Department of Molecular and Life Sciences
분자생명과학과

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1. Educational Objectives

The graduate program in Molecular and Life Sciences aims to cultivate creative and independent researchers equipped with advanced knowledge and experimental expertise in molecular and cellular biology. Through rigorous scientific training, students develop the ability to design and conduct innovative research, interpret complex biological phenomena, and contribute to the advancement of life science and biotechnology. The program also seeks to foster ethical scientific conduct, interdisciplinary collaboration skills, and the capacity to translate fundamental discoveries into applications that address medical, environmental, and societal challenges.

2. Areas of Specialization

This department does not subdivide areas of specialization.

3. Graduate School Faculty List

Name	Position	Degree	Area of Specialization	Research Areas
Hwang, Seung Yong	Professor	Ph.D. in Science	Molecular Genetics, Genomics	Functional genomics-based environmental disease research and molecular diagnostic kit development
Seo, Hyemyung	Professor	Ph.D. in Science	Neurochemistry	Neurotransmission mechanism research, neural cell differentiation mechanism research
Ahn, Seong-hun	Professor	Ph.D. in Science	Molecular Cell Biology	Anti-cancer mechanism research using histone deacetylase inhibitors, transcriptional regulation research in higher eukaryotic cells
Yang, Chul-su	Professor	Ph.D. in Medicine	Microbiology	Pathogenic mechanism research on infectious pathogen-host cell interactions and infection-inflammation-tumor treatment/control technology development research
Kim, Chun	Professor	Ph.D. in Science	Inflammation Biology	Analysis of inflammatory signaling pathways in various diseases and research on their pathological functions
Jeong, Dongtak	Professor	Ph.D. in Science	Molecular Medicine, Gene Therapy	Mechanism research on cardiac diseases and tissue fibrosis and development of gene therapeutics
Cho, Soo Young	Associate Professor	Ph.D. in Science	Bioinformatics	Clinical genome analysis using bioinformatics and computational biology, tumor microenvironment and cancer cell diversity research
Kim, Ju Youn	Associate Professor	Ph.D. in Science	Metabolic Physiology	Research on the correlation between inflammation and metabolism from a physiological perspective using non-alcoholic steatohepatitis (NASH) as a basic model
Jeong, Haengdueng	Assistant Professor	Ph.D. in Science	Molecular Pathology	Gastric carcinogenesis: Elucidate the key molecular mechanisms and external factors driving the progression from normal epithelial cells to precancerous and cancerous states

4. Department Regulations

1) Areas of Specialization

This department does not subdivide areas of specialization.

2) Admission

① Academic Performance: There are no major restrictions at admission. Priority is given to applicants for the Master's Program with a cumulative GPA of 3.0 or higher (out of 4.5) for all four undergraduate years.

② Interview: Applicants who are deemed to lack academic ability by faculty consensus during the entrance interview cannot be admitted.

③ Entrance Examination Subjects: Questions are designed to assess general knowledge of life sciences.

3) Required Credits

① In accordance with the Graduate School regulations, the graduation credit requirement for the Master's Program is 27 credits or more (11 major credits) and 5 research credits. For the Doctoral Program, it is 38 credits or more (17 major credits) and 4 research credits. For the Integrated Master's and Doctoral Program, it is 59 credits or more (26 major credits) and 7 research credits.

② In accordance with the Graduate School regulations, credits per semester cannot exceed 12 credits (however, prerequisite courses are not counted toward credit requirements).

③ When necessary for major guidance, credits earned from other departments may be recognized as major credits under the guidance of the advisor and department chair with approval from the Dean of Graduate School.

④ To obtain the Bio-Nano Convergence major, students must complete at least 6 credits of convergence major courses.

4) Required Courses

① Master's Program students must complete 5 research credits, Doctoral Program students must complete 4 research credits, and Integrated Master's and Doctoral Program students must complete 7 research credits.

② Students in the Master's Program, Integrated Master's and Doctoral Program, and Doctoral Program of the Bio-Nano Convergence major must complete "Bio-Nanotechnology" as a major required course and must take "Bio-Nano Convergence Technology Seminar" according to their degree program as follows:

- Master's/Doctoral Program students: Must take at least one course from "Bio-Nano Convergence Technology Seminar 1," "Bio-Nano Convergence Technology Seminar 3," and "Bio-Nano Convergence Technology Seminar 4"

- Integrated Master's and Doctoral Program students: Must take at least two courses from "Bio-Nano Convergence Technology Seminar 1," "Bio-Nano Convergence Technology Seminar 3," and "Bio-Nano Convergence Technology Seminar 4"

5) Prerequisite Courses

In accordance with the Graduate School regulations, students admitted to the Master's or Doctoral Program who majored in fields other than life sciences must complete an additional 6 credits of undergraduate courses designated by the advisor and department chair (however, prerequisite course credits are not recognized as credits earned in the degree program).

6) Comprehensive Examination

a. Eligibility: Students who meet all of the following requirements may take the comprehensive examination:

① Master's Program: Students who have earned 18 credits or more and completed prerequisite courses

② Doctoral Program: Students who have earned or can earn graduation credits in the current semester and have completed prerequisite courses

③ Integrated Master's and Doctoral Program: Students who have registered for 6 semesters, have earned or can earn graduation credits in the current semester, and have completed prerequisite courses

b. Examination Subjects

① Master's Program students must pass 3 major subjects, and Doctoral Program students must pass 4 major subjects in the comprehensive examination (the content of major subjects for each program is disclosed in a question bank format, and specific questions are selected from this bank).

② Internal regulations for the comprehensive examination are separately determined according to departmental faculty meeting results.

c. Scoring and Passing Criteria

Each subject of the comprehensive examination requires a score of 60 or higher out of 100 points for passing, regardless of Master's or Doctoral Program.

d. Re-examination

① Students who fail the comprehensive examination must retake it.

② If Master's, Doctoral, or Integrated Master's and Doctoral Program students fail only one subject, they may retake only that one subject. If they fail two or more subjects, they must retake all subjects. Course changes are allowed when retaking.

7) Advisor Assignment

①Assignment is based on the list of preferred advisors to prioritize student preference.

②After consultation with the advisor, students must submit the Advisor Assignment Application Form by the end of the first semester and obtain approval from the department chair.

③Faculty from other departments may also be appointed as advisor or co-advisor after consultation with both the previous and new advisors.

④If students are not assigned to their desired laboratory or if complaints arise regarding advisor assignment, consultation with the department chair will be conducted.

8) Thesis Guidance, Presentation, and Evaluation Methods

a. Thesis Submission Eligibility

Thesis submission eligibility and procedures for Master's and Doctoral Programs follow the Graduate School regulations and enforcement rules, with the following additions:

① Master's Program

- In accordance with Article 40 of the Graduate School regulations, the degree is awarded to those who have earned the required credits, passed the foreign language examination, submitted a degree thesis, and passed its review and oral examination.

② Doctoral Program

- Presentation eligibility is granted to students who have published at least one SCIE paper where they are the first author and their advisor is the corresponding author, with an impact factor of 3.0 or higher (however, for part-time students, the advisor does not need to be the corresponding author).
- Presentation eligibility is granted to students who have published one paper where they are the first author and their advisor is the corresponding author with an impact factor below 3.0, and one SCIE paper that includes their name (however, for part-time students, the advisor does not need to be the corresponding author).
- The new enforcement decree applies to Doctoral Program students admitted from the first semester of 2022 (students admitted before the second semester of 2021 follow the thesis submission eligibility that has been in effect since the first semester of 2017).

③ Integrated Master's and Doctoral Program

- The Integrated Master's and Doctoral Program follows the Doctoral Program regulations.

b. Degree Thesis Submission Date

According to the Graduate School academic calendar, students must submit the results report and printed thesis after the thesis application and final examination period.

c. Thesis Committee Selection

① For Master's degree thesis review, the examination committee members are determined through consultation between the thesis advisor and department chair.

② Doctoral Program students must form a thesis committee consisting of three department faculty members before the end of the third semester after admission, and hold a committee meeting to receive guidance on thesis research presentation. The committee chair is designated as the advisor.

9) Internal Regulations on Master's Degree Thesis Substitution

Students admitted from the first semester of 2025 are granted eligibility to substitute the Master's degree thesis.

<Permitted Terms and Definitions>

① Only the following author types are permitted: sole author, primary author, first author, and corresponding author.

