

# The Double Degree Program at the Graduate School of Science and Technology

2019 Academic Year



Niigata University

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# Student Acceptance for the Double Degree Program of the Graduate School of Science and Technology, Niigata University

## ***1. Program***

The purpose of the Graduate School's five-year (standard) integrated Master's and Doctoral Program is to cultivate highly creative individuals who possess a broad perspective and excellent research abilities in the fields of science, engineering, and agriculture. The double degree program currently accepts only applications for doctoral students in principle, until the graduate school is ready to provide an adequate international Master's double degree program.

## ***2. Major Programs and Areas of Specialization***

The major programs and the areas of specialization provisioned by the Graduate School are as shown on Table 1.

## ***3. Course Subjects, Credits, and Method of Completing the Course of Study***

The subjects and the number of credits for each subject in the doctoral program are as shown on Table 2 and Table 3. As for the subjects provided for in the preceding article, doctoral students in the double degree program must obtain either 19 or more credits, or 23 or more credits, depending on the requirements for completion of their degree program shown on Table 4.

## ***4. Acceptance of Transfer Credits***

Credits earned from other graduate schools in or outside of Japan may be accepted as equivalent to the courses offered by the Graduate School of Science and Technology, Niigata University, upon evaluation. The number of transferable credits may not exceed more than six (6) credits in the Fundamental Sciences, Life and Food Sciences, and Environmental Science and Technology programs, and eight (8) in the Advanced Materials Science and Technology and Electrical and Information Engineering programs.

## ***5. Calculation of the Number of Credits***

The number of credits for the subjects in the Graduate School is calculated based on the following references:

- (1) For lectures and seminars, one (1) credit shall be awarded for 15 hours of class sessions.
- (2) For experiments and exercises, one (1) credit shall be awarded for 30 hours of class sessions.

## ***6. Academic Advising***

Each student shall be assigned to a primary academic advisor who will, in cooperation with two (2) assistant academic advisors, be responsible for supervising the student's study and research. The primary academic advisor shall be a professor in the student's area of specialization; however, upon approval by the faculty council, the academic advisor may be replaced with a substitute chosen from among professors, associate professors, or visiting professors in the student's major program. The assistant academic advisors shall be selected from among professors, associate professors, visiting professors, and visiting associate professors in the doctoral program.

### ***7. Research Supervisory Committee***

A research supervisory committee (hereinafter referred to as the “Supervisory Committee”) shall be formed to supervise each student’s research and completion of the coursework. The Supervisory Committee shall consist of the student’s academic advisor and assistant academic advisors. The academic advisor from the partner graduate school or institution for the double degree program is expected to work collaboratively with the Supervisory Committee to provide academic guidance and advising to the student.

### ***8. Plan of Study***

Under the guidance of the Supervisory Committee, the student must decide on the research topic and the courses to be taken. The student must decide on the courses to be taken during the academic year and submit a plan of study, using a prescribed form, to the dean of the Graduate School at the beginning of each academic year, in principle.

### ***9. Completion of a Course and Award of Credits***

Completion of a course will be certified and credit will be awarded based on required attendance and a passing grade on a written or oral exam, a research report, or other assessment the instructor might require.

### ***10. Review and the Final Oral Examination on the Dissertation***

According to the Niigata University Rules on Degrees, a student ready to submit the dissertation and take the final oral defense must submit the Application for Final Oral Examination and the dissertation to the dean of the Graduate School by a prescribed date and under the guidance of the Supervisory Committee. Upon the preliminary review of the dissertation, the student may undergo the final oral examination on the dissertation and its related fields.

### ***11. Requirements for Completion of Degree***

The requirements for the doctoral degree are three (3) or more years of study in the doctoral program, obtainment of the number of credits provided for in Article 3, and, after receiving the required supervision of the student’s research project, passing of the preliminary review of the dissertation and the final oral examination. As for the requirement of the period of enrollment, however, a student who is recognized by the faculty committee as having made outstanding research achievements will need to be enrolled in the doctoral program for at least one year.

### ***12. Certification of Completion of Degree***

Based on faculty deliberation and voting on the doctoral degree award, the dean of the Graduate School shall certify the completion of the program provided for in the preceding article.

### ***13. Conferral of Degree***

A doctoral degree shall be awarded to those who have completed the doctoral program. The field of specialization accompanying the title of the degree shall be that of “Philosophy,” “Science,” “Engineering,” or “Agriculture.”

1. List of Major Programs, Areas of Specialization, and Obtainable Degrees from the Graduate School of Science and Technology

Table 1

Major Program	Area of Specialization	Obtainable Degrees
Fundamental Sciences	Physics	<ul style="list-style-type: none"> <li>• Master of Philosophy</li> <li>• Master of Science</li> <li>• Doctor of Philosophy</li> <li>• Doctor of Philosophy in Science</li> </ul>
	Chemistry	
	Mathematical Science	
Advanced Materials Science and Technology	Materials Science and Technology	<ul style="list-style-type: none"> <li>• Master of Philosophy</li> <li>• Master of Engineering</li> <li>• Doctor of Philosophy</li> <li>• Doctor of Philosophy in Engineering</li> </ul>
	Applied Chemistry and Chemical Engineering	
	Advanced Mechanical Science and Engineering	
Electrical and Information Engineering	Information Engineering	<ul style="list-style-type: none"> <li>• Master of Philosophy</li> <li>• Master of Engineering</li> <li>• Doctor of Philosophy</li> <li>• Doctor of Philosophy in Engineering</li> </ul>
	Electrical and Electronic Engineering	
	Human Sciences and Assistive Technology	
Life and Food Sciences	Life Sciences	<ul style="list-style-type: none"> <li>• Master of Philosophy</li> <li>• Master of Science</li> <li>• Master of Agriculture</li> <li>• Doctor of Philosophy</li> <li>• Doctor of Philosophy in Science</li> <li>• Doctor of Philosophy in Agriculture</li> </ul>
	Applied Life and Food Sciences	
	Agriculture and Bioresources	
Environmental Science and Technology	Natural Environmental Science	<ul style="list-style-type: none"> <li>• Master of Philosophy</li> <li>• Master of Science</li> <li>• Master of Engineering</li> <li>• Master of Agriculture</li> <li>• Doctor of Philosophy</li> <li>• Doctor of Philosophy in Science</li> <li>• Doctor of Philosophy in Engineering</li> <li>• Doctor of Philosophy in Agriculture</li> </ul>
	Environmental Science for Agriculture and Forestry	
	Architecture and Civil Engineering	
	Earth Science	
	Natural Disaster and Environmental Science	

## 2. List of Course Titles and the Number of Credits offered for the Doctoral Program

Table 2: List of General Courses shared across Majors

Course	Credits
English for Science and Technology Majors I	1
English for Science and Technology Majors II	1
Critical Review on the Applied Use of Science and Technology	2
Special Topics in Advanced Science and Technology	1
Introduction to University Research Projects	1
Lecture on Manufacturing and Development Research II	1
Internship for Doctoral Courses	1
Seminar in University Research Projects	2
Seminar on Cutting-Edge Analysis and Evaluation in University Research Projects	2
Research Camp	2
Global Meeting	2
Research Internship	2
Joint Lecture	2
Intensive Academic English Training Program for Science, Agriculture and Engineering Majors	4
International Professional / Academic Internship	4
A Global Perspective and Invigorating Assistance on Agriculture	1
Advanced Agri-Communication	1
Highly Advanced Global Technology Group-Work Internship A	3
Highly Advanced Global Technology Group-Work Internship B	4
Highly Advanced Global Market Group-Work Internship A	3
Highly Advanced Global Market Group-Work Internship B	4
Introduction to Highly Advanced Global Science and Technology	1
Topics in Highly Advanced Global Science and Technology	1
G-DORM Advanced Project Research in SciTech A	1
G-DORM Advanced Project Research in SciTech B	2
G-DORM Advanced Project Research in SciTech C	4
G-DORM Advanced Seminar in SciTech A	1
G-DORM Advanced Seminar in SciTech B	2
G-DORM Advanced Presentation Exercise in SciTech	1
Introduction to Data Science	2

Table 3: List of Course Titles specific to each Major and Area of Specialization

(1) Fundamental Sciences

Category	Course	Credits
Physics	Projective Research in Physics I	4
	Projective Research in Physics II	4
	Projective Research in Physics III	4
	Seminar in Physics I	2
	Seminar in Physics II	2
	Seminar in Physics III	2
	Presentation Exercise I	1
	Presentation Exercise II	1
	Presentation Exercise III	1
	Academic Writing Exercise	1
	Collaboration Exercise	1
	Physics of Strongly Correlated Systems I	2
	Physics of Strongly Correlated Systems II	2
	The Physics of Superconductivity I	2
	The Physics of Superconductivity II	2
	Physics of Disordered Systems I	2
	Physics of Disordered Systems II	2
	Computational Material Science	2
	Non-perturbative Field Theory I	2
	Non-perturbative Field Theory II	2
	Gauge Field Theory I	2
	Gauge Field Theory II	2
	Gauge Field Theory III	2
	High Energy Physics I	2
	Advanced High Energy Physics II	2
	Topics in Quantum Chromodynamics I	2
	Subatomic Physics I	2
	Topics in Nuclear Structure I	2
	Topics in Nuclear Structure II	2
	Studies in Astrophysics I	2
	Studies in Astrophysics II	2
	Introduction to Muon Science	2
	Nuclear Quantum Many-Body Theory : Advanced	2
	Topics in the Physics of Unstable Nuclei	2
	Condensed Matter Physics I	2
Chemistry	Projective Research in Chemistry I	4
	Projective Research in Chemistry II	4
	Projective Research in Chemistry III	4
	Seminar in Chemistry I	2
	Seminar in Chemistry II	2
	Seminar in Chemistry III	2
	Presentation Exercise I	1
	Presentation Exercise II	1
	Presentation Exercise III	1
	Academic Writing Exercise	1
	Topics in Structure of Condensed Matter	2
	Molecular Dynamics Simulation	2
	Dynamics in Chemical Reaction	2
	Topics in Chemical Reaction in Solution	2
	Structural Aspects in Solution Chemistry	2
	Quantum Reaction Dynamics	2
	Radiation Measurement	2
	Asymmetric Organic Synthesis	2

	Topics in Structure-Activity Relationships	2
	Synthetic Organic Chemistry	2
	Topics in Oxidation and Reduction Reactions	2
	Chemistry of Physiological Function	2
	Molecular and Cellular Biochemistry	2
Mathematical Science	Projective Research in Mathematical Science I	4
	Projective Research in Mathematical Science II	4
	Projective Research in Mathematical Science III	4
	Exercise in Mathematical Science	2
	Seminar in Mathematical Science I	2
	Seminar in Mathematical Science II	2
	Seminar in Mathematical Science III	2
	Literature Reading I	2
	Literature Reading II	2
	Literature Reading III	2
	Internal and External Presentation	2
	Interim Report	1
	Operator Algebra	2
	Complex Analysis	2
	Function Spaces	2
	Applied Partial Differential Equations	2
	Riemannian Manifold	2
	Algebraic Geometry	2
	Global Differential Geometry	2
	Number Theory	2
	Topology	2
	Advanced Information Statistics	2
	Advanced Theory for Optimization	2
	Advanced Applied Statistics	2
	Advanced Mathematical Programming	2
	Advanced Theory on Mathematical Systems	2

