

For students enrolled in FY 2024

Graduate School of Frontier Science Initiative

Kanazawa University

Division of Nano Life Science

(Master's / Doctoral Program)

Guidebook

The English texts are for complementary use only.
English expressions do not change the Japanese content.



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新学術創成研究科

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IV [Master's Program] Course Outline

I List of Subjects

Category	Subject Name	Year	Credit(s)		Completion Requirements		
			Compulsory	Elective			
Core Subjects	Laboratory Rotation I	1	0.5		- At least four credits, including compulsory subjects, must be earned from Core Subjects. - At least one credit must be earned from ※1 Subjects. - At least one credit must be earned from ※2 Subjects.		
	Laboratory Rotation II	1	0.5				
	Research Ethics	1	1				
	Data Science in Society 5.0 ※1	1		1			
	Advanced Science and Technology in the Next Generation ※1	1		1			
	Smart Science and Technology for Innovation ※1	1		1			
	Innovation Methodology ※1	1		1			
	Mathematical, Data Science, and AI Basic ※1	1		1			
	Strategy for Business and Technology Management ※2	1		1			
	MoT as for Disruptive Innovation ※2	1		1			
	Innovation in Healthcare ※2	1		1			
	Human and Social Challenges ※2	1		1			
Foundation Subjects in Nano Life Science	Basic Subjects	Basic Nano Life Sciences	1	1		At least six credits from Foundation Subjects in Nano Life Science (Specialized Subjects), including two or more credits from nanometrology subjects, must be earned. At least one credit, including compulsory subjects, must be earned from Skill Subjects.	
		Fundamentals of Nanoscale Measurement Technology	1	1			
		Basic Supramolecular Chemistry	1	1			
		Basic Life Sciences	1	1			
		Basic Computational Science	1	1			
	Specialized Subjects	Nanometrology	Fundamentals of Nanoscale Measurements and Control A	1-2			1
			Fundamentals of Nanoscale Measurements and Control B	1-2			1
			Nano Molecular physics A	1-2			1
			Nano Molecular physics B	1-2			1
		Supramolecular Chemistry	Material Creation Chemistry	1-2			1
			Synthesis of Metal Complexes	1-2			2
			Synthetic Chemistry of Polymeric Materials	1-2			2
		Life Science	Human Molecular biology 1	1-2			1
			Human Molecular biology 2	1-2			1
			Human Molecular biology 3	1-2			1
			Human Molecular biology 4	1-2			1
		Computational Science	Computational Chemistry and Bioscience A	1-2			1
			Computational Chemistry and Bioscience B	1-2			1
		Skill Subjects	Research Skill Training	1-2	1		
			Writing Skill Training	1-2			1
Research Projects Subjects	Project Training of Transdisciplinary Research [25701]	1~2	4				
	Project Training of Transdisciplinary Research [25702]	1~2	1				
	Internship	1~2		1			
	Off-campus Research	1~2		2			
Research Support Subjects	Creative Interdisciplinary Exercises I	1~2	1				
	Creative Interdisciplinary Exercises II	1~2	1				
	Creative Interdisciplinary Exercises III	1~2		1			
	Master Thesis Report	1~2		6			
	Research Planning for Ph.D Program	1~2		2			

Students who choose to compile their research in a master's thesis must earn at least 30 credits, and students who choose QE must earn at least 32 credits.

2 Semesters and Class Time

The semesters, class schedules and class time are as below.

Classes will be 90 minutes, once a week. However, please be aware that there are some exceptions that are held twice a week or by semester. 1-credit quarter subjects will be concluded in eight weeks.

Semester		Class time
First semester	First quarter (eight weeks)	First Period 08:45 - 10:15
	Second quarter (eight weeks)	Second Period 10:30 - 12:00
Second semester	Third quarter (eight weeks)	Third Period 13:00 - 14:30
	Fourth quarter (eight weeks)	Fourth Period 14:45 - 16:15
		Fifth Period 16:30 - 18:00
		Sixth Period 18:15 - 19:45

3 Class Subject Structure and Categories; Credit Requirements

3.1 Core Subjects

Core Subjects are assigned in the first year to cultivate students' willingness to challenge unexplored areas as a researcher and widen their perspectives regarding science. Research Ethics (one credit), "Laboratory Rotation I" and "Laboratory Rotation II" (0.5 credit each) are offered as compulsory subjects. "Research Ethics" deals with the ethics and moral awareness demanded of those engaged in research along with the social responsibility of science. "Laboratory Rotation" exposes students directly to research that is very different from their own research and broadens their perspectives. Also, nine subjects (one credit each) are offered as elective ones.

