMC,*IMAC-U
		Probability & Statistics : An introduction to the theory of probability theory and statistics		2	2	**AMC,*IMAC-U,**AMB
	Physics	Physics A: Mechanics	2		2	**AMC,**IMAC-U, AMB
		Physics B: Stress, Fluid Dynamics, Oscillations, Waves	2		2	*AMC,**IMAC-U, AMB
		Physics C: Electromagnetism	2		2	**AMC,*IMAC-U, AMB

Natural Sciences	Chemistry	Chemistry A: Fundamentals of Chemical Bond Theory	2				2	**AMC,*IMAC-U,**AMB
		Chemistry B: Fundamentals of Physical Chemistry	2				2	**AMC,**IMAC-U, AMB
		Chemistry C: Fundamentals of Basic Organic Chemistry		2			2	**AMC,*IMAC-U,**AMB
	Biology	Biology A: Life Science A - Introductory Biochemistry I	2				2	*AMC,*IMAC-U,**AMB
		Biology B: Essential Cell Biology		2			2	AMC,**AMB
		Biology C: Integrative and engineering concepts in biology: Elements of Physiology and Systems biology		2			2	*AMC,**AMB
	Earth and Space Science	Mineralogy, Petrology & Geochemistry: Fundamentals of Crystal Structures of Solids	2				2	*AMC,*IMAC-U,**AMB
	Scientific Experiments	Introductory Science Experiments : Introductory Science Experiments		4			2	**AMC,**IMAC-U,**AMB

(3) Common Subjects

Subject types	Subject Name: Course Title	Hrs./Wk.				Credits	Classes Offered
		1st year (2nd, 3rd Semester)		2nd year (4th,5th Semester)			
Small - Group Freshmen Seminars	Introductory Seminar		2			2	**AMC,**IMAC-U,**AMB
Subjects for International Students	Basic Japanese 1: Japanese for beginners	8				4	**AMC,**IMAC-U,**AMB
	Basic Japanese 2: Japanese for advanced beginners		6			3	**AMC,**IMAC-U,**AMB
	Intermediate Japanese: Japanese for intermediate students			6		3	**AMC,**IMAC-U,**AMB
Information Sciences	An Introduction to Information Science B	2				2	**AMC,**IMAC-U,**AMB
Health Sciences	Sports A: Kyudo, Softball, Tennis, Basics of Badminton, Soccer, Volleyball	2				1	AMC
			2			1	**IMAC-U
		2				1	**AMB
	Health: Health Care	2				2	AMC,*IMAC-U,**AMB

*Credits required for curriculum completion

Liberal Education Subjects	
AMC Course	50 credits
IMAC-U Course	49 credits
AMB Course	49 credits

Specialized Subject

(1) AMC Course

Subject Name	Hrs./Wk.								Credits	
	1st year (2nd, 3rd Semester)		2nd year (4th,5th Semester)		3rd year (6th,7th Semester)		4th year (8th,9th Semester)		Compulsory	Elective
Introduction to Basic Chemistry	2								2	
General Biochemistry		2								2
Special Class in Basic Chemistry I		2								2
Special Class in Basic Chemistry II		2								2
Special Class in Basic Chemistry III		2								2
Special Class in Basic Chemistry IV		2								2
General Organic Chemistry A			2							2
Exercises in Organic Chemistry A			2							1
General Physical Chemistry A			2							2
General Physical Chemistry B			2							2
Exercises in Physical Chemistry A			2							1
General Inorganic and Analytical Chemistry A			2							2
General Inorganic and Analytical Chemistry B			2							2
Exercises in Inorganic and Analytical Chemistry A			2							1
Biochemistry IA			2							2
General Organic Chemistry C				2						2
General Organic Chemistry D				2						2
General Physical Chemistry C				2						2
General Physical Chemistry D				2						2
Exercises in Physical Chemistry B				2						1
General Inorganic and Analytical Chemistry C				2						2
General Inorganic and Analytical Chemistry D				2						2
Exercises in Inorganic and Analytical Chemistry B				2						1
General Organic Chemistry B				2						2
Polymer Chemistry I				1						1
Polymer Chemistry II				1						1
Instrumental Analysis in Organic Chemistry I				1						1
Instrumental Analysis in Organic Chemistry II				1						1
Physical Chemistry VA				1						1
Physical Chemistry VB				1						1
Organic Chemistry IA					1					1
Organic Chemistry IB					1					1
Organic Chemistry IIA					1					1
Organic Chemistry IIB					1					1
Physical Chemistry IA					1					1
Physical Chemistry IB					1					1
Physical Chemistry IIA					1					1
Physical Chemistry IIB					1					1
Physical Chemistry IIIA					1					1
Physical Chemistry IIIB					1					1
Inorganic Chemistry IA					1					1
Inorganic Chemistry IB					1					1
Inorganic Chemistry IIA					1					1
Inorganic Chemistry IIB					1					1
Analytical Chemistry A					1					1
Analytical Chemistry B					1					1
Biochemistry IIA					1					1
Biochemistry IIB					1					1
Basic Expriments in Chemistry					3				1	
Laboratory Experiments in Chemistry A					15				5	
Research in Chemistry I						6			2	