•Sole author: An author who independently published the paper

•Primary author, first author: The author who performed the central role in the paper

•Corresponding author: The principal investigator who is responsible for submission, accountability, and response regarding research results

② Only the following journal types are permitted: domestic professional journals, international professional journals, and international general journals. Imprecise journal expressions such as international renowned journals, domestic journals, international journals, and professional academic papers are restricted.

- Domestic professional journals: Korea Research Foundation registered journals, Korea Research Foundation candidate journals
- International professional journals: SCI, SSCI, A&HCI
- International general journals: SCIE, SCOPUS

<Procedures>

① In the semester of thesis submission, students submit published papers (performance) to the department chair with approval from the advisor.

② The department forms an examination committee of 3 or more members and reviews the submitted materials during the thesis review period.

③ The review results are reflected in the graduation assessment thesis results.

④ Even if recognized as a substitute, if fabrication, plagiarism, or other misconduct is discovered in the substitute performance later, it will be referred to the Research Integrity Committee to cancel the substitute performance, and the awarded degree may also be revoked.

<Substitution Recognition Criteria>

"When at least one paper is published as the primary author (first author) in an international renowned journal (SCI, SCIE), it is recognized as a substitute for the Master's degree thesis.“

9) Other Provisions

① Course Offerings

Courses offered each semester are determined at faculty meetings two months before the start of the new semester.

② This regulation may be amended through departmental faculty meetings with the approval of more than half of the department faculty to reflect the flow of the times and curriculum changes.

③ Matters not covered in these regulations shall be determined by departmental faculty meetings.

④ Matters concerning Integrated Master's and Doctoral Program students follow the Graduate School's internal regulations on the operation of the Integrated Master's and Doctoral Program

10) Implementation Date

These regulations take effect from the first semester of 2026.

5. 2026-2027 Curriculum

Course Code	Course Title	Course Type	Degree Program	Credits	Lecture	Practice	Semester Offered	Semester
COE8026	Master's Thesis Research	Research Required	Master's	2	2	0	Every Semester	All Semesters
COE8027	Doctoral Thesis Research 1	Research Required	Master's and Doctoral	2	2	0	Every Semester	All Semesters
COE8028	Doctoral Thesis Research 2	Research Required	Master's and Doctoral	2	2	0	Every Semester	All Semesters
DBC8032	Advanced Biochemistry 1	Major Elective	Master's and Doctoral	3	3	0	Annually-1	1st Semester
DBC8033	Advanced Biochemistry 2	Major Elective	Master's and Doctoral	3	3	0	Annually-2	2nd Semester
DBC8064	Research Planning Methodology	Research Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
DBC8083	Regulation of Gene Expression	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
DBC8081	Diseases and Innovative Medicines	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
DBC8082	Advanced Topics in the Bioindustry	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
DBC8085	Applied Multi-Omics Data Analysis	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
DBC8077	Systems Neuroscience	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
BNT0046	*Bio-Nanotechnology	Major Elective	Master's and Doctoral	3	3	0	Annually-1	1st Semester
APP6007	*Bionetwork Analysis	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
DBC8072	Understanding and Application of Data Science	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
DBC8084	Metabolomics	Research Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
BNT6009	Bio-Intelligence	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
DBC6003	Experimental Biochemistry	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
DBC8071	Gene and Cell Therapy	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
DBC8070	Bio-Medical Technology Development	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
BNT0045	Bio-Nano Convergence Technology Seminar 4	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
DBC8076	Systems Signal Transduction	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester

BNT6010	*Bio-Nano Engineering Applications	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
BNT6006	*Diagnostic Engineering	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
BNT0042	*Bio-Nano Convergence Technology Seminar 1	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
DBC8079	Proteomics with Practical Applications of Artificial Intelligence	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
APP6008	*Artificial Neural Networks and Bio Big Data	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
CMS8099	*Medicinal Chemistry and AI-Based Drug Development	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
CMS8081	*Advanced Nanomaterials Chemistry	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
DBC8080	Microbiome with Practical Applications of Artificial Intelligence	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
DBC8078	Human Genomics with Practical Applications of Artificial Intelligence	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
BNT0044	*Bio-Nano Convergence Technology Seminar 3	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester

Note: Courses marked with * are recognized as major credits from other departments.

Department of Applied Physics
응용물리학과

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1. Educational Objectives

Applied physics is a discipline that pioneers areas of practical need for humanity and society by applying the knowledge and research methods of physics, aiming to connect pure academic research with the creation of new technologies. Following Hanyang University's practical academic tradition that emphasizes education beneficial to society, the Department of Applied Physics operates specialized educational programs centered on nano-information device physics to cultivate professional personnel who will lead advanced science and technology fields in future society. The educational goal is to nurture practical professional intellectuals who possess a logical thinking framework pursued by physics, contribute to national industry based on rigorous understanding of nature, and pioneer the era of globalization.

2. Areas of Specialization

Areas of Specialization	Introduction
Applied Physics	Future devices, nano-patterning, artificial neural networks, big data

Applied Physics (Bio-Nano Convergence Major)	Bio-nano convergence technology
Applied Physics (Quantum Information Convergence Major)	Quantum information convergence technology

3. Graduate School Faculty List

Name	Position	Degree	Area of Specialization	Research Areas
Kwon Younghun	Professor	Ph.D. in Science	Applied Physics	Quantum information theory, artificial intelligence
Jung Young-Dae	Professor	Ph.D. in Science	Applied Physics	Atomic physics, plasma theory
Hong Jooyoo	Professor	Ph.D. in Science	Applied Physics	Cosmology, particle physics theory
Jung Hee Jun	Professor	Ph.D. in Science	Applied Physics	Nanodevices, molecular device physics
Kang Bo Soo	Professor	Ph.D. in Science	Applied Physics	Materials and device physics
Son Seung-Woo	Professor	Ph.D. in Science	Applied Physics	Complex systems, artificial neural networks
Huh Ji-hyeok	Assistant Professor	Ph.D. in Science	Applied Physics	Nano-optics and metamaterials

4. Department Regulations

1) Areas of Specialization

This department operates "Applied Physics Major," "Bio-Nano Convergence Major," and "Quantum Information Convergence Major." For the "Applied Physics Major," the curriculum is specialized in information device physics, operating programs with emphasis on "nano-patterning," "future electronic devices," and "complex systems theory and artificial neural networks.“

2) Admission

Admission to this department follows the Graduate School regulations, enforcement rules, and Graduate School admission recruitment internal regulations, with other details following this department's admission recruitment internal regulations.

3) Required Credits

① Master's Program credit requirement is 27 credits, Integrated Master's and Doctoral Program is 59 credits, and Doctoral Program is 38 credits (however, including recognized credits from the same major in the Master's degree program: for students who have earned 27 credits or more in the Master's Program of the same major at this graduate school, 3 credits will be recognized as Doctoral Program credits through departmental grade review) (Related basis: Article 27 of the Regulations (Program Credit Requirements) ① and Internal Regulations on Recognition of Credits and Pre-enrollment for Graduate Master's (Doctoral) Programs).

② Major credit requirements are 11 credits or more for the Master's Program, and 26/17 credits

or more for the Integrated Master's and Doctoral Program/Doctoral Program.

4) Required Courses

① Master's Program students must complete 5 research credits, Doctoral Program students must complete 4 research credits, and Integrated Master's and Doctoral Program students must complete 7 research credits.

② No required courses are designated; however, students are encouraged to take "Quantum Mechanics" and "Electrodynamics" to qualify for the comprehensive examination.

③ Bio-Nano Convergence major students must complete "Bio-Nanotechnology" as a core course and must take the following according to their program: Master's/Doctoral Program students must take at least one course from "Bio-Nano Convergence Technology Seminar 1," "Bio-Nano Convergence Technology Seminar 3," and "Bio-Nano Convergence Technology Seminar 4" ; Integrated Master's and Doctoral Program students must take at least two courses from "Bio-Nano Convergence Technology Seminar 1," "Bio-Nano Convergence Technology Seminar 3," and "Bio-Nano Convergence Technology Seminar 4."

④ Students majoring in Quantum Information Convergence must complete at least 12 credits from the following courses: “Quantum Information Science I, II” “Quantum Computing I, II” “Quantum Measurement and Sensing I, II” “Quantum Communication and Cryptography I, II” “Advanced Quantum Algorithms” “Advanced Quantum Information Theory” “Quantum Information Physics I, II” “Quantum Optics; Advanced Theoretical Physics I, II” “Quantum Mechanics”. However, if the department determines through a departmental meeting that there is a valid reason the student is unable to take credit-exchange courses at another university, the department may approve completion through substitute courses based on that meeting.