Credit requirements for Core Subjects

- Take "Research Ethics".
- Take "Laboratory Rotation I" and "Laboratory Rotation II". "Laboratory Rotation I" will be conducted in a laboratory of a division other than your own (Category I), and "Laboratory Rotation II" will be conducted in a different laboratory within your division (Category II).
- Earn at least one credit from the below subjects
 - Data Science in Society 5.0
 - Advanced Science and Technology in the Next Generation
 - Smart Science and Technology for Innovation
 - Innovation Methodology
 - Mathematical, Data Science, and AI Basic
- Earn at least one credit from the below subjects
 - Strategy for Business and Technology Management
 - MoT as for Disruptive Innovation
 - Innovation in Healthcare
 - Human and Social Challenges

3.2 Foundation Subjects in Nano Life Science (Basic Subjects)

Foundation Subjects in Nano Life Science divide the knowledge required for research into nano life science areas focusing on transdisciplinary studies into two levels, Basic Subjects and Specialized Subjects.

Basic Subjects are distributed as five compulsory subjects in the first year.

Two subjects are offered to learn the basics of nanometrology. Specifically, in “Basic Nano Life Sciences”, students learn the basics of Bio-SPM—the technology that forms the basis of nano life science. Here, students will be introduced to the basic principles of KU’s renowned Bio-SPM and other bioimaging technologies and will acquire fundamental knowledge of nano life science based on nanoscale Bio-SPM technology. In this subject, we will also cultivate students’ willingness for research on nano life science research by touching upon the development process of Bio-SPM. In “Fundamentals of Nanoscale Measurement Technology”, students learn fundamentals such as measurement in general and electrical measurements. Students will also learn the basic principles of nanometrology and application examples other than its biological application. In addition, in “Basic Supramolecular Chemistry”, students will acquire the fundamental knowledge of supramolecular chemistry, including chemical biology and NMR; in “Basic Life Sciences”, students will acquire the fundamental knowledge of life science, including cancer research; in “Basic Computational Science”, students will learn basic mathematical methods such as reasoning, simulation, and machine learning.

Credit Requirements for Foundation Subjects in Nano Life Science (Basic Subjects)

- To earn all five credits from Basic Nano Life Sciences, Fundamentals of Nanoscale Measurement Technology, Basic Supramolecular Chemistry, Basic Life Sciences, and Basic Computational Science.

3.3 Foundation Subjects in Nano Life Science (Specialized Subjects)

Based on what was learned in Basic Subjects, students will learn more specialized content from four fields in Specialized Subjects. In the master’s level section of the integrated course, we consider it important for students to be allowed to choose the knowledge required to develop the “ability to implement comprehensive research based on their inquisitiveness, curiosity, and interests.” However, it is important to take subjects systematically, without focusing disproportionately on your specialization. For this reason, we ensure that students can take an even balance of subjects by offering two to four subjects in each field. Further, it is mandatory for students to earn six credits, including two credits from the core field of nano life science, Nanometrology.

Credit Requirements for Foundation Subjects in Nano Life Science (Specialized Subjects)

- Earn at least six credits, including two or more credits from Nanometrology subjects.

3.4 Skill Subjects

For skill subjects where students can gain the fundamental skills needed to conduct research, “Research Skill Training” (one credit) is offered as a compulsory subject. Here students will gain skills for drawing up plans and giving presentations. In this subject, students will learn the following skills regarding the formulation of research plans: the skill to accurately perform experiments based on an understanding of the principles of experiments; the skill to perform accurate operations based on an understanding of the principles of apparatus used in experiments; the skill to understand the significance of experiment results; techniques to display experiment results using suitable statistical methods; methods of data gathering using databases and literature and their analytical methods; techniques for writing. The course will also deal with presentation techniques for giving presentations as a researcher at academic conferences and meetings. “Writing Skill Training” is also offered as an elective subject. In this subject, students gain a deep understanding of scientific papers, receive training on how to introduce research, and learn about expressions in Japanese and English required to write academic papers.