Laboratory Experiments in Chemistry B						18			6	
Special Course in Organic Chemistry I						1				1
Special Course in Physical Chemistry I						1				1
Special Course in Inorganic and Analytical Chemistry I						1				1
Special Course in Biochemistry I						1				1
Special Course in Polymer Chemistry I						1				1
Special Course in Organic Chemistry II						1				1
Special Course in Physical Chemistry II						1				1
Special Course in Inorganic and Analytical Chemistry II						1				1
Special Course in Biochemistry II						1				1
Special Course in Polymer Chemistry II						1				1
Research in Chemistry II							15	15	10	

*Credits required for curriculum completion

Specialized Subject	
AMC Course	68 credits

(2) IMAC-U Course

Subject Name	Hrs./Wk.								Credits		
	1st year (2nd, 3rd Semester)		2nd year (4th,5th Semester)		3rd year (6th,7th Semester)		4th year (8th Semester)		Compulsory	Recommended	Elective
Exercises in Mathematics and Physics I	2								1		
Exercises in Mathematics and Physics II		2							1		
Practice of Information Processing			2						1		
Team Based Engineering for Invention			4								2
Overview of International Mechanical and Aerospace Engineering Course	2									2	
Mathematics I			2								2
Mathematics II			2								2
Numerical Analysis		2									2
Mechanics		2									2
The Basics of Information Sciences		2									2
Fluid Mechanics I		2									2
Mechanics of Materials I			2								2
Mechanism		2									2
Electromagnetics I				2							2
Quantum Mechanics			2								2
Fundamentals of Electronic Circuits and Systems			2								2
Mechanical Vibrations I			2								2
Thermodynamics			2								2
Mechanics of Materials II				2							2
Materials Science			2								2
Systems Engineering			2								2
Computer Seminar					3				1		
Seminar I			4						2		
Electrical Engineering Laboratory			3						1		
Fundamentals of Computer Engineering				2							2
Electromagnetics II				2							2
Basic Nuclear Physics				2							2
Solution Chemistry				2							2
Environmental Geosciences				2							2
Fluid Mechanics II				2							2
Heat Transfer I				2							2
Instrumentation				2							2
Control Engineering I				2							2
Design for Materials Function				2							2
Computer Software Engineering				2							2
Theory of Elasticity				2							2

Creation and Production				2							2
Mechatronics				2							2
Electronic Devices				2							2
Laboratory Experiment I				3					1		
Design and Drawing I				3					1		
Seminar II				3					1		
Production Process Practice				3					1		
Fortran Exercises				2					1		
Introduction to Systems Design Engineering				2					2		
Introduction to Nanomechanics				2					2		
Introduction to Aerospace Engineering				2					2		
Introduction to Quantum Science and Systems				2					2		
Introduction to Biorobot System				2					2		
Introduction to Energy and Environment Technology				2					2		
Introduction to International Mechanical and Aerospace Engineering Course				2					2		
Kinetics in Reactions					2						2
Physical Chemistry of Interface					2						2
Environmental Biology					2						2
Energy Conversion System Engineering					2						2
Computational Fluid Dynamics					2						2
Heat Transfer II					2						2
Compressible Fluid Dynamics					2						2
Computational Mechanics					2						2
Fracture Mechanics					2						2
Tribology					2						2
Machine Design Engineering					2						2
Control Engineering II					2						2
Robotics					2						2
Digital Circuits					2						2
Laboratory Experiment II					3				1		
Design and Drawing II					3				1		
Aircraft Design					2						2
Applied Nuclear Physics					2						2
Radiochemistry					2						2
Introduction to Neutron Transport					2						2
Fundamentals on Backend of Nuclear Fuel Cycle					2						2
Advanced International Mechanical and Aerospace Engineering Course					2					2	
Plasma Physics						2					2
Energy Systems Engineering						2					2
Structural Mechanics						2					2
Precision Machining						2					2
Strength of Materials						2					2
Micromachine Forming						2					2
System Dynamics II						2					2
Computer Vision						2					2
Solid State Physics						2					2
Mechanoptics						2					2
Signal Processing						2					2
Environmental Science and Technology						2					2
Introduction to Industrial Chemistry						2					2
Introduction to Electrical Engineering						2					2
Introduction to Materials Science						2					2
Introduction to Environmental Engineering						2					2
Introduction to Intellectual Property Rights						1					1
Introduction to Technology Policy						2					2
Introduction to Biomedical Engineering						2					2
Engineering Ethics						1					1