5) Comprehensive Examination

① Eligibility: Master's Program students who have completed 12 credits or more, Doctoral Program students who can earn 21 credits, and Integrated Master's and Doctoral Program students who have registered for 4 or more semesters and can earn 30 credits are eligible (prerequisite course completion is common).

② Examination subjects are 2 subjects (classical physics and modern physics) for the Master's Program, and 3 subjects (classical physics, modern physics, and general physics) for the Doctoral/Integrated Master's and Doctoral Program.

③ Each subject of the comprehensive examination requires a score of 60 or higher out of 100 points for passing, regardless of Master's or Doctoral Program.

④ Students who fail the comprehensive examination must retake only the failed subjects, with no limit on the number of retakes.

6) Advisor Assignment

① Assignment is based on the list of preferred advisors to prioritize student preference.

② After consultation with the advisor, students must submit the Advisor Assignment Application

Form by the end of the first semester and obtain approval from the department chair. As a principle, advisors should be assigned before the start of the third semester after admission.

③ Faculty from other departments may also be appointed as advisor or co-advisor after consultation with both the previous and new advisors. If students are not assigned to their desired laboratory or if complaints arise regarding advisor assignment, consultation with the department chair will be conducted.

7) Thesis Guidance, Presentation, and Evaluation Methods

① Before submitting a Master's degree thesis, students must present at least once at an academic conference of a major-related academic society or at a public seminar on campus jointly with their advisor. If a student publishes at least one paper as the primary author (first author) in an international renowned journal (SCIE), it is recognized as a public presentation according to the internal regulations on replacing Master's degree thesis, and is recognized as a substitute for the Master's degree thesis.

② Before submitting a Doctoral degree thesis, students must present at least once at a public seminar within the department and must publish research papers totaling 8 points or more in international renowned journals (SCIE). Points are calculated as follows:

Points = 6 points (1 paper) × n × IF

Where n is 1 if the student is the primary author or corresponding author, 0.5 if co-author, and IF is the impact factor of the publication year.

8) Internal Regulations on Master's Degree Thesis Substitution

Students admitted from the first semester of 2019 are granted eligibility to substitute the Master's degree thesis.

<Permitted Terms and Definitions>

① Only the following author types are permitted: sole author, primary author, first author, corresponding author, and co-author.

•Sole author: An author who independently published the paper

•Primary author, first author: The author who performed the central role in the paper

•Corresponding author: The principal investigator who is responsible for submission, accountability, and response regarding research results

•Co-author: Other co-authors

② Only the following journal types are permitted: domestic professional journals, international professional journals, and international general journals. Imprecise journal expressions such as international renowned journals, domestic journals, international journals, and professional academic papers are restricted.

• Domestic professional journals: Korea Research Foundation registered journals, Korea Research Foundation candidate journals

• International professional journals: SCI, SSCI, A&HCI

• International general journals: SCIE, SCOPUS

<Procedures>

① In the semester of thesis submission, students submit published papers (performance) to the department chair with approval from the advisor.

② The department forms an examination committee of 3 or more members and reviews the submitted materials during the thesis review period.

③ The review results are reflected in the graduation assessment thesis results.

④ Even if recognized as a substitute, if fabrication, plagiarism, or other misconduct is discovered in the substitute performance later, it will be referred to the Research Integrity Committee to cancel the substitute performance, and the awarded degree may also be revoked.

<Substitution Recognition Criteria>

"When at least one paper is published as the primary author (first author) in an international renowned journal (SCI, SCIE), it is recognized as a substitute for the Master's degree thesis.“

9) Effective Date

These regulations take effect from the first semester of 2024, applying to students admitted from the first semester of 2024. However, regulations related to 4-4 Quantum Information Convergence major are applied retroactively.

5. 2026-2027 Curriculum

Course Code	Course Title	Course Type	Degree Program	Credits	Lecture	Practice	Semester Offered	Semester
COE8026	Master's Thesis Research	Research Required	Master's	2	2	0	every semester	All Semesters
COE8027	Doctoral Thesis Research 1	Research Required	Master's and Doctoral	2	2	0	every semester	All Semesters
COE8028	Doctoral Thesis Research 2	Research Required	Master's and Doctoral	2	2	0	every semester	All Semesters
APP0002	Electrodynamics	Major Elective	Master's and Doctoral	3	3	0	annually first semester	1st Semester
APP0003	Quantum Mechanics	Major Elective	Master's and Doctoral	3	3	0	annually second semester	2nd Semester
APP0030	Advanced Condensed Matter Physics 1	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
APP0013	Advanced Theoretical Physics 1	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
APP0020	Applied Physics Research 1	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
APP0031	Advanced Condensed Matter Physics 2	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
APP0014	Advanced Theoretical Physics 2	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
APP0021	Applied Physics Research 2	Research Elective	Master's and	3	3	0	2026-2	2nd Semester

			Doctoral					
APP0011	Advanced Applied Physics 1	Major Elective	Master's and Doctoral	3	3	0	annually first semester	1st Semester
APP0035	Applied Physics Research 3	Research Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
APP0054	Physics of Information Device Materials	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
APP0012	Advanced Applied Physics 2	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
APP6009	Nanophotonics and Metamaterials	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
APP0036	Applied Physics Research 4	Research Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
APP6007	*Bionetwork Analysis	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
APP6008	*Artificial Neural Networks and Bio Big Data	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
BNT0042	*Bio-Nano Convergence Technology Seminar 1	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
BNT0044	*Bio-Nano Convergence Technology Seminar 3	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
BNT0045	*Bio-Nano Convergence Technology Seminar 4	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
BNT0046	*Bio-Nanotechnology	Major Elective	Master's and Doctoral	3	3	0	annually first semester	1st Semester
BNT6006	*Diagnostic Engineering	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
BNT6010	*Bio-Nano Engineering Applications	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
BNT6009	*Bio-Intelligence	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
CMS8081	*Advanced Nanomaterials Chemistry	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
DBC8070	*Bio-Medical Technology Development	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
PHY9094	*Quantum Information Science 1	Major Elective	Master's and Doctoral	3	3	0	annually first semester	1st Semester
PHY9089	*Quantum Sensing and Measurement II	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
PHY9090	*Topological Physics 1	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st Semester
MAT9076	*Partial Differential Equations	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd Semester
MAT9077	*Linear Algebra and Quantum Information	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd Semester
CIN9079	*Modern Cryptography	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st Semester
ETS9035	*Hybrid Quantum Cryptography	Major Elective	Master's and Doctoral	3	3	0	2027-1	2nd Semester

Note: Courses marked with * are recognized as major credits from other departments.

Department of Photonics and Nanoelectronics
나노광전자학과

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1. Educational Objectives

The Department of Photonics and Nanoelectronics aims to cultivate creative professionals who will lead the development of advanced cutting-edge technologies that form the foundation of future IoT new industries and the Fourth Industrial Revolution by integrating optical engineering, lasers, nanosemiconductors, and display fields.

2. Areas of Specialization

Areas of Specialization	Overview
Photonics and Nanoelectronics	Optical engineering, lasers, optoelectronic devices, nanosemiconductors, displays,
Photonics and Nanoelectronics (Materials-Components-Equipment Convergence)	Advanced materials, processing equipment, advanced components
Photonics and Nanoelectronics (Major in Advanced Display Engineering)	Speciallized in Advanced Display Engineering

3. Graduate School Faculty List

Name	Position	Degree	Area of Specialization	Research Areas
Shin, Dong-Soo	Professor	Ph.D. in Science	Optoelectronic Device Measurement and Performance Analysis	Optoelectronic Devices
Kim, Ji Won	Professor	Ph.D. in Science	Laser Systems and Nonlinear Optics	Laser Science
Kim, Sueune	Professor	Ph.D. in Engineering	Low-Dimensional Nanomaterial Characterization and Analysis	Nanoelectronics
Kim, Jaekyun	Professor	Ph.D. in Engineering	Semiconductor and Display Device Processing	Nanosemiconductors
Cho Seong-Yong	Associate Professor	Ph.D. in Engineering	Semiconductor Thin Films and Display Devices	Semiconductor thin film & Display
Kim Younghyun	Associate Professor	Ph.D. in Engineering	Semiconductor Device Design, Fabrication, and Characterization	Semiconductor Devices
Kim, Honghyuk	Assistant Professor	Ph.D in Engineering	Compound semiconductor materials and their related optoelectronic devices	Optoelectronic Devices
Lee, Daewon	Assistant Professor	Ph.D. in Engineering	Semiconductor Device and MEMS Fabrications	Semiconductor & Diaplay

4. Department Regulations

1) Areas of Specialization

This department operates a single major, "Photonics and Nanoelectronics," with programs focusing on optical engineering, optoelectronic devices, nanosemiconductors, displays, and lasers.