Credit requirements for Skill Subjects

- Earn at least one credit, including Research Skill Training.

3.5 Research Projects Subjects

In Research Projects Subjects, where students acquire a science-oriented mindset while communicating with others, “Project Training of Transdisciplinary Research” (four credits) and “Project Training of Transdisciplinary Research” (one credit) are offered as compulsory subjects. In “Project Training of Transdisciplinary Research”, students participate in the research of the Nano Life Science Institute. Students will cultivate the ability to conduct research, design research, and the willingness and ability to actively engage in unexplored interdisciplinary areas and emerging fields. Also, in, Project Training of Transdisciplinary Research, students will participate in transdisciplinary research projects. Through this, we aim to increase students’ willingness to conduct research and to acquire skills.

For “Internship”, credits will be approved for a two-week or longer internship authorized by the Graduate School. For “Off-Campus Research”, credits will be approved for a two-week or longer research training at a university other than KU or a research institution. In either case, students must inform the Graduate School Affairs Section one month before the start of their internship or training.

Credit requirements for Research Projects Subjects

- Earn at least five credits, including Project Training of Transdisciplinary Research and Project Training of Transdisciplinary Research.

3.6 Research Support Subjects

Students can choose either Master’s Thesis or Qualifying Examination as a way of compiling their master’s research. Research Support Subjects are offered in the first and second year to support students compile their research. In these subjects, students discover issues related to their research field and cultivate their ability to design research, presentation ability, and writing ability.

“Creative Interdisciplinary Exercises I” and “Creative Interdisciplinary Exercises II” (both one credits), where students receive guidance from secondary supervisors, are offered as compulsory subjects. In this Division, two secondary supervisors—including one supervisor from a different field—, are allocated, and students receive guidance from each. Also, “Master Thesis Report” (six credits) and “Research Planning for Ph.D. Program” (two credits) are offered as compulsory elective subjects (of which students choose one) to support students’ approach to the final compilation of their research. In “Master Thesis Report”, under the principal academic advisor’s supervision, students decide their research theme and compile their master’s thesis while incorporating new knowledge and research techniques acquired through attending seminars and exercises of different research fields held by secondary research supervisors. Students who go on to Doctoral Level Section of the Integrated Course and choose “Research Planning for Ph.D. Program” will seek to compile, submit, and present a doctoral thesis in the future. Therefore, they will learn to collect data and related articles along with learning techniques for surveys and experiments to acquire a higher level of knowledge and skills concerning their specialization and a basic grounding in related fields. Finally, they will compile a Research Planning for Ph.D. Program Report.

Credit Requirements for Research Support Subjects

*Satisfy the requirements for the chosen research compilation method.

- (1) Students who chose Master’s Thesis
 - Earn at least eight credits including, Master Thesis Report, Creative Interdisciplinary Exercises I, and Creative Interdisciplinary Exercises II.
- (2) Students who chose Qualifying Examination
 - Earn at least four credits, including Research Planning for Ph.D. Program, Creative Interdisciplinary Exercises I, and Creative Interdisciplinary Exercises II.

4 Conditions for Completion

Students must satisfy all of the below requirements for completion. Please note, after consulting with their supervisor, it is the students' responsibility to check whether they have satisfied the requirements.

- (1) Students must be enrolled in the master's level section of the integrated course for at least two years. However, for students with excellent marks, enrollment for at least one year is sufficient.
- (2) After receiving the necessary research guidance, students who have chosen Master's Thesis Project must have submitted a master's thesis and have passed the screening process and final test. Students who have chosen Qualifying Examination must have submitted a Application form for QE program and must have passed the Qualifying Examination.
- (3) Students must obtain at least 30 credits, including credits that have been certified to meet the credit requirements in the above 3.1 to 3.6. However, students who chose Qualifying Examination to compile their research must obtain at least 32 credits.
- (4) Up to 15 credits from subjects offered in other divisions may be included in the conditions for completion. However, this is limited to subjects of master's course or master's level section, which the relevant graduate school has allowed you to take.
- (5) For credits gained from other graduate schools before admission and credits earned at other graduate schools, including other KU graduate schools, in addition to (4), up to 15n credits can be included in the conditions for completion when approved by the graduate school conference.
- (6) As part of initiatives to improve English proficiency at KU, all students enrolled in the master's program, as a general rule, are to take an external English test. Students (except those whose nationality is English-speaking as determined by the University) are to submit a copy of their external English test score (minimum score of 400 and taken within the last two years) to the Graduate School Affairs Section at the same time as applying for a degree. This is a requirement for the approval of credits for "Master Thesis Report", or "Research Planning for Ph.D Program". Credit will be granted to students who have scores of English proficiency tests other than TOEIC, if their English proficiency is deemed to be equivalent to the above scores.
- (7) It is recommended that master's theses (including Problem study) be written in a foreign language, but exceptions may be made in special circumstances. If exceptions are made, a separate document in English describing the contents of the thesis (short paper: 400-800 words for a master's thesis, no more than 2 pages with figures and tables) must be prepared and attached to the thesis. It is acceptable to submit an abstract of the thesis in Japanese even when the above document is attached.