## (2) Advanced Materials Science and Technology

Category	Course	Credits
General Subjects within the Major	PhD-Course Project Research in Advanced Materials Science and Technology I	4
	PhD-Course Project Research in Advanced Materials Science and Technology II	4
	PhD-Course Project Research in Advanced Materials Science and Technology III	4
	PhD-Course Seminar in Advanced Materials Science and Technology I	2
	PhD-Course Seminar in Advanced Materials Science and Technology II	2
	PhD-Course Seminar in Advanced Materials Science and Technology III	2
	Colloquia and Discussions for Technical Reading I	2
	Colloquia and Discussions for Technical Reading II	2
	Colloquia and Discussions for Technical Reading III	2
	PhD-Course Work for Materials Science and Technology	2
	PhD-Course Work for Applied Chemistry and Chemical Engineering	2
	Course Work in Mechanical Science and Engineering	2
	Presentation of Research Progress Report	1
	Seminar for Research Presentation	2
	Special Lecture on Advanced Materials Science and Technology I	1
	Special Lecture on Advanced Materials Science and Technology II	1
	Special Lecture on Advanced Materials Science and Technology III	1
	Special Lecture on Advanced Materials Science and Technology IV	1
Materials Science and	Design of Composite Materials	2
	Solid State Physics	2



Technology	Magnetic Materials	2
	Superconductivity	2
	Optoelectronic Device Materials	2
	Photofunctional Chemistry	2
	Design of Biomaterials	2
	Biochemical Reaction Engineering	2
	Strength of Functional Materials	2
	Functional Inorganic Materials	2
	Advanced Smart Material	2
	Electronic Properties of Metallic Materials	2
	Soft Material Engineering	2
	Nanomaterials Chemistry, Advanced Course	2
Applied Chemistry and Chemical Engineering	Synthesis of Biologically Active Natural Products	2
	Design of Inorganic Materials	2
	Functions and Control of Fine Particulate Materials	2
	Structures and Properties of Natural Products	2
	Molecular Design of Well-defined Macromolecules	2
	Molecular Design of Functional Polymers	2
	Chemistry for Transformation of Existing Organic Molecules	2
	Chemistry for Controlled Material Reaction	2
	Material Analysis Chemistry	2
	Chemical Thermodynamics for Inorganic Materials	2
	Inorganic Solid State Chemistry	2
	Development of Composite Particles	2
	Fine Powder Technology	2
	Advanced Chemical Materials Production Apparatuses	2
	Mass Transfer in Production Processes	2
	Advanced Biochemical Engineering	2
	Management of Waste Materials	2
	Thermal Energy Physics and Chemistry	2
Advanced Mechanical Science and Engineering	Bionic Design and Materials	2
	Transport Phenomena in Production	2
	Complex Fluid Engineering	2
	Flow Visualization and Image Measurement	2
	Intelligent Robotics	2
	Applied Acoustics	2
	Design System	2
	Control Theory for Mechanical Systems	2
	Strength and Fracture of Materials	2
	Intellectual Applications of Laser Scanning Technology	2
	X-ray Study of Mechanical Behavior of Materials	2
	Advanced Micromachine Engineering	2
	Materials Joining and Welding Technology	2
	Advanced Environmental Energy Engineering	2
	Advanced KANSEI Microrobotic Systems	2

### (3) Electrical and Information Engineering

Category	Course	Credits
General Subjects within the Major	Project Research in Electrical and Information Engineering I	4
	Project Research in Electrical and Information Engineering II	4
	Project Research in Electrical and Information Engineering III	4
	Seminar in Electrical and Information Engineering I	2
	Seminar in Electrical and Information Engineering II	2
	Seminar in Electrical and Information Engineering III	2
	Literature Reading I	2
	Literature Reading II	2
	Literature Reading III	2
	Internal and External Presentation	2
	Interim Report	1
	Special Lectures on Electrical and Information Engineering	1

	Practice for Career-Path Formation	2
Information Engineering	Exercises in Information Engineering	2
	Advanced Mobile Communications	2
	Remote Sensing	2
	Advanced Wireless Communication Systems	2
	Theory of Algorithms	2
	Human Information Science	2
	GIS and Measuring System	2
	Advanced Genome Informatics	2
	Algebraic Geometry and its Application	2
	Mathematical Analysis	2
	Functional Analytic Discrete Group Theory	2
	Mathematical Systems and Control Theory	2
	Collaborative and Distributed Media	2
	Applied on Partial Differential Equation	2
	Spatial Signal Control Course	2
	Advanced Topics in Models of Computation	2
	Information Security and Intelligent Infrastructure	2
Electrical and Electronic Engineering	Seminar in Electrical and Electronic Engineering Course I	2
	Seminar in Electrical and Electronic Engineering Course II	2
	Seminar in Electrical and Electronic Engineering Course III	2
	Exercises in Electrical and Electronic Engineering Course	2
	Advanced Topics on Spread Spectrum Communications	2
	Selected Topics in Digital Signal Processing	2
	Selected Topics in Multidimensional Signal Processing	2
	Applied Superconducting Technology	2
	Plasma Processing Technology	2
	Electromagnetic Energy Engineering	2
	Energy Application Device	2
	Device/Energy Systems	2
	High Voltage Pulse Engineering	2
	Superconducting Energy Systems	2
	Thin Films and Application	2
	Advanced Lecture on Nano Photonics	2
	Molecular Electronics	2
	Telecommunication Systems and Their Trends and Edges	2
	Advanced Devices for Information Technologies	2
	Laser Physics	2
	Thin Film Optical Devices	2
	Optical Nanometrology	2
Human Sciences and Assistive Technology	Seminar in Human Science and Assistive Technology Course I	2
	Seminar in Human Science and Assistive Technology Course II	2
	Seminar in Human Science and Assistive Technology Course III	2
	Exercises in Human Science and Assistive Technology Course	2
	Motor Functions of the Nervous System	2
	Advanced Biomaterials	2
	Wellness, Sports and Health	2
	Neuro Engineering	2
	Introduction to Cybernetics	2
	Biomedical Signal and Image Processing	2
	Bio-electromagnetics	2
	Intelligent Mechatronics	2
	Well-being Community Simulation	2
	Advanced Assistive Device	2
	Advanced Sensing Devices	2
	Bioengineering in Functional Activity	2
	Life Support Science for Persons with Motion and Communication Disabilities	2

	Assistive Technology for Visually Impaired and Blind People	2
	Assistive Technology for Auditory Impairment	2

(4) Life and Food Sciences

Category	Course	Credits
General Subjects within the Major	Advanced Seminar in Life and Food Science I	2
	Advanced Seminar in Life and Food Science II	2
	Advanced Seminar in Life and Food Science III	2
	Advanced Graduate Study in Life and Food Science I	4
	Advanced Graduate Study in Life and Food Science II	4
	Advanced Graduate Study in Life and Food Science III	4
	Seminar in Current Topics I	2
	Seminar in Current Topics II	2
	Seminar in Current Topics III	2
	Management of Food Industry	2
	Management Strategy and Marketing	1
	Global Agriculture and Food Science (Short Program)	3
	International Internship in Agriculture and Food Science (Intermediate Program)	1
	International Internship in Agriculture and Food Science (Long Program)	2
	International Graduate Study in Agriculture and Food Science (Intermediate Program)	2
	International Graduate Study in agriculture and Food Science (Long Term)	4
	Global Disaster Risk Reduction and Recovery (Short Program)	3
	International Internship in Disaster Risk Reduction and Recovery (Intermediate Program)	1
	International Internship in Disaster Risk Reduction and Recovery (Long Program)	2
	International Graduate Study in Disaster Risk Reduction and Recovery (Intermediate Program)	2
	International Graduate Study in Disaster Risk Reduction and Recovery (Long Program)	4
Life Sciences	Life Science Special Seminar II	1
	Presentation Practice (Interim Presentation for Doctoral Thesis)	1
	Practice in Research Presentation (Presentation in Scientific Meeting)	1
	Topics in Cell Recognition	2
	Topics of Regulation of Cell Differentiation	2
	Advanced Glycoscience	2
	Advanced Lecture in Animal Embryology	2
	Plant Function Control I	2
	Plant Function Control II	2
	Plant Function Control III	2
	Integrative Adaptation Biology	2
	Advanced Plant Molecular Genetics II	2
	Advanced Protein and Nucleic Acid Chemistry	2
	Advanced Lectures in Environmental Aquatic Biology	2
Applied Life and Food Sciences	Topics in Applied Life and Food Sciences	2
	Presentation Practice (Interim Presentation for Graduation Thesis)	1
	Exercise in Applied Life and Food Sciences	1
	Topics in Epigenetics	2
	Topics in Plant Metabolic Control	2
	Environmental Plant Physiology	2
	Topics in Molecular Life Science for Plants	1
	Topics in Environmental Responses of Plants II	2
	Microbial Chemistry	2
	Topic in Molecular Microbiology	2

	Topics in Molecular Microbiology	2
	Topics in Molecular Life Science for Microorganisms	1
	Regulation of Meat Property	2
	Property of Food Materials	2
	Topics in Animal Protein Function	2
	Advanced Biofunctional Chemistry of Food	2
	Topics in Food and Nutrition Science	1
	Topics in Environmental Soil science	2
	Advanced Science on the Utilization of Natural-resources	1
	Applied Chemistry of Wood Component	2
	Bioinformatics	2
	Topics in Plant Genome Function	2
	Topics in Plant Bio-control	2
	Topics in High Pressure Food Science	2
	Topics in Applied Bioresource Chemistry	2
	Topics in Biotechnology and Biochemistry	2
	Topics in Food Sciences	2
	Research Agri-Internships	1
	Practical English	1
	Scientific Writing and Presentation in English	1
	Research Communication	1
	Glycoscience Studies	2
	Advanced in Food Technology	2
Agriculture and Bioresources	Special Lecture on Agriculture and Bioresources	1
	Seminar on Agriculture and Bioresources I	1
	Seminar on Agriculture and Bioresources II	1
	International Agricultural Development	2
	Analysis of Agricultural Productivity	2
	Special Lecture on Rural Food Industry	2
	Plant Development Regulation	2
	Advanced Agro-resources Science	2
	Utilization of Crop Resource	2
	Plant Cell Breeding	2
	Genome Analysis	2
	Special Lecture of Farming System	2
	Grassland Vegetation, its Management and Utilization	2
	Physiological Regulation of Animal Production	2
	Genetic Analysis in Animals	2
	Animal Histochemistry and Cytochemistry	2
	Nutritional Regulation of Protein(Amino Acids) Metabolism in Monogastric Animals	2
	Comparative Virology	2
	International Agriculture and Resources Development	2
	Plant Genome Analysis	2
	Topic in Agro-Resources Science	2
	Research Agri-Internships	1
	Practical English	1
	Scientific Writing and Presentation in English	1
	Research Communication	1
	Animal Germ Cell Regulation	2
	Crop Genomics	2