2) Admission

Admission to this department follows the Graduate School Regulations, Implementation Rules, and Graduate School Admission Guidelines. Other detailed matters follow the departmental admission regulations.

3) Required Credits

① The Master's Program requires 27 credits, Integrated Master's and Doctoral Program requires 59 credits, and the Doctoral Program requires 38 credits (including recognized credits from the same major in the Master's Program).

② Minimum major credit requirements are: Master's Program 11 or more credits, Combined Master's and Doctoral Program/Doctoral Program 26/17 or more credits.

4) Required Courses

① The Master's Program requires 5 research credits, the Doctoral Program requires 4 research credits, and the Integrated Master's and Doctoral Program requires 7 research credits.

② Advanced Semiconductor Theory 1 and Advanced Semiconductor Theory 2 must be offered each relevant semester, and students must take at least one of these two courses for graduation.

③ For the Major in Materials-Components-Equipment Convergence, students must complete the credits specified by admission period and degree type as stipulated in the Materials-Components-Equipment Convergence major regulations.

④ For the Major in Advanced Display Engineering, students must complete the credits specified by admission period and degree type as stipulated in the Advanced Display Engineering

⑤ For the Major in Future Information Display Engineering, students must complete the credits specified by admission period and degree type as stipulated in the Future Information Display Engineering

5) Prerequisite Courses

Prerequisite courses are not designated.

6) Comprehensive Examination

① Eligibility: Master's students after completing 18 or more credits; Doctoral students when able to complete graduation credits; Integrated Master's and Doctoral Program students after registering for 6 or more semesters when able to complete graduation credits

② Exam Subjects: Master's 2 subjects, Doctoral/Integrated Master's and Doctoral Program 3

subjects

③ Scoring and Passing Criteria: 60 points

④ Students who fail the comprehensive examination must retake only the failed subjects, with no limit on the number of retakes

7) Comprehensive Examination Alternatives

① Students who obtain A+ or A grades in 2 or more courses (Master's) or 3 or more courses (Doctoral/Integrated Master's and Doctoral Program) from the courses specified in the Curriculum below will be considered as having passed the comprehensive examination (applicable to examinees from the 2023 second semester onwards, regardless of admission period)

② Procedures for comprehensive examination based on course grades:

i) Finalize the list of comprehensive examination eligible courses

ii) Students select and apply for examination subjects during the application period

iii) Verify student course grades and score accordingly (e.g., A+ = 95 points, A = 90 points, etc.)

iv) Enter comprehensive examination scores and determine pass/fail status

v) Announce comprehensive examination results

8) Advisor Assignment

① Assignment is based on the list of preferred advisors to prioritize student preference.

② After consultation with the advisor, students must submit the Advisor Assignment Application Form by the end of the first semester and obtain approval from the department chair.

③ Faculty from other departments may also be appointed as advisor or co-advisor after consultation with both the previous and new advisors. If students are not assigned to their desired laboratory or if complaints arise regarding advisor assignment, consultation with the department chair will be conducted.

④ Even if a student has been assigned an advisor at the end of the 1st semester, the student may request a change of advisor after consulting with both the current advisor and the desired advisor, and can be reassigned accordingly.

9) Thesis Guidance, Presentation, and Evaluation Methods

① Before submitting the Master's degree thesis, students must present at least once at domestic/international academic conferences in their major field jointly with their advisor. Publications (or accepted publications) in SCI(E) journals are recognized as public presentations. For detailed information, refer to the regulations for the Master's degree thesis alternative system.

② Before submitting the Doctoral degree thesis, students must present at least once at international academic conferences in their major field jointly with their advisor and must publish at least one research paper as principal author or corresponding author in SCI(E) journals.

10) Regulations for Master's Degree Thesis Alternative System

Starting from students admitted in the first semester of the 2020 academic year, qualification to substitute for the Master's degree thesis is granted.

<Permitted Terms and Definitions>

① Only the following author designations are permitted: sole author, principal author, first author, corresponding author, and co-author.

•Sole author: An author who independently published the paper

•Primary author, first author: The author who performed the central role in the paper

•Corresponding author: The principal investigator who is responsible for submission, accountability, and response regarding research results

•Co-author: Other co-authors

② Only the following journal categories are permitted: domestic professional journals, international professional journals, and international general journals. Inaccurate journal expressions such as international prestigious journals, domestic journals, international journals, and professional academic papers are restricted.

•Domestic professional journal: Korea Research Foundation registered journal, Korea Research Foundation candidate journal

•International professional journal: SCI, SSCI, A&HCI

•International general journal: SCIE, SCOPUS

<Procedures>

① In the semester of thesis submission, published papers (achievements) are submitted to the department chair with the advisor's approval.

② The criteria for recognizing publication achievements are acceptance letters received by the day before the thesis examination application deadline for each semester. The applicant must submit supporting documents for published papers (achievements) to the department chair before the thesis examination period to apply for thesis alternative recognition.

③ The department forms an examination committee of 3 or more members and reviews the submitted materials within the thesis examination period.

④ The review results are reflected in the graduation evaluation thesis results.

⑤ Even if recognized as an alternative achievement, if forgery, plagiarism, or other misconduct is discovered in the alternative achievement later, it may be referred to the Research Integrity Committee to cancel the alternative achievement, and the awarded degree may also be revoked.

<Alternative Recognition Criteria>

Publication achievement of at least one paper as principal author (first author) in international professional journals (SCI) or international general journals (SCIE) is recognized.

11) Effective Date

These regulations apply to new students from the first semester of the 2024 academic year. However, regulation 7) is retroactively applied to both new and current students from the second semester of 2023 according to the stated provisions.

5. 2026-2027 Curriculum

Course Code	Course Title	Course Type	Degree Program	Credits	Lecture	Practice	Semester Offered	Semester
COE8026	Master's Thesis Research	Research Required	Master's	2	2	0	Every Semester	All semester
COE8027	Doctoral Thesis Research 1	Research Required	Master's and Doctoral	2	2	0	Every Semester	All semester
COE8028	Doctoral Thesis Research 2	Research Required	Master's and Doctoral	2	2	0	Every Semester	All semester
NNE6003	Advanced Semiconductor 1	Research Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
NNE6004	Advanced Semiconductor 2	Research Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
NNE6007	Optoelectronics Seminar 1	Research Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
NNE6008	Optoelectronics Seminar 2	Research Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
CIN6052	*Synthesis and Properties of Low-Dimensional Nanomaterials	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
DME6030	*Nanobio Machinery and Materials*	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
DME6037	*Applied Optics and Laser Processing	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
DME6039	*Introduction to Nano Processes	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
DME6044	*Industry 4.0 Advanced Materials, Components, and Equipment	Major Elective	Master's and Doctoral	3	3	0	Annually-1	1st semester
DME6045	*Introduction to Mechanical Engineering*	Major Elective	Master's and Doctoral	3	3	0	Annually-2	2nd semester
DME6049	*Thermal Process Systems	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
DME6050	*Machine Vision and Smart Manufacturing	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
DME9022	*Advanced Equipment Design Engineering	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
DME9023	*Comprehensive Analysis of Advanced Manufacturing Processes	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
DME9025	*Advanced Printing Process Equipment	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
DME9026	*Precision Actuators and Control	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
DME9027	*Semiconductor/Display Core Processes and Equipment	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
FCE0025	*Polymer Nanocomposites	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
MEE8025	*Convective Heat Transfer	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
MMS6008	*Advanced Semiconductor Materials and Processes for AI	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
MMS6039	*Coating Materials Research and Industry	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
MMS6041	*Special Topics in Semiconductor Field Practice	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
MMS8079	*Introduction to Advanced	Major	Master's and Doctoral	3	3	0	Annually-	1st