5 Course Completion Examples

		Completion of the Master's Level Section of the Integrated Course	Completion of the Master's Level Section of the Integrated Course	Completion of the Master's Level Section of the Integrated Course
Research Support Subjects: (Master's Thesis) Eight Credits Required (QE) Four Credits Required		Creative Interdisciplinary Exercises I Creative Interdisciplinary Exercises II Master Thesis Report	Creative Interdisciplinary Exercises I Creative Interdisciplinary Exercises II Master Thesis Report	Creative Interdisciplinary Exercises I Creative Interdisciplinary Exercises II Master Thesis Report
Research Projects Subjects: Five Credits Required		Project Training of Transdisciplinary Research [25701] Project Training of Transdisciplinary Research [25702]	Project Training of Transdisciplinary Research [25701] Project Training of Transdisciplinary Research [25702]	Project Training of Transdisciplinary Research [25701] Project Training of Transdisciplinary Research [25702]
Skill Subjects: One Credit Required		Research Skill Training Writing Skill Training	Research Skill Training	Research Skill Training
Foundation Subjects in Nano Life Science	Specialized Subjects: Six credits earned including two from Nanometrology	Fundamentals of Nanoscale Measurements and Control A, B Nano Molecular Physics A, B Synthetic Chemistry of Polymeric Materials	Fundamentals of Nanoscale Measurements and Control A, B Nano Molecular Physics A, B Human Molecular Biology 1,2,3	Fundamentals of Nanoscale Measurements and Control A, B Material Creation Chemistry Synthesis of Metal Complexes Synthetic Chemistry of Polymeric Materials
	Basic Subjects: Five Credits Required	Basic Nano Life Sciences Fundamentals of Nanoscale Measurement Technology Basic Supramolecular Chemistry Basic Life Sciences Basic Computational Science	Basic Nano Life Sciences Fundamentals of Nanoscale Measurement Technology Basic Supramolecular Chemistry Basic Life Sciences Basic Computational Science	Basic Nano Life Sciences Fundamentals of Nanoscale Measurement Technology Basic Supramolecular Chemistry Basic Life Sciences Basic Computational Science
Core Subjects: Four Credits Required		Research Ethics Elective compulsory subjects	Research Ethics Elective compulsory subjects	Research Ethics Elective compulsory subjects
		Students who research nanometrology	Students who research life science	Students who research supramolecular chemistry

6 Class Registration and Notification of Grades

6.1 Class Registration

Class registration is carried out online. For more information, please refer to Handbook for students.

If you wish to take subjects outside of this Division, first, please complete the necessary items on the "Application for other divisions' courses" attached to the notification e-mail from the Graduate School Affairs Section. Next, have your class instructor and supervisor attach their seal to the request, and then submit the request to the Graduate School Affairs Section within the period designated by the KU Graduate School (once per quarter).

See below for registration schedule and timetable.

<https://gsinfiniti.w3.kanazawa-u.ac.jp/student/>

"Graduate school' website" → "To Student" → "Nano Life Science"

6.2 Grade Notification

Grade notification will be carried out online.

6.3 Syllabus

The syllabus will be published on the KU website.

V [Master's Program] Education and Research Guidance Framework

As the first stage of the system for education and research guidance, in April of the first year, students will be assigned to the laboratory of the supervisor requested at the application. The second supervisor will be decided shortly afterward. As a result, this ensures a system where academic staff work together to conduct research guidance and provide detail-oriented guidance for each student.