#### (5) Environmental Science and Technology

Category	Course	Credits
General Subjects within	Project Research in Environmental Science and Technology	4

the Major	Project Research in Earth Science Da	4
	Project Research in Earth Science Db	4
	Project Research in Earth Science Dc	4
	Seminar in Environmental Science and Technology I	1
	Seminar in Environmental Science and Technology II	1
	Seminar in Environmental Science and Technology III	1
	Seminar in Earth Science D	1
	Special Lecture on Environmental Science and Technology	1
	Lecture on the Global Warming from Regional Aspects D	2
	Presentation of Research Progress Report D	1
	Presentation Exercise D	1
	Academic Writing Exercise D	4
	Project Research Exercise on Abroad	1
	ISI Journal Submission Exercise	1
	Advanced Impact Assessment of Air Pollution	2
	Advanced Atmospheric Pollutant Sciences	2
	Global Agriculture and Food Science (Short Program)	3
	International Internship in Agriculture and Food Science (Intermediate Program)	1
	International Internship in Agriculture and Food Science (Long Program)	2
	International Graduate Study in Agriculture and Food Science (Intermediate Program)	2
	International Graduate Study in agriculture and Food Science (Long Term)	4
	Global Disaster Risk Reduction and Recovery (Short Program)	3
	International Internship in Disaster Risk Reduction and Recovery (Intermediate Program)	1
	International Internship in Disaster Risk Reduction and Recovery (Long Program)	2
	International Graduate Study in Disaster Risk Reduction and Recovery (Intermediate Program)	2
	International Graduate Study in Disaster Risk Reduction and Recovery (Long Program)	4
Natural Environmental Science	Environmental Physics I	2
	Environmental Physics II	2
	Advanced Chemistry of the Environment I	2
	Advanced Chemistry of the Environment II	2
	Advanced Chemistry of the Environment III	2
	Topics in Environmental Chemistry IV	2
	Advanced Chemistry of the Environment V	2
	Advanced Course in Geophysics I	2
	Advanced Course in Geophysics II	2
	Special Lecture of Earth Surface Environment I	2
	Special Lecture of Earth Surface Environment II	2
	Structure and Function I	2
	Biological Diversity I	2
	Biological Diversity II	2
	Biological Diversity III	2
	Conservation Biology I	2
	Conservation Biology III	2
	Introduction to Structure Analysis	2
Environmental Science for Agriculture and Forestry	Applied Snow Hydrology	2
	Advanced Agricultural Water Management	2
	Ecosystem Function	2
	Agricultural Environmental Systems	2
	Advanced Ecological Genetics I	2
	Advanced Ecological Genetics II	2
	Forest Ecosystem Management I	2

	Forest Ecosystem Management II	2
	Forest Ecosystem Management III	2
	Environmental Biophysics	2
	Forest Geoinformatics	2
	Design and Management of Agricultural Land and Rural Community I	2
	Design of Hydraulic Structures	2
	Systems Engineering for Agricultural Production	2
	Topics in Agroinformatics	2
	Vegetation Dynamics	2
	Advanced Agricultural Machinery and Post Harvest Technology	2
	Applied Snow Hydrology	2
	Agricultural Engineering for Soil and Water Environment	2
	Topics in Forest Ecosystem Management	2
	Research Agri-Internships	1
	Practical English	1
	Scientific Writing and Presentation in English	1
	Research Communication	1
	Island Biogeography	2
Architecture and Civil Engineering	Structural Systems I	2
	Structural Systems II	2
	Structural Systems III	2
	Structural Mechanics and Computational Methods I	2
	Structural Mechanics and Computational Methods II	2
	Geotechnical Disaster Management	2
	Space Design I	2
	Design Theories for Dwelling Space II	2
	Control of Architectural and Urban Environment I	2
	Control of Architectural and Urban Environment II	2
	Risk Management of Urban Water Quality	2
	Nearshore Dynamics and Disaster Mitigation	2
	Materials for Construction and Environmental	2
	Numerical Modeling for Civil and Environmental Engineering	2
	Landscape Planning Theory	2
Earth Science	Geological Engineering Exercise D	2
	Science Communication Exercise D	2
	Lithospheric Dynamics	2
	Advanced Mineralogical Sciences	2
	Isotope Geology	2
	Arc volcanology	2
	Deformation of Lithosphere	2
	Theory of Deep Materials in the Earth	2
	Fault Material Science	2
	Paleobiogeography	2
	Sedimentology of Clastic Materials	2
	Co-evolution of Earth and Life	2
	Microfossil Biostratigraphy	2
	Paleobiology	2
	Geosphere Environment	2
Natural Disaster and Environmental Science	Topics in Snow and Ice Disasters	2
	Numerical Hydrodynamics	2
	Active Geological Process	2
	Disasters by Slope Movements	2
	Hazards by Slope Movement II	2
	Advanced Topics in Volcano-hydrologic Hazards	2

### 3. General Guidelines for Coursework Requirements by Major and Area of Specialization

Table 4

Major Program	Area of Specialization	Minimum Coursework Requirements		
		Courses offered within the area of specialization	Courses offered by other areas or majors	Total credits
Fundamental Sciences	Physics	At least 14 credits (including following courses) <ul style="list-style-type: none"> <li>•Projective Research in Physics I (4)</li> <li>•Projective Research in Physics II (4)</li> <li>•Seminar in Physics I (2)</li> <li>•Seminar in Physics II (2)</li> </ul>	At least 2 credits	Minimum 19 credits required
	Chemistry	At least 14 credits (including following courses) <ul style="list-style-type: none"> <li>•Projective Research in Chemistry I (4)</li> <li>•Projective Research in Chemistry II (4)</li> <li>•Seminar in Chemistry I (2)</li> <li>•Seminar in Chemistry II (2)</li> </ul>	At least 2 credits	Minimum 19 credits required
	Mathematical Science	At least 14 credits (including following courses) <ul style="list-style-type: none"> <li>•Projective Research in Mathematical Science I (4)</li> <li>•Projective Research in Mathematical Science II (4)</li> <li>•Exercise in Mathematical Science (2)</li> <li>•Interim Report (1)</li> </ul>	At least 2 credits	Minimum 19 credits required
Advanced Materials Science and Technology	Materials Science and Technology	At least 19 credits (including following courses) <ul style="list-style-type: none"> <li>•PhD-Course Project Research in Advanced Materials Science and Technology I (4)</li> <li>•PhD-Course Project Research in Advanced Materials Science and Technology II (4)</li> <li>•PhD-Course Project Research in Advanced Materials Science and Technology III (4)</li> <li>•PhD-Course Work for Materials Science and Technology (2)</li> <li>•Presentation of Research Progress Report (1)</li> </ul>	At least 4 credits	Minimum 23 credits required
	Applied Chemistry and Chemical Engineering	At least 19 credits (including following courses) <ul style="list-style-type: none"> <li>•PhD-Course Project Research in Advanced Materials Science and Technology I (4)</li> <li>•PhD-Course Project Research in Advanced Materials Science and Technology II (4)</li> <li>•PhD-Course Project Research in Advanced Materials Science and Technology III (4)</li> <li>•PhD-Course Work for Applied Chemistry and Chemical Engineering (2)</li> <li>•Presentation of Research Progress Report (1)</li> </ul>	At least 4 credits	Minimum 23 credits required
	Advanced Mechanical Science and Engineering	At least 19 credits (including following courses) <ul style="list-style-type: none"> <li>•PhD-Course Project Research in Advanced Materials Science and Technology I (4)</li> <li>•PhD-Course Project Research in Advanced Materials Science and Technology II (4)</li> <li>•PhD-Course Project Research in Advanced Materials Science and Technology III (4)</li> <li>•Course Work in Mechanical Science and Engineering (2)</li> <li>•Presentation of Research Progress Report (1)</li> </ul>	At least 4 credits	Minimum 23 credits required

Electrical and Information Engineering	Information Engineering	At least 19 credits (including following courses) •Project Research in Electrical and Information Engineering I (4) •Project Research in Electrical and Information Engineering II (4) •Project Research in Electrical and Information Engineering III (4) •Exercises in Information Engineering (2) •Interim Report (1)	At least 4 credits	Minimum 23 credits required
	Electrical and Electronic Engineering	At least 19 credits (including following courses) •Project Research in Electrical and Information Engineering I (4) •Project Research in Electrical and Information Engineering II (4) •Project Research in Electrical and Information Engineering III (4) •Exercises in Electrical and Electronic Engineering Course (2) •Interim Report (1)	At least 4 credits	Minimum 23 credits required
	Human Sciences and Assistive Technology	At least 19 credits (including following courses) •Project Research in Electrical and Information Engineering I (4) •Project Research in Electrical and Information Engineering II (4) •Project Research in Electrical and Information Engineering III (4) •Exercises in Human Science and Assistive Technology Course (2) •Interim Report (1)	At least 4 credits	Minimum 23 credits required
Life and Food Sciences	Life Sciences	At least 15 credits (including following courses) •Advanced Graduate Study in Life and Food Science I (4) •Advanced Seminar in Life and Food Science I (2) •Seminar in Current Topics I (2) •Life Science Special Seminar II (1) •Presentation Practice (Interim Presentation for Doctoral Thesis) (1) •Practice in Research Presentation (Presentation in Scientific Meeting) (1)	At least 4 credits	Minimum 19 credits required
	Applied Life and Food Sciences	At least 17 credits (including following courses) •Advanced Graduate Study in Life and Food Science I (4) •Advanced Graduate Study in Life and Food Science II (4) •Presentation Practice (1)	At least 2 credits	Minimum 19 credits required
	Agriculture and Bioresources	At least 15 credits (including following courses) •Seminar on Agriculture and Bioresources I (1) •Advanced Graduate Study in Life and Food Science I (4) •Advanced Seminar in Life and Food Science I (2) •Seminar in Current Topics I (2)	At least 4 credits	Minimum 19 credits required



Environmental Science and Technology	Natural Environmental Science	At least 11 credits (including following courses) •Project Research in Environmental Science and Technology (4) •Seminar in Environmental Science and Technology I (1)	At least 4 credits	Minimum 19 credits required
	Environmental Science for Agriculture and Forestry	At least 11 credits (including following courses) •Project Research in Environmental Science and Technology (4) •Seminar in Environmental Science and Technology II (1)	At least 4 credits	Minimum 19 credits required
	Architecture and Civil Engineering	At least 11 credits (including following courses) •Project Research in Environmental Science and Technology (4) •Seminar in Environmental Science and Technology III(1)	At least 4 credits	Minimum 19 credits required
	Earth Science	At least 15 credits (including following courses) •Project Research in Earth Science Da (4) •Project Research in Earth Science Db (4) •Presentation of Research Progress Report D (1) •Project Research in Earth Science Dc (4) or Academic Writing Exercise D (4) •Seminar in Earth Science D (1) or Presentation Exercise D (1)	At least 4 credits	Minimum 19 credits required
	Natural Disaster and Environmental Science	At least 11 credits (including following courses) •Project Research in Environmental Science and Technology (4) •Seminar in Environmental Science and Technology I (1)	At least 4 credits	Minimum 19 credits required

#### 4. Classification of Courses by Intended Learning Outcomes and Requirements for Majors and Specializations

##### (1) Fundamental Sciences Major

###### Physics

##### 1. Expected Outcomes through the Study of this Program

###### Students will

- (A) develop the ability to view nature, ethics, and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) develop the ability to understand and apply advanced theories and technologies.
- (B-1) develop the ability to understand particle physics both within and beyond the Standard Model at an advanced level through experimental and theoretical approach.
- (B-2) gain an advanced understanding of the structures and interactions at subatomic quantum systems as regards quarks, hadrons, and atomic nuclei.
- (B-3) learn advanced schemes of elucidating the basic laws and fundamental physical processes involved in the origin, structure, and evolution of the universe, celestial objects – especially general-relativistic celestial objects –, the early universe, the Milky Way, and the stars.
- (B-4) gain an advanced understanding of the problems related to the initial processes involved in the formation of the elements which are the origin of matter in the universe, and the structure of the existing stable nuclei and the unstable nuclei far from the valley of stability.
- (B-5) acquire an advanced understanding of experimentation and computer simulation related to physical properties of complex systems of solid electrolytes, irregular semiconductors, nanostructured materials, and so on.
- (B-6) gain an advanced understanding of the structures and phase transitions of matter at the meso-scale, and master advanced data-analysis methods and development ability in numerical computing.
- (C) become proficient in identifying, analyzing, and solving problems.
- (D) demonstrate outstanding general academic communication skills.
- (E) deliver persuasive presentations at international and other academic conferences.
- (F) utilize effective writing skills in academic journals.