	Semiconductor Materials	Elective					1	semester
MMS8080	*Surface and Interface Processes and Equipment	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6001	Advanced Advanced Optical Engineering 1	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
NNE6002	Advanced Optical Engineering 2	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
NNE6005	Optoelectronics	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
NNE6006	Advanced Semiconductor Processing	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6011	Optical Information Processing	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6012	Electromagnetic Wave Transmission Engineering	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6013	Optical Communication Engineering	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
NNE6014	Laser Engineering and Applications	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
NNE6015	Advanced Optoelectronics	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
NNE6016	Topics in Advanced Optics	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
NNE6017	Nonlinear Optics	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6018	Nanomaterials and Thin Film Devices	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6019	Nanotechnology and Applications	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
NNE6020	Industry-Academic Project	Major Elective	Master's and Doctoral	3	3	0	Annually-2	2nd semester
NNE6021	Optical Convergence Project	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6022	Introduction to Materials Engineering and Optoelectronics	Major Elective	Master's and Doctoral	3	3	0	Annually-2	2nd semester
NNE6023	Advanced Display Technology	Major Elective	Master's and Doctoral	3	3	0	2027-2	2nd semester
NNE6024	Comprehensive Analysis of Semiconductor Equipment	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
NNE6025	Integrated Optoelectronics	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
NNE6026	Micro-LED Devices and Applications	Major Elective	Master's and Doctoral	3	3	0	2026-2	2nd semester
NNE6027	Quantum Dot Displays	Major Elective	Master's and Doctoral	3	3	0	2027-1	1st semester
NNE6028	Thin Films and Spectroscopic Analysis	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
NNE6029	Special Topics in Compound Semiconductor Processing and Devices	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester
NNE6030	Micro/Nano Device Integration for Emerging Displays	Major Elective	Master's and Doctoral	3	3	0	2026-1	1st semester

Note: Courses marked with * are recognized as major credits from other departments.

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1. Educational Objectives

Bionanotechnology is a representative fusion technology that combines biotechnology (BT) with

nanotechnology (NT), and it serves as a cornerstone of 21st-century knowledge-based convergence industries. The educational goal of the Department of Bionano Engineering is to cultivate creative and innovative professionals who will lead knowledge-convergence industries through the integration of a broad range of disciplines—including the fundamentals of BT, IT, and NT, as well as engineering and natural sciences.

2. Areas of Specialization

Areas of Specialization	Introduction
BIOTECHNOLOGY	- Structural and functional characterization of biological materials - Life phenomena and mechanisms of biological materials - Interactions of biological materials - Discovery of biological information - Stabilization of biological material activity and development of molecular imaging technologies
NANOTECHNOLOGY	- Fabrication and application of nanoparticles - Thin film and surface fabrication and analysis techniques - Understanding and application of micro and nano lithography technologies - Fabrication of nanodevices and bio-applications - Optical and surface measurement techniques - Development of biomimetic and biocompatible nanomaterials and devices
BIONANOTECHNOLOGY	- Methods for analyzing biological activity of biological materials - High-sensitivity bio-nano analytical techniques, principles of analytical instruments, and applications - Biofunctionalization and biotargeting of nanoparticles - Principles of biochips and biosensors - Bio-analysis using microfluidics - High-sensitivity bio-functional detection and analysis using nanodevices
BIONANO CONVERGENCE	- Medical diagnostic biosensors and biochips - Cancer (tumor) diagnosis and therapy technologies - Bioprobe sensor technologies - Biomolecule and harmful virus detection technologies - Development of nano organic-inorganic hybrid materials - Biomimetic bionanomaterials

3. Graduate School Faculty List

Name	Position	Degree	Area of Specialization	Research Areas
Sung, Kihoon	Professor	Ph.D. (Engineering)	Analytical Biochemistry	Electrochemical Sensors, Biochips/Biosensors
Lim, Dongwoo	Professor	Ph.D. (Engineering)	Bionanotechnology Convergence, Biomedical Engineering, Biosensors	Bio-nano Convergence Materials, Artificial Protein Materials, Biopolymer Materials, Tissue Engineering, Drug Delivery Systems, Biosensors
Chae, Pilseok	Professor	Ph.D. (Engineering)	Bioorganic Chemistry, Chemical Biology	Organic Nanoparticles, Biomembrane Mimetic Systems, Nanodisc Development
Hong, Jongwook	Professor	Ph.D. (Engineering)	Convergence Bioengineering and Future Medicine	Personalized Medicine, Ultra-precise Early Diagnosis, BioMEMS/NEMS,

				BioChip/LabChip
Lee, Seunghwan	Professor	Ph.D. (Engineering)	Bioengineering, Nano-bioengineering	Biochips and Biosensors, MEMS/NEMS, Bioengineering, Biomimetic System Development
Kim, Dokyun	Professor	Ph.D. (Engineering)	Materials Chemistry	Biomaterials, Biosensing, Bioimaging
Lee, Joohoon	Associate Professor	Ph.D. (Engineering)	Nano-bioengineering	Nano-biomaterials, Biomimetics, Nano-biosensors, Biopiezoelectrics, Self-assembly, Virus Engineering
Lee, Chanseok	Assistant Professor	Ph.D. (Engineering)	Nanoengineering, DNA Nanoengineering	Nanomaterial Design, Materials Mechanics and Computational Analysis, Nano-imaging, Nanomaterial Property Analysis
Lee, Jonghwan	Associate Professor	Ph.D. (Engineering)	Nano-bioengineering, Biophotonics	Plasmonic materials, Plasmonic biosensors, Bio-Nano hybrid materials, Drug/Vaccine delivery systems

4. Department Regulations

1) Areas of Specialization

The Department of Bionano Engineering consists of four majors: Biotechnology, Nanotechnology, Bionanotechnology, and Bionano Convergence. The abolition or establishment of detailed majors shall be determined by the Graduate Operating Committee of the Department of Bionano Engineering.

Within Hanyang University's Graduate School Department of Bionano Engineering, the Master's Program, Doctoral Program, and Integrated Master's-Doctoral Program do not have separate classifications of majors. When necessary, the classification of a student's major shall follow the designation determined by the academic advisor.

2) Admission

Admission to the Department shall, in principle, be conducted through a special selection process, and the detailed criteria are determined by the Graduate Committee of the Department of Bionano Engineering.

① Academic Record: No restrictions are placed on an applicant's undergraduate major at the time of admission.

② Interview: Applicants who are deemed, by consensus of the faculty members participating in the interview, to lack the academic ability required for the program shall not be admitted.

③ Entrance Examination Subjects: Examination questions are designed to assess knowledge relevant to the field of bionano engineering.

3) Required Credits

① In accordance with Article 27 of the Graduate School Regulations, the required credits for graduation are as follows:

- Master's Program: A total of 27 credits (22 coursework credits and 5 research credits)
- Integrated Master's-Doctoral Program: A total of 59 credits (52 coursework credits and 7 research credits)
- Doctoral Program: A total of 38 credits (34 coursework credits and 4 research credits)

② Minimum Major Credit Requirements:

Master's Program: At least one-half of the required coursework credits (22 credits) must be earned in major courses.

- Integrated Master's-Doctoral Program: At least one-half of the required coursework credits (52 credits) must be earned in major courses.
- Doctoral Program: At least one-half of the required coursework credits (34 credits) must be earned in major courses.

③ In accordance with Article 28 of the Graduate School Regulations, students may register for up to 12 credits per semester. Prerequisite courses are not counted toward this limit; however, when including prerequisite courses, students may take up to a maximum of 15 credits per semester.

④ Minimum Requirements for the Bionano Convergence Major: To obtain the Bionano Convergence Major, students must complete at least 6 credits from designated convergence-major courses.

⑤ When necessary for academic advising, credits earned in other departments may be recognized as major credits with the approval of the Dean of the Graduate School, under the guidance of the academic advisor and the Chair of the Department of Bionano Engineering.

4) Required Courses

①Students in the Department of Bionano Engineering, including those in the Bionano Convergence Major, are required to take the core course Bionanotechnology in the Master's, Doctoral, or Integrated Master's-Doctoral Program.

②Students in the Department of Bionano Engineering, including those in the Bionano Convergence Major, must complete the following core seminar courses according to their program requirements:

-Master's and Doctoral Program students: Must take at least one of the following courses:

Bionanotechnology Convergence Technology Seminar 1,
Bionanotechnology Convergence Technology Seminar 3,
Bionanotechnology Convergence Technology Seminar 4.