1 Supervisors

Supervisors take on the primary role in providing education and research guidance for their students. This includes guidance on taking classes related to their student's research theme, research, and thesis writing. They focus on the guidance of their students in cooperation with second supervisors.

2 Second Supervisor

Second supervisors cooperate with supervisors and give guidance and advice from a different perspective so that their student's research can integrate multiple scientific fields.

3 Research Cooperation Faculty

Research Cooperation Faculty's area of specialization differs from that of principal academic advisors, and they give advice and consultation to students regarding the entire research guidance environment. They are assigned to all graduate students enrolled at KU.

Also, as Research Cooperation Faculty's role overlaps with that of Advice Faculty—faculty assigned to all students enrolled at KU to support them with student life— at Kanazawa University Graduate School, Research Cooperation Faculty also take on the role of Advice Faculty.

Please note, after notification of the decision regarding Research Cooperation Faculty, you are to contact your assigned faculty directly and arrange biannual consultations with them (around June and November).

VI [Master's Program] Degree Awarding

1 Degree Application

After obtaining the approval of their supervisor, students who are predicted to meet the conditions for completion (excluding Research Support Subjects) and will apply for academic degree conferral are to submit the Academic Degree Application Form and required documentation to the Graduate School Affairs Section.

The Academic Degree Application Form's submission date will be specified by KU two months before the month of expected course completion.

2 Master's Thesis Submission

After obtaining the approval of their supervisor, degree applicants who chose Master's Thesis are to submit their Master's Thesis to the Graduate School Affairs Section by a date specified by KU.

Degree applicants that chose Research Planning for Ph.D. Program will be informed separately.

3 Final Presentation

A final presentation session will be held in February of the second year to screen degree-seeking theses. Also, the final presentation session will be open to full-time faculty from other divisions and students.

4 Academic Thesis Screening Process

The screening committee for the screening of degree-seeking theses screening will consist of at least three members. During the screening process, grading will be conducted after carefully considering the evaluation and opinions given at the final presentation.

5 Conferral of Academic Degrees

The conferral of academic degrees will be discussed at the graduate school conference, taking into consideration the above degree-seeking thesis screening results. At the graduate school conference, based on results of the academic degree screening process and the evaluation and opinions the student was awarded at the final presentation, discussions will be held from the perspective of:

- 1) Basic ability to conduct comprehensive research concerning nano life science
- 2) The ability to formulate a research plan that integrates your research field with other fields
- 3) The willingness and ability to actively engage in unexplored interdisciplinary areas and emerging fields
- 4) Presentation, communication, and writing abilities related to fundamental research fields

With this result, after necessary deliberation at the graduate school conference, we will confer academic degrees.

6 Qualifying Examination

Students who will go on to the Doctoral Program are permitted to complete the master's Program by Qualifying Examination (QE) instead of a master's thesis. The details of which will be notified separately.

Below is the typical schedule for students who entered in April and chose the QE and will complete it in two years. For the schedule common to master's thesis students, including laboratory assignments, please refer to the next section, "7 Schedule Leading up to Degree Obtainment".

Month	First Year	Second Year
June	<ul style="list-style-type: none"> • Application for QE 	<ul style="list-style-type: none"> • Application for QE • Application for Degree • Midterm Presentation
September		<ul style="list-style-type: none"> • Written examination • Oral examination * Pass/fail decision for QE * In case of failure, it can be changed to submission of master's thesis.
January	<ul style="list-style-type: none"> • Preliminary screening (if needed) 	
February		<ul style="list-style-type: none"> • Final presentation * Oral presentation as well as non-QE applicants

7 Schedule Leading up to Degree Obtainment

Below is the typical schedule for students who entered in April and chose the Master's Thesis Project and will complete it in two years. Students who chose the Qualifying Examination will be informed separately. As only the main items are listed below, please check the Graduate School website regarding specific dates and items that are not listed.

In the case of students entering in October, it will be approximately six months later.