##### 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A)	General Natural Sciences II • III • IV • V	Elective	1	At least 14 credits must be taken from courses offered within the area of specialization including required courses, and at least 2 credits should be earned from those offered by other areas and majors. (DDP students may transfer up to six credits from equivalent courses taken at their home institution.)
	(Courses offered by other areas or majors)	Required	2	
(B-1)	High Energy Physics I	Elective	2	
	Advanced High Energy Physics II	Elective	2	
	Gauge Field Theory I	Elective	2	
	Gauge Field Theory II	Elective	2	
	Gauge Field Theory III	Elective	2	
	Non-perturbative Field Theory I	Elective	2	
	Non-perturbative Field Theory II	Elective	2	
(B-2)	Topics in Quantum Chromodynamics I	Elective	2	
	Subatomic Physics I	Elective	2	
	Topics in Nuclear Structure I	Elective	2	
(B-3)	Topics in Nuclear Structure II	Elective	2	
	Studies in Astrophysics I	Elective	2	
(B-4)	Studies in Astrophysics II	Elective	2	
	Introduction to Muon Science	Elective	2	
	Nuclear Quantum Many-Body Theory : Advanced	Elective	2	
(B-5)	Topics in the Physics of Unstable Nuclei	Elective	2	
	The Physics of Superconductivity I	Elective	2	
	The Physics of Superconductivity II	Elective	2	
	Physics of Strongly Correlated Systems I	Elective	2	
(B-6)	Physics of Strongly Correlated Systems II	Elective	2	
	Physics of Disordered Systems I	Elective	2	
	Physics of Disordered Systems II	Elective	2	
	Condensed Matter Physics I	Elective	2	
	Computational Material Science	Elective	2	
(A) (C) (D) (E) (F)	Collaboration Exercise	Elective	1	
	Projective Research in Physics I	Required	4	
	Projective Research in Physics II	Required	4	
	Projective Research in Physics III	Elective	4	
	Seminar in Physics I	Required	2	
	Seminar in Physics II	Required	2	
	Seminar in Physics III	Elective	2	
	Presentation Exercise I	Elective	1	
	Presentation Exercise II	Elective	1	
	Presentation Exercise III	Elective	1	
	Academic Writing Exercise	Elective	1	
	Primarily for DDP students (open to all)***	Research Camp	Elective	
Global Meeting		Elective	2	
Research Internship		Elective	2	
Joint Lecture		Elective	2	
Minimum 19 credits required.				

\* General Natural Sciences is recommended if this course was not taken previously within the master's program.

\*\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Projective Research in Physics I	4	
		Projective Research in Physics II	4	Transfer
		Seminar in Physics I	2	
		Seminar in Physics II	2	Transfer
	Elective Course	Courses offered within the area of specialization	>2	*
Total		At least 14 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 2 credits		
Grand Total		Minimum 19 credits required		

\* Students are recommended taking two elective courses offered within the area of specialization.

**1. Expected Outcomes through the Study of this Program****Students will**

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their  
 (B) develop the ability to understand and apply advanced theories and technologies.  
 (B-1) gain an advanced ability to understand and elucidate the reactions and structures of inorganic materials at the  
 (B-2) become able to understand and elucidate, at an advanced level, methods of synthesizing organic compounds  
 (B-3) acquire an advanced ability to understand and elucidate biopolymers based on an analysis of their molecular  
 (B-4) acquire, at an advanced level, the ability to understand and elucidate the structures and phase transitions of  
 (B-5) with regard to chemical reactions, gain an advanced ability to understand and elucidate the basic processes of  
 (C) become proficient in identifying, analyzing, and solving problems.  
 (D) demonstrate outstanding general academic communication skills.  
 (E) deliver persuasive presentations at international and other academic conferences.  
 (F) utilize effective writing skills in academic journals.

**2. List of Courses, Categorized by the Intended Educational Outcomes**

Category	Course	Elective/ Required	Credits	Requirement
(A)	General Natural Sciences II • III • IV • V	Elective	1	At least 14 credits must be taken from courses offered within the area of specialization including required courses, and at least 2 credits should be earned from those offered by other areas and majors. (DDP students may transfer up to six credits from equivalent courses taken at their home institution.)
	(Courses offered by other areas or majors)	Required	2	
(B-1)	Structural Aspects in Solution Chemistry	Elective	2	
	Topics in Chemical Reaction in Solution	Elective	2	
	Radiation Measurement	Elective	2	
(B-2)	Synthetic Organic Chemistry	Elective	2	
	Topics in Structure-Activity Relationships	Elective	2	
	Topics in Oxidation and Reduction Reactions	Elective	2	
	Asymmetric Organic Synthesis	Elective	2	
(B-3)	Molecular and Cellular Biochemistry	Elective	2	
	Chemistry of Physiological Function	Elective	2	
(B-4)	Topics in Structure of Condensed Matter	Elective	2	
	Molecular Dynamics Simulation	Elective	2	
(B-5)	Dynamics in Chemical Reaction	Elective	2	
	Quantum Reaction Dynamics	Elective	2	
(A) (C) (D) (E) (F)	Projective Research in Chemistry I	Required	4	
	Projective Research in Chemistry II	Required	4	
	Projective Research in Chemistry III	Elective	4	
	Seminar in Chemistry I	Required	2	
	Seminar in Chemistry II	Required	2	
	Seminar in Chemistry III	Elective	2	
	Presentation Exercise I	Elective	1	
	Presentation Exercise II	Elective	1	
	Presentation Exercise III	Elective	1	
Primarily for DDP students (open to all)***	Academic Writing Exercise	Elective	1	
	Research Camp	Elective	2	
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
Primarily for DDP students (open to all)****	Joint Lecture	Elective	2	
	Structural Aspect of Complex Formation in Solution	Elective	2	

Minimum 19 credits required.

\* General Natural Sciences is recommended if this course was not taken previously within the master's program.

\*\* Classes common to both the master's and doctoral programs may only count toward one program or the other. Classes already

\*\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken

\*\*\*\* These credits shall be counted as courses taken within the area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Projective Research in Chemistry I	4	
		Projective Research in Chemistry II	4	Transfer
		Seminar in Chemistry I	2	
		Seminar in Chemistry II	2	Transfer
	Elective Course	Courses offered within the area of specialization	> 2	*
Total		At least 14 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 2 credits		
Grand Total		Minimum 19 credits required		

\* Students are recommended taking two elective courses offered within the area of specialization.

# 1. Expected Outcomes through the Study of this Program

## Students will

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their
- (B) by understanding both the mathematical structures that appear in the information and computing sciences as
- (C) acquire the ability to understand and apply theories from fields related to mathematical science and information
  - (C-1) the ability to research and apply the structures of function spaces and the structures of operators defined on
  - (C-2) the ability to systematically research and apply theories related to algebraic geometry, number theory,
  - (C-3) the ability to research and apply information science: algebraic theory, including formula manipulation,
- (D) develop the ability to identify, analyze, and solve issues; demonstrate outstanding general academic

# 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(B) (C) (D)	Projective Research in Mathematical Science I	Required	4	At least 11 credits
	Projective Research in Mathematical Science II	Required	4	
	Projective Research in Mathematical Science III	Elective	4	
	Exercise in Mathematical Science	Required	2	
	Interim Report	Required	1	
(A) (B)	(Courses offered by other areas or majors)	Required	2	At least 2
(B) (C) (D)	Seminar in Mathematical Science I	Elective	2	At least 3 credits
	Seminar in Mathematical Science II	Elective	2	
	Seminar in Mathematical Science III	Elective	2	
	Literature Reading I	Elective	2	
	Literature Reading II	Elective	2	
	Literature Reading III	Elective	2	
	Internal and External Presentation	Elective	2	
(C-1)	Operator Algebra	Elective	2	
	Complex Analysis	Elective	2	
	Function Spaces	Elective	2	
	Applied Partial Differential Equation	Elective	2	
(C-2)	Riemannian Manifold	Elective	2	
	Algebraic Geometry	Elective	2	
	Global Differential Geometry	Elective	2	
	Number Theory	Elective	2	
	Topology	Elective	2	
(C-3)	Advanced Information Statistics	Elective	2	
	Advanced Theory for Optimization	Elective	2	
	Advanced Applied Statistics	Elective	2	
	Advanced Mathematical Programming	Elective	2	
	Advanced Theory on Mathematical Systems	Elective	2	
Primarily for DDP students (open to all)	Research Camp	Elective	2	***
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 19 credits required. (including 13 credits from required courses)				

\* Classes common to both the master's and doctoral programs may only count toward one program or the other. Classes already

\*\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

### 3 . Example of Plan of Study with Transfer Credit

#### [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Projective Research in Mathematical Science I	4	
		Projective Research in Mathematical Science II	4	Transfer
		Exercise in Mathematical Science	2	
		Interim Report	1	
	Elective Course	Transfer credit	2	Transfer
		Courses offered within the area of specialization	> 1	
Total		At least 14 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 2 credits		
Grand Total		Minimum 19 credits required		

## (2) Advanced Materials Science and Technology Major

### Materials Science and Technology

#### 1. Expected Outcomes through the Study of this Program

##### Students will

(A) become proficient in identifying, analyzing, and solving problems.

(A-1) become capable in identifying, analyzing, and solving problems related to functional materials concerning optoelectronics, metal-hydrogen systems, magnetism, and superconductivity by applying the advanced theories and skills based on materials science and technology.

(A-2) acquire the ability to identify, analyze, and solve problems related to inorganic nano-materials, hybrid materials, hybrid materials, and biomaterials by applying the advanced theories and skills based on materials science and technology.

(B) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.

(C) demonstrate outstanding general academic communication skills; deliver persuasive presentations at international academic conferences; and utilize effective writing skills in academic journals.

#### 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A-1)	Solid State Physics	Elective	2	At least 4 credits from (A-1) or (A-2)
	Optoelectronic Device Materials	Elective	2	
	Magnetic Materials	Elective	2	
	Superconductivity	Elective	2	
	Electronic Properties of Metallic Materials	Elective	2	
(A-2)	Functional Inorganic Materials	Elective	2	
	Photofunctional Chemistry	Elective	2	
	Nanomaterials Chemistry, Advanced Course	Elective	2	
	Design of Composite Materials	Elective	2	
	Design of Biomaterials	Elective	2	
	Biochemical Reaction Engineering	Elective	2	
	Strength of Functional Materials	Elective	2	
	Soft Material Engineering	Elective	2	
(B) (C)	Colloquia and Discussions for Technical Reading I	Elective	2	At least 19 credits must be taken from this category including 4 credits from required elective courses offered by other areas or majors
	Colloquia and Discussions for Technical Reading II	Elective	2	
	Colloquia and Discussions for Technical Reading III	Elective	2	
	PhD-Course Seminar in Advanced Materials Science and Technology I	Elective	2	
	PhD-Course Seminar in Advanced Materials Science and Technology II	Elective	2	
	PhD-Course Seminar in Advanced Materials Science and Technology III	Elective	2	
	PhD-Course Project Research in Advanced Materials Science and Technology I	Required	4	
	PhD-Course Project Research in Advanced Materials Science and Technology II	Required	4	
	PhD-Course Project Research in Advanced Materials Science and Technology III	Required	4	
	(Courses offered by other areas or majors)	Required elective	At least 4 credits	
	PhD-Course Work for Materials Science and Technology	Required	2	
	Presentation of Research Progress Report	Required	1	
	Seminar for Research Presentation	Elective	2	
	Internship for Doctoral Courses	Elective	1	
Primarily for DDP students (open to all)	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
	Advanced Smart Material	Elective	2	***
Minimum 23 credits required. (At least 19 credits must be taken from required courses including 4 credits from required elective courses offered by other areas or majors, and at least 4 credits should be earned from elective courses.)				