-Integrated Master's-Doctoral Program students: Must take at least two of the following courses:

Bionanotechnology Convergence Technology Seminar 1,
Bionanotechnology Convergence Technology Seminar 3,
Bionanotechnology Convergence Technology Seminar 4.

③ Doctoral Program students admitted from non-major fields follow the same core-course requirements as the Master's Program. The determination of whether an applicant is considered from a non-major or related field shall be made by the Departmental Operating Committee of the

Department of Bionano Engineering.

④ Doctoral Program students admitted from related fields follow the same core-course requirements as the Doctoral Program. The determination of whether an applicant is considered from a non-major or related field shall be made by the Departmental Operating Committee of the Department of Bionano Engineering.

5) Prerequisite Courses

In accordance with Article 30 of the Graduate School Regulations, students admitted to Master's or Doctoral programs who are deemed to lack learning and research capabilities due to major changes or other reasons must complete up to 6 credits of prerequisite courses from undergraduate courses. The prerequisite courses and credits to be completed shall be determined by the Department Chair and the advisor. Furthermore, prerequisite courses are not recognized as credits earned in the degree program.

6) Comprehensive Examination

① Article 1 (Eligibility for the Comprehensive Examination)

Applicants who meet any of the following conditions are eligible to take the comprehensive examination:

-Students who have completed at least three semesters in the Master's Program.

-Students who have completed at least three semesters in the Doctoral Program.

-Students who have completed at least five semesters in the Integrated Master's-Doctoral Program.

② Article 2-1 (Substitution of the Comprehensive Examination with Major Coursework)

The comprehensive examination may be substituted by completing designated major courses. The detailed implementation is as follows:

- Master's Program: Students who complete three or more major elective courses (excluding research elective courses) listed in the curriculum table with a grade of AO or higher shall be considered to have passed the major component of the comprehensive examination.

-Doctoral Program and Integrated Master's-Doctoral Program:Students who complete four or more major elective courses (excluding research elective courses) listed in the curriculum table with a grade of AO or higher shall be considered to have passed the major component of the comprehensive examination.

③ Article 2-2 (Examination Format for the Comprehensive Examination)

If the comprehensive examination is not substituted by completing major coursework, the examination shall be conducted as follows:

-Master's Program: The comprehensive examination shall consist of two major subjects.

-Doctoral Program and Integrated Master's-Doctoral Program: The comprehensive examination shall consist of three major subjects.

④ Article 3 (Scoring and Passing Criteria)

Each subject of the comprehensive examination shall be scored on a 100-point scale, and a score of 60 or higher shall be considered a passing grade.

⑤ Article 4 (Re-examination)

Students who fail the comprehensive examination may retake only the subjects they did not pass. There is no limit to the number of re-examinations, and students may change the subjects when retaking the examination.

7) Advisor Assignment

① Applicants should identify a preferred academic advisor and consult with the faculty member prior to submitting their application for admission.

② If an advisor has not been selected by the time of enrollment, the student shall consult with the Department Chair to finalize the advisor assignment.

③ At the end of the first semester, students must submit the Academic Advisor Assignment Form and obtain approval from the Department Chair.

④ When changing advisors due to reasons such as the retirement of the existing advisor, the previous advisor may be appointed as a co-advisor.

⑤ Faculty members from other departments may also be appointed as an advisor or co-advisor upon consultation with both the previous and newly assigned advisors.

8) Thesis Guidance, Presentation, and Evaluation Methods

① Students must select their thesis advisor in consultation with the Department Chair either before admission or within the first semester after admission. Until an advisor is selected, the Department Chair provides academic guidance, including course selection. If an advisor is changed, Master's Program students must receive at least six months of thesis guidance, and Integrated Master's-Doctoral and Doctoral Program students must receive at least one year of thesis guidance from the newly appointed advisor.

② Thesis Submission Eligibility

- Master's Program: Follows Article 25 (Thesis Submission Eligibility) of the Detailed Regulations for the Enforcement of the Graduate School Regulations.
- Integrated Master's-Doctoral Program and Doctoral Program: From admission until the submission of the thesis application, the following requirements must be satisfied: Students are eligible if they have a total Impact Factor (IF) of 5.0 or higher from SCIE-indexed publications in which the student is the first author and the advisor is the corresponding author. (For part-time students, the advisor must be either the corresponding author or a co-author.)

When applying for degree thesis evaluation, students must submit reprints or certificates of acceptance of their published papers to both the Department Chair and the Chair of the Thesis Examination Committee.

The degree thesis must be publicly presented at a designated venue prior to the thesis examination.
Doctoral candidates must submit an overview (abstract) of their thesis to the Department Chair at least two weeks prior to the public presentation. The Department Chair shall determine the presentation schedule and venue and notify the candidate. The advisor and the thesis guidance (examination) committee members must attend and evaluate the presentation.
Students who transferred their affiliation to the Department of Bionano Engineering due to the BK21 Plus program shall follow the regulations of their previous department, applicable only to students whose academic status changed in May 2013.

③ Selection of Thesis Examination Committee
- Examination committee members for Master's degree thesis examination shall be determined through consultation between the thesis advisor and the Department Chair.
- Doctoral Program students must form a thesis committee of three members before the end of the fourth semester after admission and hold a committee meeting to receive guidance on thesis research presentations. The committee chair shall be the advisor.

9) Other Provisions
For the efficient operation of the Department of Bionano Engineering, a Graduate Committee shall be established and operated, and matters not specified in these regulations shall follow the operational enforcement rules of this committee.

10) Implementation Date
These regulations shall take effect beginning in the first semester of the 2026 academic year and shall apply to all enrolled students and program completers of the Department of Bionano Engineering.

5. 2026-2027 Curriculum

Course Code	Course Title	Course Type	Degree Program	Credits	Lecture	Practice	Semester Offered
COE8026	Master's Thesis Research	Research Required	Master's	2	2	0	Every Semester
COE8027	Doctoral Thesis Research 1	Research Required	Master's and Doctoral	2	2	0	Every Semester
COE8028	Doctoral Thesis Research 2	Research Required	Master's and Doctoral	2	2	0	Every Semester
BNT0046	#Bionanotechnology	Major Elective	Master's and Doctoral	3	3	0	Offered Annually (First Semester Only)
BNT6002	★Bionanotechnology Research Methodology	Research Elective	Master's and Doctoral	3	3	0	2026-2

CHM8009	*Advanced Analytical Chemistry	Major Elective	Master's and Doctoral	3	3	0	2026-1
BNT0040	Special Topics in Nanoscience	Major Elective	Master's and Doctoral	3	3	0	2026-1
BNT0008	Proteomics	Major Elective	Master's and Doctoral	3	3	0	2026-1
BNT6010	#Bionanotechnology Engineering Applications	Major Elective	Master's and Doctoral	3	3	0	2026-1
BNT6012	Nucleic Acid Nanoengineering	Major Elective	Master's and Doctoral	3	3	0	2026-1
CMS8097	*Methods for AI and Computational Chemistry	Major Elective	Master's and Doctoral	3	3	0	2026-1
BNT0042	*#Bionanotechnology Convergence Technology Seminar 1	Major Elective	Master's and Doctoral	3	3	0	2026-1
BNT6011	Bionanochemistry	Major Elective	Master's and Doctoral	3	3	0	2026-1
CMS8085	*Energy Conversion Chemistry	Major Elective	Master's and Doctoral	3	3	0	2026-1
CMS8051	*Principles of Organic Chemistry	Major Elective	Master's and Doctoral	3	3	0	2026-1
APP0003	*Quantum Mechanics	Major Elective	Master's and Doctoral	3	3	0	Offered Annually (Second Semester Only)
BNT0041	Bionanotechnology Engineering	Major Elective	Master's and Doctoral	3	3	0	2026-2
BNT0051	Bionanotechnology Instrumental Analysis	Major Elective	Master's and Doctoral	3	3	0	2026-2
APP6007	*#Bionetwork Analysis	Major Elective	Master's and Doctoral	3	3	0	2026-2
BNT6003	Molecular Biotechnology	Major Elective	Master's and Doctoral	3	3	0	2026-2
CMS8088	Materials Physical Chemistry	Major Elective	Master's and Doctoral	3	3	0	2026-2
CMS8006	*Organic Material Structure Determination	Major Elective	Master's and Doctoral	3	3	0	2026-2
CMS8081	*#Advanced Nanomaterials Chemistry	Major Elective	Master's and Doctoral	3	3	0	2027-1
BNT6008	Advanced Physiology	Major Elective	Master's and Doctoral	3	3	0	2027-1
BNT0044	*#Bionanotechnology Convergence Technology Seminar 3	Major Elective	Master's and Doctoral	3	3	0	2027-1
BNT6009	*#Bio-Intelligence	Major Elective	Master's and Doctoral	3	3	0	2027-1
BNT0048	Convergence BIOMEMS/NEMS	Major Elective	Master's and Doctoral	3	3	0	2027-1
APP6008	*#Artificial Neural Networks and Bio Big Data	Major Elective	Master's and Doctoral	3	3	0	2027-1
BNT6005	Bio-Industry in the Fourth Industrial Revolution (FIR)	Major Elective	Master's and Doctoral	3	3	0	2027-2
BNT0016	Bionanotechnology Analytics	Major Elective	Master's and Doctoral	3	3	0	2027-2
BNT0045	*#Bionanotechnology Convergence Technology Seminar 4Major	Major Elective	Master's and Doctoral	3	3	0	2027-2
BNT0036	Bionanomaterials and Tissue Engineering	Major Elective	Master's and Doctoral	3	3	0	2027-2
BNT0037	Bionanophotonics	Major Elective	Master's and Doctoral	3	3	0	2027-2
DBC8070	*#Bio-Medical Technology Development	Major Elective	Master's and Doctoral	3	3	0	2027-2
BNT6006	#Diagnostic	Major Elective	Master's and	3	3	0	2027-2