Month	First Year (Year-round: Take class subjects)	Second Year (Year-round: Take class subjects)
April	<ul style="list-style-type: none"> • Assigned to a laboratory * Assigned to supervisor's laboratory • Confirmation of second supervisor • Take Core Subjects * Taken between the first and third quarter (estimate) 	
May	<ul style="list-style-type: none"> • Confirmation of Research Cooperation Faculty (Advice Faculty) 	
December		<ul style="list-style-type: none"> * Complete the followings • Submission of English Score • Internship/Off-campus Research
January		<ul style="list-style-type: none"> • Submission of Academic Degree Application Form • Submission of Master's Thesis
February		<ul style="list-style-type: none"> • Final Presentation Session • Screening of Master's Thesis
March	<ul style="list-style-type: none"> • Choose Master's Thesis or Research Planning for Ph.D. Program as a research completion method 	<ul style="list-style-type: none"> • Degree conferment

VII [Doctoral Program] Course Outline

1 List of Subjects

Category	Subject Name	Year	Credit(s)		Completion Requirements	
			Compulsory	Elective		
Advanced Core Subjects	Basic Nano Life Sciences	1		1	- At least three credits from Advanced Core Subjects, including compulsory subjects, must be earned. - At least one credit must be earned from ※1 Subjects.	
	Advanced nano life science	1		2		
	Research Ethics for Ph.D. Researchers	1	1			
	Unleashing the Potential of Innovation for Future ※1	1		1		
	Mathematical, Data Science, and AIAdvanced ※1	1		1		
Advanced Subjects in Nano Life Sciences	Nanometrology	Advanced Nanoscale Measurement Technology	1・2・3		1	At least four credits must be earned from Advanced Subjects in Nano Life Sciences.
		Nanobio-materials science	1・2・3		1	
		Nanobio-metrology	1・2・3		1	
		Structure and dynamics of biological molecules	1・2・3		1	
		Functional dynamics of biological molecules	1・2・3		1	
		Advanced Electrochemical Measurement	1・2・3		2	
		Bioenergetics	1・2・3		1	
	Supramolecular Chemistry	Advanced Coordination Chemistry	1・2・3		2	
		Precision Macromolecular Synthesis	1・2・3		2	
	Life Science	Molecular and Cellular Biology	1・2・3		1	
		Radiation Biology	1・2・3		1	
		Regulation of Gene expression	1・2・3		2	
	Computational Science	Simulating Scanning Probe Microscopy	1・2・3		2	
		Biomaterial Mechanics & Computational Mechanics	1・2・3		2	
Advanced Skill Subjects	Ph.D Skill Training	1~2	1			
Advanced Research Projects Subjects	Project Training of Transdisciplinary Research	1・2	1		-At least two credits, including compulsory subjects, must be earned from Advanced Research Projects Subjects. - At least one subject must be earned from the subjects indicated in ※2.	
	Overseas Research A ※2	1・2		1		
	Overseas Research B ※2	1・2		2		
	Overseas Research C ※2	1・2		4		
	Internship ※2	1・2		1		
	Off-campus Research ※2	1・2		2		
	Cooperative Education through Research Internships	1・2		2		
Advanced Research Support Subjects	Advanced Interdisciplinary Exercises I	1~3	2		At least ten credits, including compulsory subjects, must be earned from Advanced Research Support Subjects.	
	Advanced Interdisciplinary Exercises II	1~3	2			
	Advanced Interdisciplinary Exercises III	1~3		1		
	Doctoral Thesis Report	1~3	6			

At least 20 credits must be earned.

2 Class Subject Structure and Categories; Credit Requirements

2.1 Advanced Core Subjects

The objective of Advanced Core Subjects is to strengthen the perspective necessary to conduct comprehensive research as a nano life science researcher. In the first year, “Research Ethics for Ph.D Researchers” (one credit) will be offered as a compulsory subject. This subject will deal with: Conducting research that is trusted by society; the moral awareness and ethics required to be independent as a researcher; social responsibility of science, and research expenses. Also, Basic Nano Life Sciences is offered for students who will study nano life science from the Doctoral Level Section of the Integrated Course to acquire the basic knowledge that will form the foundation of nano life science based on nanoscale Bio-SPM technology.

Credit requirements for Advanced Core Subjects

- At least three credits must be earned.
- Take “Research Ethics for Next Generation”.
- Earn at least one credit from the below subjects
Unleashing the Potential of Innovation for Future
Mathematical, Data Science, and AI Advanced

2.2 Advanced Subjects in Nano Life Sciences

Advanced Subjects in Nano Life Sciences are positioned as high-level specialized subjects of a higher level than the foundational nano life sciences subjects of the Master’s Level Section of the Integrated Course, Basic Subjects, and Specialized Subjects. So that students can study the latest academic trends necessary to conduct cutting-edge nano life science research, fields of study include nanometrology, supramolecular chemistry, life sciences, and computational science. Also, two to five subjects are offered in each field so that students acquire the latest knowledge required to attempt research in emerging areas.