English Communications in Technology						2					2
Surface Science and Engineering						2					2
Aircraft Technologies						2					2
Space Engineering						2					2
Combustion Engineering						2					2
Propulsion Engineering						2					2
High Energy Materials Engineering						2					2
Mechanics for Quantum Engineering and Energy Systems						2					2
Nuclear Reactor Safety and Design						2					2
Radiation Protection and Safety Engineering						2					2
Laboratory Experiment on the Backend of Nuclear Fuel Cycle						3					1
Environmental Crustal Engineering						2					2
Geomechanics						2					2
Geosphere Transport Phenomena						2					2
Chemical Energy Conversion						2					2
Earth Resources and Energy						2					2
Special Topics in International Mechanical and Aerospace Engineering Course						2				2	
Basic Theory of Plasticity							2				2
Flight Dynamics							2				2
The Chemistry of Nuclear Fuel Cycle							2				2
Plant Visit (Supplemental 1)											
Industrial Practice											
Special Lectures I (Supplemental 2)											
Special Lectures II											
Graduation Thesis					3	6	9		6		

*Credits required for curriculum completion

Specialized Subject	
IMAC-U Course	81 credits

(3) AMB Course

Subject Name	1st year (2nd, 3rd Semester)		2nd year (4th, 5th Semester)		3rd year (6th, 7th Semester)		4th year (8th, 9th Semester)		Credits	
									Compulsory	Elective
Introduction to Aquatic Production		1							1	
Introduction to Natural and Agricultural Production		1							1	
Modern Agriculture and Agricultural Science		2							2	
Introduction to Physiology and Ecology	2								2	
An Introduction to Bioindustrial Information Processing					2					2
Reading of Scientific Paper I					2				1	
Reading of Scientific Paper II					2				1	
Practice on Marine Bio-resources Science		2							1	
Graduation Thesis							*	*	10	
Physiology of Biological Resources					2				2	
Animal Ecology and Ethnology				2						2
Genetics and Breeding			2							2
Field Practice of Marine Production				3		3			2	
Fishery Science Practice				12	18				10	
Basic Chemistry, Practice				3					1	
Basic Biology, Practice				3					1	
Aqua cultural Biology						2			2	
Fisheries Biology and Ecology					2				2	
Aquatic Plant Ecology					2				2	
Marine Biochemistry				2					2	
Biological Oceanography					2				2	

Marine Biotechnology					2				2	
Applied Genetics in Aquatic Organisms					2				2	
Aquatic Invertebrate Biology						2				2
Applied Aquatic Botany					2					2
Marine Product Technology					2					2
Seafood management						2				2
Planktonology				2						2
Integrate Aquatic Biology				2						2
Marine Applied Biochemistry						1				1
Related Subjects										4
Introduction to Fisheries Science			2						2	
Practical Training						2			1	
Marine Biology			2						2	
Current topics of Agricultural Plant Science						2				2
Introduction to Resource and Environmental						2				2
Introduction to Applied Animal and Dairy Science						2				2
Applied Biological Chemistry						2				2
Food and Chemistry						2				2
Current topics of Shellfish Physiology						1				1
Current topics of Fish Ecology						1				1
Current topics of Fish Biochemistry						1				1
Current topics of Genetics in Aquatic organisms						1				1
Current topics of Coastal Ecology						1				1
Current topics of Fish Molecular Biology						1				1
Current topics of Plankton Biology						1				1

*Credits required for curriculum completion

Specialized Subject	
AMB Course	85 credits