\* DDP students may transfer up to eight credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

\*\*\* These credits shall be counted as courses taken within the area of specialization.(A-2)



## 3. Example of Plan of Study with Transfer Credit

## [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	PhD-Course Project Research in Advanced Materials Science and Technology I	4	
		PhD-Course Project Research in Advanced Materials Science and Technology II	4	Transfer
		PhD-Course Project Research in Advanced Materials Science and Technology III	4	Transfer
		PhD-Course Work for Materials Science and Technology	2	
		Presentaion of Research Progress Report	1	
	Elective Course	Courses offered within the area of specialization	$\geq 4$	*
Total		At least 19 credits (including 8 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	$\geq 4$	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 23 credits required		

\* Students are recommended taking two elective courses (4 credits) offered within the area of specialization.

## 1. Expected Outcomes through the Study of this Program

### Students will

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) master advanced, specialized knowledge related to optimizing the manufacturing and functions of cutting-edge functional materials and to manufacturing efficient production systems for such materials; and gain an ability to discover and solve related problems.
- (B-1) gain the ability to understand and apply knowledge related to manufacturing advanced, highly functional substances and materials by means of designing, synthesizing and functionally analyzing them at the atomic and molecular levels.
- (B-2) acquire an ability to understand and apply knowledge related to constructing efficient, environmentally friendly production systems and green technologies.
- (C) demonstrate outstanding general academic communication skills; deliver persuasive presentations at international academic conferences; and utilize effective writing skills in academic journals.

## 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A)	PhD-Course Seminar in Advanced Materials Science and Technology I	Elective	2	At least 4 credits must be taken from courses offered within the area of specialization, and at least 4 credits should be earned from those offered by other areas or majors.
(B)	PhD-Course Seminar in Advanced Materials Science and Technology II	Elective	2	
	PhD-Course Seminar in Advanced Materials Science and Technology III	Elective	2	
	(Courses offered by other areas or majors)	Required elective	At least 4 credits	
(B-1)	Molecular Design of Well-defined Macromolecules	Elective	2	
	Chemistry for Controlled Material Reaction	Elective	2	
	Molecular Design of Functional Polymers	Elective	2	
	Chemistry for Transformation of Exicted Organic Molecules	Elective	2	
	Chemical Thermodynamics for Inorganic Materials	Elective	2	
	Synthesis of Biologically Active Natural Products	Elective	2	
	Inorganic Solid State Chemistry	Elective	2	
	Structures and Properties of Natural Products	Elective	2	
	Material Analysis Chemistry	Elective	2	
(B-2)	Design of Inorganic Materials	Elective	2	
	Thermal Energy Physics and Chemistry	Elective	2	
	Functions and Control of Fine Particulate Materials	Elective	2	
	Mass Transfer in Production Processes	Elective	2	
	Management of Waste Materials	Elective	2	
	Advanced Biochemical Engineering	Elective	2	
	Development of Composite Particles	Elective	2	
(C)	Fine Powder Technology	Elective	2	
	Advanced Chemical Materials Production Apparatuses	Elective	2	
	Colloquia and Discussions for Technical Reading I	Elective	2	15 credits
	Colloquia and Discussions for Technical Reading II	Elective	2	
	Colloquia and Discussions for Technical Reading III	Elective	2	
	Seminar for Research Presentation	Elective	2	
	PhD-Course Project Research in Advanced Materials Science and Technology I	Required	4	
	PhD-Course Project Research in Advanced Materials Science and Technology II	Required	4	
	PhD-Course Project Research in Advanced Materials Science and Technology III	Required	4	
Primarily for DDP students (open to all)	PhD-Course Work for Applied Chemistry and Chemical Engineering	Required	2	
	Presentaion of Research Progress Report	Required	1	
	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	

Minimum 23 credits required. (At least 15 credits must be taken from required courses, and at least 8 credits should be earned from elective courses including 4 credits from courses offered by other areas or majors and 4 credits from those offered within the area of specialization.)

\* DDP students may transfer up to eight credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [ SPECIAL CAUTION ]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	PhD-Course Project Research in Advanced Materials Science and Technology I	4	
		PhD-Course Project Research in Advanced Materials Science and Technology II	4	Transfer
		PhD-Course Project Research in Advanced Materials Science and Technology III	4	Transfer
		PhD-Course Work for Applied Chemistry and Chemical Engineering	2	
		Presentaion of Research Progress Report	1	
	Elective Course	Courses offered within the area of specialization	≥ 4	*
Total		At least 19 credits (including 8 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 23 credits required		

\* Students are recommended taking two elective courses (4 credits) offered within the area of specialization.

## Advanced Mechanical Science and Engineering

### 1. Expected Outcomes through the Study of this Program

#### Students will

(A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.

(B) become proficient in identifying, analyzing, and solving problems.

(B-1) acquire an ability to evaluate and analyze machinery and equipment; and to understand and use highly functional, miniaturized technology as well as the medical applications of nano-technology and nanobiology.

(B-2) gain the ability to understand the integrated dynamic-characteristic analysis, and the safety and stability evaluation technologies of the mechanical and structural systems that constitute production systems; and learn to apply that knowledge to designing such systems.

(B-3) gain the ability to understand and apply: materials-related plasticity control, microstructure control and microprocessing technologies; the designing of micromechanical parts; the scientific control of material surfaces and interfaces; and manufacturing technologies that have little impact on the environment.

(C) demonstrate outstanding general academic communication skills; deliver persuasive presentations at international academic conferences; and utilize effective writing skills in academic journals.

### 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A)	PhD-Course Seminar in Advanced Materials Science and Technology I	Elective	2	At least 4 credits must be taken from courses offered within the area of specialization, and at least 4 credits should be earned from those offered by other areas or majors.
(B)	PhD-Course Seminar in Advanced Materials Science and Technology II	Elective	2	
	PhD-Course Seminar in Advanced Materials Science and Technology III	Elective	2	
	(Courses offered by other areas or majors)	Required elective	At least 4 credits	
(B-1)	Bionic Design and Materials	Elective	2	
	Transport Phenomena in Production	Elective	2	
	Complex Fluid Engineering	Elective	2	
(B-2)	Flow Visualization and Image Measurement	Elective	2	
	Intelligent Robotics	Elective	2	
	Applied Acoustics	Elective	2	
	Design System	Elective	2	
	Control Theory for Mechanical Systems	Elective	2	
(B-3)	Advanced KANSEI Microbotic Systems	Elective	2	
	Strength and Fracture of Materials	Elective	2	
	Intellectual Applications of Laser Scanning	Elective	2	
	X-ray Study of Mechanical Behavior of Materials	Elective	2	
	Advanced Micromachine Engineering	Elective	2	
	Materials Joining and Welding Technology	Elective	2	
(C)	Advanced Environmental Energy Engineering	Elective	2	15 credits
	Colloquia and Discussions for Technical Reading I	Elective	2	
	Colloquia and Discussions for Technical Reading II	Elective	2	
	Colloquia and Discussions for Technical Reading III	Elective	2	
	Seminar for Research Presentation	Elective	2	
	Internship for Doctoral Courses	Elective	1	
	PhD-Course Project Research in Advanced Materials Science and Technology I	Required	4	
	PhD-Course Project Research in Advanced Materials Science and Technology II	Required	4	
	PhD-Course Project Research in Advanced Materials Science and Technology III	Required	4	
	Course Work in Mechanical Science and Engineering	Required	2	
Primarily for DDP students (open to all)	Presentaion of Research Progress Report	Required	1	**
	Research Camp	Elective	2	
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	

Minimum 23 credits required. (At least 15 credits must be taken from required courses, and at least 8 credits should be earned from elective courses including 4 credits from courses offered by other areas or majors and 4 credits from those offered within the area of specialization.)

\* DDP students may transfer up to eight credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	PhD-Course Project Research in Advanced Materials Science and Technology I	4	
		PhD-Course Project Research in Advanced Materials Science and Technology II	4	Transfer
		PhD-Course Project Research in Advanced Materials Science and Technology III	4	Transfer
		Course Work in Mechanical Science and Engineering	2	
		Presentaion of Research Progress Report	1	
	Elective Course	Courses offered within the area of specialization	≥ 4	*
Total		At least 19 credits (including 8 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 23 credits required		

\* Students are recommended taking two elective courses (4 credits) offered within the area of specialization.

### (3) Electrical and Information Engineering Major

#### Information Engineering

#### 1. Expected Outcomes through the Study of this Program

##### Students will

(A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.

(B) acquire the ability to understand and apply basic theories and technologies from the following fields:

(B-1) the fields of telecommunication networks and wave information engineering, which contribute to the growth of societies with access to advanced information and ubiquitous networks:

(B-2) cutting-edge IT technology fields in the following areas: software engineering, artificial intelligence, electronics for assistive technology, geographic information systems, and so on:

(B-3) analysis, algebraic, and other information and computing fields necessary for understanding the behaviors of systems in the natural world and the man-made world.

(C) become proficient in identifying, analyzing, and solving problems; demonstrate outstanding general academic communication skills; deliver persuasive presentations at international and other academic conferences; become proficient in the time management skills required for managing academic projects, from the beginning to the submission of the final report, according to specified deadlines; and utilize effective writing skills in academic journals.

#### 2. List of Courses, Categorized by the Intended Educational Outcomes

2. List of Courses, Categorized by the Intended Educational Outcomes				
Category	Course	Elective/ Required	Credits	Requirement
(A)	Exercises in Information Engineering	Required	2	At least 6 credits
	Special Lectures on Electrical and Information Engineering	Elective	1	
	(Courses offered by other areas or majors)	Required	4	
(C)	Internal and External Presentation	Elective	2	At least 1 credit
	Interim Report	Required	1	
(B)	Project Research in Electrical and Information Engineering I	Required	4	At least 12 credits
	Project Research in Electrical and Information Engineering II	Required	4	
	Project Research in Electrical and Information Engineering III	Required	4	
	Seminar in Electrical and Information Engineering I	Elective	2	
	Seminar in Electrical and Information Engineering II	Elective	2	
	Seminar in Electrical and Information Engineering III	Elective	2	
	Literature Reading I	Elective	2	
	Literature Reading II	Elective	2	
	Literature Reading III	Elective	2	
(B-1)	Advanced Mobile Communications	Elective	2	At least 4 credits
	Remote Sensing	Elective	2	
	Advanced Wireless Communication Systems	Elective	2	
	Advanced Course on Distributed and Cooperative Media	Elective	2	
	Spatial Signal Control Course	Elective	2	
(B-2)	Theory of Algorithms	Elective	2	
	Human Information Science	Elective	2	
	GIS and Measuring System	Elective	2	
	Advanced Genome Informatics	Elective	2	
	Advanced Topics in Models of Computation	Elective	2	
	Information Security and Intellient Infrastructur	Elective	2	
	Introduction to Data Science	Elective	2	
(B-3)	Algebraic Geometry and its Application	Elective	2	
	Mathematical Analysis	Elective	2	
	Functional Analytic Discrete Group Theory	Elective	2	
	Mathematical Systems and Control Theory	Elective	2	
	Applied Partial Differential Equation	Elective	2	
Primarily for DDP students (open to all)	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 23 credits required. (including 19 credits from required courses)				

\* DDP students may transfer up to eight credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Electrical and Information Engineering I	4	
		Project Research in Electrical and Information Engineering II	4	Transfer
		Project Research in Electrical and Information Engineering III	4	Transfer
		Exercises in Information Engineering	2	
		Interim Report	1	
	Elective Course	Courses offered within the area of specialization	$\geq 4$	*
Total		At least 19 credits (including 8 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	$\geq 4$	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 23 credits required		

\* Students are recommended taking two elective courses (4 credits) offered within the area of specialization.