	Engineering		Doctoral				
CMS8099	*#Medicinal Chemistry and AI-based Drug Discovery	Major Elective	Master's and Doctoral	3	3	0	2027-2

Notes:
Courses marked with * are cross-departmental major recognition courses.
Courses marked with # are Bionanotechnology Convergence Major courses.
★Research Elective courses are offered biennially (2026-2nd semester offering).

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https:// defenseintelinfo.hanyang.ac.kr

1. Educational Objectives

Nowadays, global conflicts and regional tensions around the Korean peninsula are increasing, Korea's ability to protect itself is more important than ever. This growing need highlights the value of cultivating experts who can lead the future of advanced defense technology and contribute to a safer, stronger nation. Strengthening national defense capabilities requires not only cutting-edge defense technology and improved strategies but also a significant expansion of highly specialized talent capable of leading innovation in advanced defense technologies. The Department of Intelligence, Information and Quantum Engineering aims to train highly practical experts optimized for advanced science and technology in national defense, defense and space industry. Our program provides education in artificial intelligence for defense, big data and information, ocean engineering, underwater acoustics, advanced materials, electro-magnetic warfare, laser technology, and quantum technology.

2. Areas of Specialization

Defense Intelligence, Information and Quantum Technology: Drone and unmanned aerial vehicle engineering, Defense AI, Big data, Network information and strategy for defense applications, Ocean engineering, Underwater acoustics, Advanced materials, Electro-magnetic warfare and Communications, Radar, Laser and Optical technology, Communications, and Quantum technology

3. Graduate School Faculty List

Name	Position	Degree	Area of Specialization	Research Areas
Jee Woong Choi	Professor	Ph.D. in Engineering	Underwater Acoustics	Underwater Sound Propagation, Target Tracking, Acoustic Signal Processing
Ji Won Kim	Professor	Ph.D. in Science	Laser Engineering	High-Power Laser Development, Laser Spectroscopy, Nonlinear Optics
Seong Won Shin	Professor	Ph.D. in Engineering	Marine Fluid Dynamics	Marine Fluid Dynamics, Marine Structural Dynamics, Coastal and Harbor Engineering
Bo Soo Kang	Professor	Ph.D. in Science	Condensed Matter Physics	Oxide electronics, Neuromorphic devices, Memory devices
Seung-Woo Son	Professor	Ph.D. in Science	Statistical Physics and Complexity Science	Complex Systems and Nonlinear Dynamics, Evolutionary Game Dynamics on Networks, Percolation and Phase Transitions, Statistical Inference and Machine Learning for Physical Systems, Computational Modeling and Simulation
Ji-Hyeok Huh	Professor	Ph.D. in Science	Nanophotonics	Photonics Metamaterials, Plasmonics, Cavity Quantum Electrodynamics, Colloidal Metatronics
Dong-Gyun Han	Professor	Ph.D. in Engineering	Underwater Acoustics	Passive acoustic monitoring, Underwater noise impact assessment, Bioacoustics, Acoustic modeling & simulation, AI & Data-Driven Acoustics

4. Department Regulations

This regulation aims to establish detailed matters necessary for the education and research guidance of graduate students belonging to this program, covering items not specified in the graduate school regulations, implementation rules, or engineering college regulations.

1) Admission

- Admission procedures follow the university's graduate regulations and admissions guidelines.
- Additional details follow the department's internal admissions policy.

2) Required Courses (Modified according to regulation amendments)

- The required credits for Master's Program shall be 27 credits or more including credits recognized as the same major.
- Master's students must complete at least 11 credits in major courses.

3) Required Courses

- Master's students must complete 5 research credits.
- Students must complete at least one of Advanced Defense Technology I and Advanced Defense Technology II for graduation

4) Prerequisite Courses

This program does not establish prerequisite courses.

5) Comprehensive Examination

- Article 1 (Eligibility)

a. Students who meet the following requirements may take the comprehensive examination:

b. Students who are on track for graduation
c. Students who have earned 18 or more credits
d. Students who have finished 2 major courses

- Article 2 (Comprehensive Examination Methods)

Master's Program: The comprehensive examination subjects consist of 2 subjects from the department's major courses.

- Article 3 (Scoring and Pass Criteria)

Each subject of the comprehensive examination shall be scored out of 100 points, with 60 points or higher considered passing.

- Article 4 (Re-examination)

a. Students who fail the comprehensive examination must retake it.
b. Students may retake failed subjects with no limit on attempts

6) Advisor Assignment

- Research labs are assigned based on prior consultation with preferred advisors before admission. Students who cannot be assigned to their desired research lab will be assigned an advisor and research lab through consultation with the department chair.
- At the end of the first semester, consult with the advisor and submit the advisor assignment application to the administrative team and obtain approval from the department chair.
- Faculty from other departments may also be appointed as advisors or co-advisors after consultation with both the previous and new advisors.
- The advisor provides guidance on course registration and study planning, credit management, thesis topic selection, and thesis writing.

7) Thesis Submission, Guidance, and Presentation Methods

- Degree Thesis Application Eligibility

Matters regarding degree thesis application eligibility follow Article 25, Chapter 4 of the Graduate School General Implementation Rules and engineering college regulations.: Master's Program students must present or publish at least 1 paper as lead author with their advisor at domestic academic conferences or higher-level venues before submitting their degree thesis.

- Degree Thesis Submission

Matters regarding qualification for thesis submission follow Article 25, Chapter 4 of the University Regulations Implementation Rules and graduate school engineering college regulations.

a. The submission period for degree theses for each degree program follows the university academic calendar.
b. The nature of theses for each degree program should systematically describe solid basic

knowledge of the major field and the academic validity of the topic.

- Thesis Review

Matters regarding thesis review follow Article 41, Chapter 4 of the University Regulations Implementation Rules.

8) Master's Degree Thesis Substitute System

a. Students with achievements of 1 or more papers published (including scheduled for publication) in eligible journals as a first author may substitute their Master's degree thesis.

- Domestic professional journals: KCI or KCI-candidate
- International professional journals: SCI, SSCI, A&HCI
- International general journals: SCIE, SCOPUS

(Other vague or non-standard journal categories are not accepted.)

b. Students wishing to substitute must submit their published paper achievements to the department chair with advisor approval in the thesis submission semester, and the department forms a review committee of 3 or more members to deliberate on the submitted materials within the thesis review period.

c. Other detailed matters follow the regulations regarding Master's degree thesis substitution.

8) Other Provisions

Matters not specified in this regulation shall follow graduate school regulations and implementation rules.

9) Implementation Date

This regulation shall be enforced starting with new students from 2026.