Credit Requirements for Advanced Subjects in Nano Life Sciences

- At least four credits must be earned.

2.3 Advanced Skill Subjects

“Ph.D. Skill Training” (one credit) is offered as a compulsory subject for Advanced Skill Subjects where students acquire practical research techniques, essential for cutting-edge researchers. When formulating a research plan, students will learn how to: gather and analyze information from databases and literature; discover issues based on this analysis; formulate and write up a research plan to solve these issues. Students will also learn skills as a researcher, such as techniques related to science communication, such as techniques for giving presentations at academic conferences and meetings, and management methods for project research that are necessary for completing research.

Credit Requirements for Advanced Skill Subjects

- Earn at least one credit, including Ph.D. Skill Training

2.4 Advanced Research Projects Subjects

Advanced Research Projects Subjects are where students acquire a mindset for pursuing the truth and gain practical experience as a researcher while communicating with foreign and domestic researchers. Here, “Project Training of Transdisciplinary Research” (one credit) is offered as a compulsory subject. In this subject, through participating in joint research projects with external researchers, we seek to improve students’ analysis techniques and communication ability. We

also seek to have students construct a research network that focuses on the perception of their research and the development of future joint research projects.

Also, if students have conducted external research training, credits will be certified as below, depending on their training duration and location. Students who wish to do external training must inform the Graduate School Affairs Section one month before their training begins. Please note that for the training, five days will be seen as one week of training, and eight hours will be seen as one day of training. Time spent traveling or participating in academic conferences are not included in the training duration.

1. Overseas Research A: Research training for one to two weeks at an overseas university or research institution.
2. Overseas Research B: Research training for two weeks to one month at an overseas university or research institution.
3. Overseas Research C: Research training for one month or more at an overseas university or research institution.
4. Internship: An internship for two weeks or more at a overseas corporation or global's.
5. Off-Campus Research: Research training for two weeks or more at a domestic university or research institution.
6. Job-type Research Internship: Long-term, paid internship

*If you choose from 1 to 5, consult with your supervisor to determine the institution where you will be practicing.

*Refer the following URL regarding "6". Those who wish to participate are required to inform the Affairs Section.

"Education & Learning" → "LMS Course" → "新学術創成研究科就職支援" →

"For Doctoral students Cooperative Education through Research Internship"

Credit Requirements for Advanced Research Projects Subjects

- Earn at two credits, including Project Training of Transdisciplinary Research.
- Complete any one of "Overseas Research A", "Overseas Research B", "Overseas Research C", "Internship" and "Off-Campus Research".

2.5 Advanced Research Support Subjects

In Advanced Research Support Subjects, students solve problems related to their research field, cultivate presentation abilities, and the ability to complete research. Here, Advanced Interdisciplinary Exercises I, Advanced Interdisciplinary Exercises II (both two credits), and Doctoral Thesis Report (six credits) are offered as compulsory subjects. In Advanced Interdisciplinary Exercises I, under the guidance and advice of their secondary research supervisor, students learn approaches from other fields for their research theme and further develop their knowledge of their main theme through research, discussion, and study. In Doctoral Thesis Report, under their principal academic advisor's supervision, students compile and improve the quality of their doctoral thesis based on research outcomes and the knowledge of nanometrology, supramolecular chemistry, life science, and computational science acquired up until now—including the Master's Level Section of the Integrated Course. They also receive guidance on writing theses in English.

Credit Requirements for Advanced Research Support Subjects

- Earn at least ten credits, including Advanced Interdisciplinary Exercises I, Advanced Interdisciplinary Exercises II, and Doctoral Thesis Report.

3 Conditions for Completion

Students must satisfy all of the below requirements for completion. Please note, after consulting with their supervisor, it is the students' responsibility to check whether they have satisfied the requirements.

- (1) As a general rule, students must be enrolled in the Doctoral Level Section of the Integrated Course for at least three years.
- (2) After receiving the required research guidance, students must submit a doctoral thesis and pass the screening and final