## Electrical and Electronic Engineering

### 1. Expected Outcomes through the Study of this Program

#### Students will

(A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.

(B) develop the ability to understand and apply basic theories and technologies related to electrical and electronic engineering, the natural sciences, and information technologies.

(B-1) develop the ability to understand and apply fundamental technologies related to the fields of electrical energy and electronics.

(B-2) develop the ability to understand and apply fundamental technologies related to signal processing, communication systems, optical and measurement control, and applied optics.

(C) become proficient in identifying, analyzing, and solving problems; demonstrate outstanding general academic communication skills; deliver persuasive presentations at academic conferences; and become proficient in the time management skills required for managing academic projects, from the beginning to the submission of the final report, according to specified deadlines.

### 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A) (B)	Seminar in Electrical and Electronic Engineering Course I	Elective	2	At least 6 credits
	Seminar in Electrical and Electronic Engineering Course II	Elective	2	
	Seminar in Electrical and Electronic Engineering Course III	Elective	2	
	Exercises in Electrical and Electronic Engineering Course	Required	2	
	Literature Reading I	Elective	2	
	Literature Reading II	Elective	2	
	Literature Reading III	Elective	2	
	Special Lectures on Electrical and Information Engineering (Courses offered by other areas or majors)	Required	4	
(B-1)	Applied Superconducting Technology	Elective	2	At least 4 credits
	Plasma Processing Technology	Elective	2	
	Electromagnetic Energy Engineering	Elective	2	
	Energy Application Device	Elective	2	
	Device/Energy Systems	Elective	2	
	High Voltage Pulse Engineering	Elective	2	
	Superconducting Energy Systems	Elective	2	
	Advanced Lecture on Nano Photonics	Elective	2	
	Thin Films and Application	Elective	2	
(B-2)	Molecular Electronics	Elective	2	At least 13 credits
	Telecommunication Systems and Their Trends and Edges	Elective	2	
	Advanced Devices for Information Technologies	Elective	2	
	Laser Physics	Elective	2	
	Thin Film Optical Devices	Elective	2	
	Advanced Topics on Spread Spectrum Communications	Elective	2	
	Selected Topics in Digital Signal Processing	Elective	2	
(C)	Selected Topics in Multidimensional Signal Processing	Elective	2	
	Optical Nanometrology	Elective	2	
	Project Research in Electrical and Information Engineering I	Required	4	
	Project Research in Electrical and Information Engineering II	Required	4	
	Project Research in Electrical and Information Engineering III	Required	4	
Primarily for DDP students (open to all)	Internal and External Presentation	Elective	2	**
	Interim Report	Required	1	
	Research Camp	Elective	2	
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 23 credits required. (including 19 credits from required courses)				

\* DDP students may transfer up to eight credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.



**3. Example of Plan of Study with Transfer Credit****[ SPECIAL CAUTION ]**

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Electrical and Information Engineering I	4	
		Project Research in Electrical and Information Engineering II	4	Transfer
		Project Research in Electrical and Information Engineering III	4	Transfer
		Exercises in Electrical and Electronic Engineering Course	2	
		Interim Report	1	
	Elective Course	Courses offered within the area of specialization	$\geq 4$	*
Total		<b>At least 19 credits (including 8 transfer credits)</b>		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	$\geq 4$	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		<b>At least 4 credits</b>		
Grand Total		<b>Minimum 23 credits required</b>		

\* Students are recommended taking two elective courses (4 credits) offered within the area of specialization.

**1. Expected Outcomes through the Study of this Program****Students will**

(A) gain a broad perspective in fields related to the mechanism of disabilities, aging societies, the physically challenged, rehabilitation, independent living, self-determination, social inclusion, etc., and the assistive technologies related to these areas; acquire an awareness of their related social responsibilities.

(B) gain the ability to research and develop cutting-edge technology in one of the following engineering fields (information engineering, electronic engineering, mechanical engineering)

(B-1) the biomedical engineering field as it relates to biological instrument control, human interfaces, medical equipment, equipment necessary for overcoming and ameliorating disabilities, and so on:

(B-2) the support equipment engineering field as it relates to intelligent sensing, mechatronics and other device technologies and to systems that use measurement and control technology to support and expand the functionality of people:

(B-3) the lifestyle-support science field as it relates to the analysis and optimal control of living environments for purposes of supporting and promoting the independence and health of the elderly and the disabled, and to sports sciences, wellness theory, rehabilitation engineering, adaptation theory for support technology, and so on.

(C) become proficient in identifying, analyzing, and solving problems; demonstrate outstanding general academic communication skills; deliver persuasive presentations at international academic conferences; and utilize effective writing skills in academic journals.

**2. List of Courses, Categorized by the Intended Educational Outcomes**

2. List of Courses, Categorized by the Intended Educational Outcomes				
Category	Course	Elective/ Required	Credits	Requirement
(A) (C)	Project Research in Electrical and Information Engineering I	Required	4	At least 19 credits
	Project Research in Electrical and Information Engineering II	Required	4	
	Project Research in Electrical and Information Engineering III	Required	4	
	Internal and External Presentation	Elective	2	
	Interim Report	Required	1	
	Exercises in Human Science and Assistive Technology Course	Required	2	
	Seminar in Human Science and Assistive Technology Course I ***	Elective	2	
	Seminar in Human Science and Assistive Technology Course II ***	Elective	2	
	Seminar in Human Science and Assistive Technology Course III ***	Elective	2	
	Literature Reading I	Elective	2	
	Literature Reading II	Elective	2	
	Literature Reading III	Elective	2	
	(Courses offered by other areas or majors)	Required	At least 4 credits	
(A)	Internship for Doctoral Courses	Elective	1	At least 4 credits
	Special Lectures on Electrical and Information Engineering	Elective	1	
	Motor Functions of the Nervous System	Elective	2	
	Advanced Biomaterials	Elective	2	
	Wellness, Sports and Health	Elective	2	
(B-1)	Neuro Engineering	Elective	2	
	Introduction to Cybernetics	Elective	2	
	Biomedical Signal and Image Processing	Elective	2	
(B-2)	Bio-electromagnetics	Elective	2	
	Intelligent Mechatronics	Elective	2	
	Well-being Community Simulation	Elective	2	
	Advanced Assistive Device	Elective	2	
(B-3)	Advanced Sensing Devices	Elective	2	
	Bioengineering in Functional Activity	Elective	2	
	Life Support Science for Persons with Motion and Communication Disabilities	Elective	2	
	Assistive Technology for Visually Impaired and Blind People	Elective	2	
Primarily for DDP students (open to all)	Assistive Technology for Auditory Impairment	Elective	2	**
	Research Camp	Elective	2	
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 23 credits required. (including 19 credits from required courses)				

\* DDP students may transfer up to eight credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

\*\*\* Do not request to register Seminar in Electrical and Electronic Engineering Course I ~ III

## 3. Example of Plan of Study with Transfer Credit

## [ SPECIAL CAUTION ]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Electrical and Information Engineering I	4	
		Project Research in Electrical and Information Engineering II	4	Transfer
		Project Research in Electrical and Information Engineering III	4	Transfer
		Exercises in Human Science and Assistive Technology Course	2	
		Interim Report	1	
	Elective Course	Courses offered within the area of specialization	≥ 4	*
Total		At least 19 credits (including 8 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 23 credits required		

\* Students are recommended taking two elective courses (4 credits) offered within the area of specialization.

#### (4) Life and Food Sciences Major

##### Life Sciences

#### 1. Expected Outcomes through the Study of this Program

##### Students will

(A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.

(B) acquire basic knowledge and develop research skills about fundamental biology and related fields.

(B-1) acquire basic knowledge and develop research skills about immunity and the structure and function of biomolecules, supramolecules and organelles.

(B-2) acquire basic knowledge and develop research skills about regulatory mechanisms from the cellular to the individual level.

(C) develop the ability to identify, analyze, and solve issues; demonstrate outstanding academic communication skills; deliver persuasive presentations at academic conferences; and become proficient in the time management skills required for managing academic projects, from the beginning to the submission of the final report, according to specified deadlines.

#### 2. List of Courses, Categorized by the Intended Educational Outcomes

2. List of Courses, Categorized by the Intended Educational Outcomes				
Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required		At least 4 credits
(B)	Management of Food Industry	Elective	2	At least 5 credits from courses offered within the area of specialization
	Management Strategy and Marketing	Elective	1	
	Life Science Special Seminar II	Required	1	
(B-1)	Topics in Cell Recognition	Elective	2	
	Topics of Regulation of Cell Differentiation	Elective	2	
	Advanced Glycoscience	Elective	2	
	Advanced Protein and Nucleic acid Chemistry	Elective	2	
(B-2)	Advanced Lecture in Animal Embryology	Elective	2	
	Plant Function Control I	Elective	2	
	Plant Function Control II	Elective	2	
	Plant Function Control III	Elective	2	
	Integrative Adaptation Biology	Elective	2	
	Advanced Plant Molecular Genetics II	Elective	2	
	Advanced Lectures in Environmental Aquatic Biology	Elective	2	
(C)	Presentation Practice (Interim Presentation for Doctoral Thesis)	Required	1	At least 10 credits
	Practice in Research Presentation (Presentation in Scientific Meeting)	Required	1	
	Advanced Graduate Study in Life and Food Science I	Required	4	
	Advanced Graduate Study in Life and Food Science II	Elective	4	
	Advanced Graduate Study in Life and Food Science III	Elective	4	
	Advanced Seminar in Life and Food Science I	Required	2	
	Advanced Seminar in Life and Food Science II	Elective	2	
	Advanced Seminar in Life and Food Science III	Elective	2	
	Seminar in Current Topics I	Required	2	
	Seminar in Current Topics II	Elective	2	
	Seminar in Current Topics III	Elective	2	
Primarily for DDP students (open to all)	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 19 credits required. ( including 15 credits from required courses)				

\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Advanced Graduate Study in Life and Food Science I	4	DDP students may transfer up to six credits from equivalent courses taken at their home institution.
		Advanced Seminar in Life and Food Science I	2	
		Seminar in Current Topics I	2	
		Life Science Special Seminar II	1	
		Presentation Practice (Interim Presentation for Doctoral Thesis)	1	
		Practice in Research Presentation (Presentation in Scientific Meeting)	1	
	Elective Course	Courses offered within the area of specialization	≥ 4	
Total		At least 15 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		

# 1. Expected Outcomes through the Study of this Program

## Students will

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) become proficient in identifying, analyzing, and solving problems based on the fundamental theories and technologies in this field.
- (B-1) increase their ability to identify, analyze, and solve issues in order to make the advancement in the use of plant functions: improvement of breeding, discovery of plant physiology; and development of fertilization design and fertilizer-applying technologies by utilizing applicable theories and technologies related to genomic functions, control, metabolic adjustment of plants, and to the control of organelle formation.
- (B-2) become capable in identifying, analyzing, and solving issues in order to improve and upgrade the functions of microorganisms, and uncover the functions of enzymes by applying theories and technologies related to the genomic information, function control, and material production of microorganisms.
- (B-3) acquire the knowledge and skills to identify, analyze, and solve issues in order to develop new food products and new food production technologies and to reveal how foods affect bodily processes by applying theories and technologies related to manufacturing, processing, ingredient analysis, and quality evaluation of food products to nutrient and metabolic control and regulation of biological and cellular functions.
- (B-4) be equipped with the ability to identify, analyze, and solve issues in order to ensure preservation of the biological production, restoration, and sustainability of the global environment by applying theories and technologies related to the useful functions of soil microorganisms, to the reciprocal relationships between microorganisms and plants, and to the advanced development and use of wood resources.
- (C) demonstrate outstanding general academic communication skills, deliver persuasive presentations at international academic conferences, and utilize effective writing skills in academic journals.

## 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required	2	At least 2 credits
(B)	Topics in Applied Life and Food Sciences	Elective	2	At least 4 credits
	Bioinformatics	Elective	2	
	Management of Food Industry	Elective	2	
	Management Strategy and Marketing	Elective	1	
	Topics in Epigenetics	Elective	2	
	Topics in Plant Metabolic Control	Elective	2	
	Environmental Plant Physiology	Elective	2	
	Topics in Plant Genome Function	Elective	2	
	Topics in Plant Bio-control	Elective	2	
	Topics in Molecular Life Science for Plants	Elective	1	
	Topics in Environmental Responses of Plants II	Elective	2	
	Microbial Chemistry	Elective	2	
	Topic in Molecular Microbiology (Intensive	Elective	2	
	Topics in Molecular Microbiology	Elective	2	
	Topics in Molecular Life Science for Microorganisms	Elective	1	
	Regulation of Meat Properties	Elective	2	
	Topics in Animal Protein Function	Elective	2	
	Topic in Food Sciences	Elective	2	
	Property of Food Materials	Elective	2	
	Advanced Biofunctional Chemistry of Food	Elective	2	
	Topics in Food and Nutrition Science	Elective	1	
	Glycoscience Studies	Elective	2	
	Advanced in Food Technology	Elective	2	
(B-3)	Topics in Environmental Soil Science	Elective	2	
	Applied Chemistry of Wood Components	Elective	2	
	Advanced Science on the Utilization of Natural-resources	Elective	1	
(B) (C)	Advanced Graduate Study in Life and Food Science I	Required	4	At least 9 credits
	Advanced Graduate Study in Life and Food Science II	Required	4	
	Advanced Graduate Study in Life and Food Science III	Elective	4	
	Advanced Seminar in Life and Food Science I	Elective	2	
	Advanced Seminar in Life and Food Science II	Elective	2	
	Advanced Seminar in Life and Food Science III	Elective	2	
	Seminar in Current Topics I	Elective	2	
	Seminar in Current Topics II	Elective	2	
(C)	Seminar in Current Topics III	Elective	2	
	Presentation Practice	Required	1	
Primarily for DDP students (open to all)	Exercise in Applied Life and Food Sciences	Elective	1	
	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	***
	Topics in High Pressure Food Science	Elective	2	

Minimum 19 credits required. (At least 17 credits must be taken from courses offered within the area of specialization including required courses, and at least 2 credits should be earned from those offered by other areas or majors.)

\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

\*\*\* These credits shall be counted as courses taken within the area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [SPECIAL CAUTION]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major program	Required Course	Advanced Graduate Study in Life and Food Science I	4	
		Advanced Graduate Study in Life and Food Science II	4	Transfer
		Presentation Practice (Interim Presentation for Graduation Thesis)	1	
	Elective Course	Transfer credit	2	Transfer
		Courses offered within the area of specialization	≧ 6	
Total		At least 17 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≧ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 2 credits		
Grand Total		Minimum 19 credits required		

# 1. Expected Outcomes through the Study of this Program

## Students will

(A) increase their ability to fundamentally understand the life phenomena related to biological resources; effectively develop new technologies, and proactively and flexibly apply their knowledge to improving regional industries and environments; and develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.

(B) gain the ability to understand and apply the basic theories and technologies of this field.

(B-1) gain the ability to understand and apply theories related to managing regional agriculture, and to developing international agricultural resources, that will contribute to the expansion of sustainable agriculture and the promotion of industries related to agriculture.

(B-2) gain the ability to understand and apply the sciences of heredity/breeding and plant pathology, including agronomy, plant physiology, plant ecology and plant propagation related to food products, horticultural products, and other cultivated plants and resource plants.

(B-3) gain the ability to understand and apply theories, related to the safe and efficient insease of animal protein production by using the reproductive, developmental, and nutritional characteristics of resource animals and their genetic diversity.

(C) become proficient in identifying, analyzing, and solving problems; demonstrate outstanding general academic communication skills; deliver persuasive presentations at academic conferences; and become proficient in the time management skills required for managing academic projects, from the beginning to the submission of the final report, according to specified deadlines.

# 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required		At least 4 credits
	Seminar on Agriculture and Bioresources I	Required	1	At least 1 credits
	Seminar on Agriculture and Bioresources II	Elective	1	
	Special Lecture on Agriculture and Bioresources	Elective	1	
(B)	Management of Food Industry	Elective	2	At least 6 credits from courses offered within the area of specialization
	Management Strategy and Marketing	Elective	1	
(B-1)	International Agricultural Development	Elective	2	
	Analysis of Agricultural Productivity	Elective	2	
	Rural Food Industry	Elective	2	
(B-2)	Plant Development Regulation	Elective	2	
	Utilization of Crop Resource	Elective	2	
	Plant Cell Breeding	Elective	2	
	Genome Analysis	Elective	2	
	Special Lecture of Farming System	Elective	2	
	Comparative Virology	Elective	2	
	Advanced Agro-resources Science	Elective	2	
(B-3)	Crop Genomics	Elective	2	
	Grassland Vegetation, its Management and Utilization	Elective	2	
	Physiological Regulation of Animal Production	Elective	2	
	Genetic Analysis in Animals	Elective	2	
	Animal Histochemistry and Cytochemistry	Elective	2	
(C)	Animal Germ Cell Regulation	Elective	2	At least 8 credits from required courses
	Advanced Graduate Study in Life and Food Science I	Required	4	
	Advanced Graduate Study in Life and Food Science II	Elective	4	
	Advanced Graduate Study in Life and Food Science III	Elective	4	
	Advanced Seminar in Life and Food Science I	Required	2	
	Advanced Seminar in Life and Food Science II	Elective	2	
	Advanced Seminar in Life and Food Science III	Elective	2	
	Seminar in Current Topics I	Required	2	
Primarily for DDP students (open to all)	Seminar in Current Topics II	Elective	2	**
	Seminar in Current Topics III	Elective	2	
	Research Camp	Elective	2	
	Global Meeting	Elective	2	
	Research Internship	Elective	2	***
	Joint Lecture	Elective	2	
	Nutritional Regulation of Protein (Amino Acids) Metabolism in Monogastric Animals	Elective	2	

Minimum 19 credits required. (At least 15 credits must be taken from courses offered within the area of specialization including required course, and at least 4 credits should be earned from those offered by other areas or majors.)

\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

\*\*\* These credits shall be counted as courses taken within the area of specialization.(B-3)



## 3. Example of Plan of Study with Transfer Credit

## [ SPECIAL CAUTION ]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major program	Required Course	Advanced Graduate Study in Life and Food Science I	4	DDP students may transfer up to six credits from equivalent courses taken at their home institution.
		Advanced Seminar in Life and Food Science I	2	
		Seminar in Current Topics I	2	
		Seminar on Agriculture and Bioresources I	1	
	Elective Course	Courses offered within the area of specialization	≥ 6	
Total		At least 15 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		

**(5) Environmental Science and Technology Major****Natural Environmental Science****1. Expected Outcomes through the Study of this Program****Students will**

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) become proficient in identifying, analyzing, and solving problems.
- (C) demonstrate outstanding general academic communication skills.
- (D) deliver persuasive presentations at international and other academic conferences.
- (E) utilize effective writing skills in academic journals.

**2. List of Courses, Categorized by the Intended Educational Outcomes**

Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required elective	At least 4 credits	At least 4 credits
	Special Lecture on Environmental Science and Technology	Elective	1	
	Lecture on the Global Warming from Regional Aspects D	Elective	2	
(B)	Environmental Physics I	Elective	2	At least 10 credits (including 4 credits from Project Research )
	Environmental Physics II	Elective	2	
	Advanced Chemistry of the Environment I	Elective	2	
	Advanced Chemistry of the Environment II	Elective	2	
	Advanced Chemistry of the Environment III	Elective	2	
	Advanced Chemistry of the Environment IV	Elective	2	
	Advanced Chemistry of the Environment V	Elective	2	
	Advanced Course in Geophysics I	Elective	2	
	Advanced Course in Geophysics II	Elective	2	
	Special Lecture of Earth Surface Environment I	Elective	2	
	Special Lecture of Earth Surface Environment II	Elective	2	
	Biological Structure and Function	Elective	2	
	Biological Diversity I	Elective	2	
	Biological Diversity II	Elective	2	
	Biological Diversity III	Elective	2	
	Conservation Biology I	Elective	2	
	Conservation Biology III	Elective	2	
	Project Research in Environmental Science and Technology	Required	4	
	Advanced Impact Assessment of Air Pollution	Elective	2	
	Advanced Atmospheric Pollutant Sciences	Elective	2	
(C) (D) (E)	Seminar in Environmental Science and Technology I	Required	1	At least 1 credit
	Project Research Exercise on Abroad	Elective	1	
	ISI Journal Submission Exercise	Elective	1	
Primarily for DDP students (open to all)	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
	Introduction to Structure Analysis	Elective	2	***
Minimum 19 credits required. (At least 10 credits must be taken from required elective courses, and 5 credits from required courses.)				

\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

\*\*\* These credits shall be counted as courses taken within the area of specialization.(B)

## 3. Example of Plan of Study with Transfer Credit

## [ SPECIAL CAUTION ]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Environmental Science and Technology	4	
		Seminar in Environmental Science and Technology I	1	
	Elective Course	Transfer credit	6	Transfer
		Courses offered within the area of specialization	≥ 4	
Total		At least 11 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		

## Environmental Science for Agriculture and Forestry

### 1. Expected Outcomes through the Study of this Program

#### Students will

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) become proficient in identifying, analyzing, and solving problems.
- (C) demonstrate outstanding general academic communication skills.
- (D) deliver persuasive presentations at international and other academic conferences.
- (E) utilize effective writing skills in academic journals.

### 2. List of Courses, Categorized by the Intended Educational Outcomes

2. List of Courses, Categorized by the Intended Educational Outcomes				
Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required elective	At least 4 credits	At least 4 credits
	Internship for Doctoral Courses	Elective	1	
	Special Lecture on Environmental Science and Technology	Elective	1	
	Lecture on the Global Warming from Regional Aspects D	Elective	2	
(B)	Forest Ecosystem Management I	Elective	2	At least 10 credits (including 4 credits from Project Research )
	Forest Ecosystem Management II	Elective	2	
	Forest Ecosystem Management III	Elective	2	
	Environmental Biophysics	Elective	2	
	Forest Geoinfomatics	Elective	2	
	Design and Management of Agricultural Land and Rural Community I	Elective	2	
	Design of Hydraulic Structures	Elective	2	
	Systems Engineering for Agricultural Production	Elective	2	
	Topics in Agroinformatics	Elective	2	
	Applied Snow Hydrology	Elective	2	
	Advanced Agricultural Water Management	Elective	2	
	Ecosystem Function	Elective	2	
	Advanced Impact Assessment of Air Pollution	Elective	2	
	Advanced Atmospheric Pollutant Sciences	Elective	2	
	Agricultural Environmental Systems	Elective	2	
	Advanced Ecological Genetics I	Elective	2	
	Advanced Ecological Genetics II	Elective	2	
	Island Biogeography	Elective	2	
Project Research in Environmental Science and Technology	Required	4		
(C) (D) (E)	Seminar in Environmental Science and Technology II	Required	1	At least 1 credit
	Project Research Exercise on Abroad	Elective	1	
	ISI Journal Submission Exercise	Elective	1	
Primarily for DDP students (open to all)	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
	Vegetation Dynamics	Elective	2	***
	Advanced Agricultural Machinery and Post Harvest Technology	Elective	2	
Minimum 19 credits required. (At least 10 credits must be taken from required elective courses, and 5 credits from required courses.)				

\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

\*\*\* These credits shall be counted as courses taken within the area of specialization. (B)

## 3. Example of Plan of Study with Transfer Credit

## [ SPECIAL CAUTION ]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Environmental Science and Technology	4	
		Seminar in Environmental Science and Technology II	1	
	Elective Course	Transfer credit	6	Transfer
		Courses offered within the area of specialization	≥ 4	
Total		At least 11 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		

## Architecture and Civil Engineering (Civil Engineering Concentration)

### 1. Expected Outcomes through the Study of this Program

#### Students will

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) become proficient in identifying, analyzing, and solving problems.
- (C) demonstrate outstanding general academic communication skills.
- (D) deliver persuasive presentations at international and other academic conferences.
- (E) utilize effective writing skills in academic journals.

### 2. List of Courses, Categorized by the Intended Educational Outcomes

Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required elective	At least 4 credits	At least 4 credits
	Special Lecture on Environmental Science and Technology	Elective	1	
	Lecture on the Global Warming from Regional Aspects D	Elective	2	
(B)	Structural Systems I	Elective	2	At least 10 credits (including 4 credits from Project Research )
	Structural Systems II	Elective	2	
	Structural Systems III	Elective	2	
	Structural Mechanics and Computational Methods I	Elective	2	
	Structural Mechanics and Computational Methods II	Elective	2	
	Geotechnical Disaster Management	Elective	2	
	Risk Management of Urban Water Quality	Elective	2	
	Nearshore Dynamics and Disaster Mitigation	Elective	2	
	Materials for Construction and Environmental	Elective	2	
	Numerical Modeling for Civil and Environmental Engineering	Elective	2	
(C) (D) (E)	Project Research in Environmental Science and Technology	Required	4	At least 1 credit
	Seminar in Environmental Science and Technology III	Required	1	
	Project Research Exercise on Abroad	Elective	1	
	ISI Journal Submission Exercise	Elective	1	
Primarily for DDP students (open to all)	Research Camp	Elective	2	***
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 19 credits required. (At least 10 credits must be taken from required elective courses, and 5 credits from required courses.)				

\* "Courses offered by other areas or majors" includes those offered by Architecture concentration

\*\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

**3. Example of Plan of Study with Transfer Credit****[ SPECIAL CAUTION ]**

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Environmental Science and Technology	4	
		Seminar in Environmental Science and Technology III	1	
	Elective Course	Transfer credit	6	Transfer
		Courses offered within the area of specialization	≥ 4	
Total		At least 11 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		

## Architecture and Civil Engineering (Architecture Concentration)

### 1. Expected Outcomes through the Study of this Program

#### Students will

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) become proficient in identifying, analyzing, and solving problems.
- (C) demonstrate outstanding general academic communication skills.
- (D) deliver persuasive presentations at international and other academic conferences.
- (E) utilize effective writing skills in academic journals.

### 2. List of Courses, Categorized by the Intended Educational Outcomes

2. List of Courses, Categorized by the Intended Educational Outcomes				
Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required elective	At least 4 credits	At least 4 credits
	Special Lecture on Environmental Science and Technology	Elective	1	
	Lecture on the Global Warming from Regional Aspects D	Elective	2	
(B)	Structural Systems I	Elective	2	At least 10 credits (including 4 credits from Project Research )
	Structural Systems II	Elective	2	
	Structural Systems III	Elective	2	
	Structural Mechanics and Computational Methods I	Elective	2	
	Structural Mechanics and Computational Methods II	Elective	2	
	Geotechnical Disaster Management	Elective	2	
	Space Design I	Elective	2	
	Design Theories for Dwelling Space II	Elective	2	
	Control of Architectural and Urban Environment I	Elective	2	
	Control of Architectural and Urban Environment II	Elective	2	
	Landscape Planning Theory	Elective	2	
	Project Research in Environmental Science and Technology	Required	4	
(C) (D) (E)	Seminar in Environmental Science and Technology III	Required	1	At least 1 credit
	Project Research Exercise on Abroad	Elective	1	
	ISI Journal Submission Exercise	Elective	1	
Primarily for DDP students (open to all)	Research Camp	Elective	2	***
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 19 credits required. (At least 10 credits must be taken from required elective courses, and 5 credits from required courses.)				

\* "Courses offered by other areas or majors" includes those offered by Civil Engineering concentration

\*\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.



**3. Example of Plan of Study with Transfer Credit****[ SPECIAL CAUTION ]**

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Environmental Science and Technology	4	
		Seminar in Environmental Science and Technology III	1	
	Elective Course	Transfer credit	6	Transfer
		Courses offered within the area of specialization	≥ 4	
Total		At least 11 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		

**1. Expected Outcomes through the Study of this Program****Students will**

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their  
 (B) understand advanced theories and technologies and their applications.  
 (B-1) elucidate the formative processes of igneous and metamorphic rocks using petrology, isotope geochemistry, and  
 (B-2) elucidate the properties of the upper mantle and crust as well as their genesis, changes, and interrelationship.  
 (B-3) elucidate the global environmental changes at various time scales.  
 (C) become proficient in identifying, analyzing, and solving problems.  
 (D) develop general academic communication skills.  
 (D) deliver persuasive presentations at international and other academic conferences.  
 (F) develop effective writing skills for international academic journals.

**2. List of Courses, Categorized by the Intended Educational Outcomes**

Category	Course	Elective/ Required	Credits	Requirement
(A)	General Natural Sciences I • II • III • IV (Choose one of them)	Elective	1	*
(B-1)	Lithospheric Dynamics	Elective	2	At least 2 credits
	Advanced Mineral Science	Elective	2	
	Isotope Geology	Elective	2	
	Arc Volcanology	Elective	2	
(B-2)	Deformation of Lithosphere	Elective	2	
	Theory of Deep Materials in the Earth	Elective	2	
	Fault Material Science	Elective	2	
(B-3)	Paleobiogeography	Elective	2	
	Sedimentology of Clastic Materials	Elective	2	
	Geosphere Environment	Elective	2	
	Corevolution of Earth and Life	Elective	2	
(A) (C) (D) (E) (F)	Microfossil Biostratigraphy	Elective	2	
	(Courses offered by other areas or majors)	Required	4	At least 18 credits ***
	Presentation of Research Progress Report D	Required	1	
	Presentation Exercise D	Required elective	1	
	Seminar in Earth Science D	***1	1	
	Academic Writing Exercise D	Required elective	4	
	Project Research in Earth Science Dc	***2	4	
	Geological Engineering Exercise D	Elective	2	
	Science Communication Exercise D	Elective	2	
	Project Research in Earth Science Da	Required	4	
	Project Research in Earth Science Db	Required	4	
Primarily for DDP students (open to all)	Research Camp	Elective	2	****
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
	Paleobiology	Elective	2	*****

Minimum 19 credits required.

\* General Natural Sciences is recommended if this course was not taken previously within the master's program.

\*\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\*\* 1. Required to take either "Presentation Exercise D" or "Seminar in Earth Science D".

2. Required to take either "Academic Writing Exercise D" or "Project Research in Earth Science Dc".

3. Required to earn more than 4 credits from other major courses.

\*\*\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

\*\*\*\*\* These credits shall be counted as courses taken within the area of specialization.(B-3)

### 3 . Example of Plan of Study with Transfer Credit

#### [ SPECIAL CAUTION ]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Earth Science Da	4	Transfer
		Project Research in Earth Science Db	4	
		Presentation of Research Progress Report D	1	
		either "Project Research in Earth Science Dc" or "Academic Writing Exercise D"	4	
	either "Seminar in Earth Science D" or "Presentation Exercise D"	1		
	Elective Course	Courses offered within the area of specialization	≥ 1	
Total		At least 15 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		

## Natural Disaster and Environmental Science

### 1. Expected Outcomes through the Study of this Program

#### Students will

- (A) develop the ability to view nature, society and humankind from a broad perspective and to be aware of their responsibility to them.
- (B) become proficient in identifying, analyzing, and solving problems.
- (C) demonstrate outstanding general academic communication skills.
- (D) deliver persuasive presentations at international and other academic conferences.
- (E) utilize effective writing skills in academic journals.

### 2. List of Courses, Categorized by the Intended Educational Outcomes

2. List of Courses, Categorized by the Intended Educational Outcomes				
Category	Course	Elective/ Required	Credits	Requirement
(A)	(Courses offered by other areas or majors)	Required elective	At least 4 credits	At least 4 credits
	Special Lecture on Environmental Science and Technology	Elective	1	
	Lecture on the Global Warming from Regional Aspects D	Elective	2	
	Advanced Impact Assessment of Air Pollution	Elective	2	
	Advanced Atmospheric Pollutant Sciences	Elective	2	
	Internship for Doctoral Courses	Elective	1	
(B)	Topics in Snow and Ice Disasters	Required elective	2	At least 10 credits (including 4 credits from Project Research )
	Active Geological Processes	Required elective	2	
	Disasters by Slope Movements	Required elective	2	
	Hazards by Slope Movement II	Required elective	2	
	Advanced Topics in Volcano-hydrologic Hazards	Required elective	2	
	Numerical Hydrodynamics	Required elective	2	
	Project Research in Environmental Science and Technology	Required	4	
(C) (D) (E)	Seminar in Environmental Science and Technology I	Required	1	At least 1 credit
	Project Research Exercise on Abroad	Elective	1	
	ISI Journal Submission Exercise	Elective	1	
Primarily for DDP students (open to all)	Research Camp	Elective	2	**
	Global Meeting	Elective	2	
	Research Internship	Elective	2	
	Joint Lecture	Elective	2	
Minimum 19 credits required. (At least 10 credits must be taken from required elective courses, and 5 credits from required courses.)				

\* DDP students may transfer up to six credits from equivalent courses taken at their home institution.

\*\* These courses are offered as general subjects within the doctoral program. These credits shall be counted as courses taken outside the major or area of specialization.

## 3. Example of Plan of Study with Transfer Credit

## [ SPECIAL CAUTION ]

This table represents an example only. Since credits available for transfer are required to be approved by the Graduate School of Science and Technology on a case-by-case basis, students are strongly encouraged to confer with their advisors regarding this matter after admission.

Category		Course	Credits	Note
Major Program	Required Course	Project Research in Environmental Science and Technology	4	
		Seminar in Environmental Science and Technology I	1	
	Elective Course	Transfer credit	6	Transfer
		Courses offered within the area of specialization	≥ 4	
Total		At least 11 credits (including 6 transfer credits)		
Courses primarily for DDP students (which shall be counted as courses taken outside the major or area of specialization.)		Research Camp	≥ 4	DDP students are recommended taking two of these courses (4 credits).
		Global Meeting		
		Research Internship		
		Joint Lecture		
Other programs	Elective Course	Courses offered by other areas or majors		
Total		At least 4 credits		
Grand Total		Minimum 19 credits required		