5. 2026-2027 Curriculum

Course Code	Course Title	Classification	Degree Program	Credits	Lecture	Practice	Semester Offered
COE8026	Master's Thesis Research	Research Requirement	Master	2	2	0	Every semesters
IIQ0001	Introduction to Advanced Defense Technology 1	Major Elective	Master	3	3	0	2026-1 2027-1
NNE6014	Laser Engineering and Application	Major Elective	Master	3	3	0	2026-1
IIQ0002	Underwater acoustic instrumentation and	Major Elective	Master	3	3	0	2026-1

	sensor engineering						
IIQ0003	Introduction to Unmanned systems Engineering 1	Major Elective	Master	3	3	0	2026-1
IIQ0004	Introduction to Advanced Defense Technology 2	Major Elective	Master	3	3	0	2026-2 2027-2
IIQ0005	Complex Intelligent Systems	Major Elective	Master	3	3	0	2026-2
IIQ0006	Introduction to Information Device Engineering	Major Elective	Master	3	3	0	2026-2
IIQ0007	Introduction to Nanophotonics	Major Elective	Master	3	3	0	2026-2
IIQ0008	Optical technology and Defense applications	Major Elective	Master	3	3	0	2027-1
IIQ0009	Networks and Information Science	Major Elective	Master	3	3	0	2027-1
IIQ0010	Introduction to Unmanned systems Engineering 2	Major Elective	Master	3	3	0	2027-1
IIQ0011	Dielectric Materials Engineering	Major Elective	Master	3	3	0	2027-2
IIQ0012	Plasmonics & Metamaterials	Major Elective	Master	3	3	0	2027-2
IIQ0013	Tracking and control engineering	Major Elective	Master	3	3	0	2027-2

Department of Intelligence and Information Engineering

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1. Educational Objectives

At a time when military risks around the Korean Peninsula are increasing internationally, there is a need to expand specialized development personnel in advanced defense technology fields to strengthen national defense capabilities. As society transforms into a highly knowledge-based society, the defense industry also requires specialized development personnel who possess software development capabilities, big data, and artificial intelligence technologies along with basic and applied technologies across the defense industry. The Department of Intelligence and Information Engineering aims to cultivate specialized research personnel who will lead the development of next-generation advanced defense industry technologies in response to the Fourth Industrial Revolution era.

2. Areas of Specialization

Area	Overview
Intelligent Information Convergence Engineering	Underwater acoustics, radar, laser engineering, wireless/mobile communications, information security, artificial intelligence, signal processing, mechanical engineering, fluid dynamics

3. Graduate School Faculty List

Name	Position	Degree	Area of Specialization	Research Areas
Choi, Ji-woong	Professor	Ph.D.	Underwater Acoustics	Underwater Sound Propagation, Target Tracking, Acoustic Signal Processing
Shin, Seong-won	Professor	Ph.D.	Marine Fluid Dynamics	Marine Fluid Dynamics, Marine Structural Dynamics, Coastal and Harbor Engineering
Kim, Ji-won	Professor	Ph.D.	Laser Engineering	High-Power Laser Development, Laser Spectroscopy, Nonlinear Optics
Jo, Seong-hyeon	Professor	Ph.D.	Wireless/Mobile Communications	Wireless Communication Theory, Mobile Communication Systems, Satellite Communications
Nam, Hae-woon	Professor	Ph.D.	Wireless Communications/Signal Processing	Communication Networks, Signal Processing, Embedded Software
Seo, Seung-hyeon	Professor	Ph.D.	Computer Science, Information Security	Blockchain Application Service Security, IoT/CPS Security, Cryptographic Algorithm/Cryptographic Protocol Design and Analysis
Scott Uk-Jin Lee	Professor	Ph.D.	Computer Science	Software Engineering
Ko, Hyun-suk	Associate Professor	Ph.D.	Image Signal Processing, Computer Vision, Artificial Intelligence	Deep Learning-based Image Signal Processing/Computer Vision
Lee, Yeon-jun	Associate Professor	Ph.D.	Information Security	Machine Learning/Cybersecurity
Kim, Wan-su	Associate Professor	Ph.D.	Mechanical Engineering	Human-Robot Interaction

Name	Position	Degree	Area of Specialization	Research Areas
Han, Dong-Gyun	Assistant Professor	Ph.D.	Underwaer acoustics	Underwater acoustic surveillance, Underwater acoustic M&S, Underwater acoustic environments in polar and strategic waters

4. Department Regulations

This regulation aims to establish detailed matters necessary for the education and research guidance of graduate students belonging to this program, covering items not specified in the graduate school regulations, implementation rules, or engineering college regulations.

1) Steering Committee

- The steering committee consists of 6 steering committee members appointed by Hanyang University and LIG Nex1 (3 from Hanyang University, 3 from LIG Nex1), and includes the Associate Dean of Graduate School (ERICA) as an observer without voting rights.
- The chairperson is selected from among Hanyang University's steering committee members. The steering committee convenes at the call of the steering committee chairperson, and steering committee members may request the chairperson to convene the steering committee when necessary.
- Regular meetings are held once annually to deliberate and approve the budget and settlement of department operating expenses, and to discuss all other matters necessary for department operations.

2) Admission

Admission procedures follow the regulations for special admissions of this department.

3) Required Credits (Modified according to regulation amendments)

The required credits for Master's Program shall be 27 credits or more, and major course credits must be at least 1/2 of the coursework credits (22 credits).

4) Required Courses

This program does not establish required courses. However, when necessary, courses may be designated according to decisions made by the department faculty meeting.

5) Prerequisite Courses

This program does not establish prerequisite courses.

6) Comprehensive Examination

- Article 1 (Eligibility)

Students who meet the following requirements may take the comprehensive examination: Students who have registered for 3 or more semesters in Master's Program and have earned 18 or more credits and have completed or can complete required courses.

- Article 2-1 (Comprehensive Examination Substitute Courses)

Comprehensive examinations may be substituted by completing major courses, with detailed implementation methods as follows: Master's Program: Students who complete 3 or more major courses with A0 or higher grades from Major Elective courses offered by their department (excluding Research Elective) may substitute this for passing the comprehensive examination major subjects.

- Article 2-2 (Comprehensive Examination Methods)

When students cannot substitute the comprehensive examination through major course completion, the detailed implementation methods for the comprehensive examination are as follows: Master's Program: The comprehensive examination subjects consist of 3 subjects from the department's major courses.

- Article 3 (Scoring and Pass Criteria)

Each subject of the comprehensive examination shall be scored out of 100 points, with 60 points or higher considered passing.

- Article 4 (Re-examination)

a. Students who fail the comprehensive examination must retake it.

b. If a Master's Program student fails only 1 subject, they may retake only that 1 subject in the following semester. If 2 or more subjects are failed, all subjects must be retaken. Subject changes are allowed when retaking.

7) Thesis Advisor Assignment

- Research labs are assigned based on prior consultation with preferred advisors before admission. Students who cannot be assigned to their desired research lab will be assigned an advisor and research lab through consultation with the department chair.
- At the end of the first semester, consult with the advisor and submit the advisor assignment application to the administrative team and obtain approval from the department chair.
- Faculty from other departments may also be appointed as advisors or co-advisors after consultation with both the previous and new advisors.
- The advisor provides guidance on course registration and study planning, credit management, thesis topic selection, and thesis writing.

8) Thesis Guidance, Presentation, and Evaluation Methods

- Degree Thesis Application Eligibility

Matters regarding degree thesis application eligibility follow Article 25, Chapter 4 of the Graduate School General Implementation Rules and engineering college regulations.: Master's Program students must present or publish at least 1 paper as lead author with their advisor at

domestic academic conferences or higher-level venues before submitting their degree thesis.

- Degree Thesis Submission

Matters regarding qualification for thesis submission follow Article 25, Chapter 4 of the University

Regulations Implementation Rules and graduate school engineering college regulations.

a. The submission period for degree theses for each degree program is June and December.

b. The nature of theses for each degree program should systematically describe solid basic knowledge of the major field and the academic validity of the topic.

- Thesis Review

Matters regarding thesis review follow Article 41, Chapter 4 of the University Regulations Implementation Rules.

- Master's Degree Thesis Substitute System

a. Students with achievements of 1 or more papers published (including scheduled for publication) in journals ranked at Korea Research Foundation registered level or higher may substitute their Master's degree thesis.

b. Students wishing to substitute must submit their published paper achievements to the department chair with advisor approval in the thesis submission semester, and the department forms a review committee of 3 or more members to deliberate on the submitted materials within the thesis review period.

c. Other detailed matters follow the regulations regarding Master's degree thesis substitution.

9) Other Provisions

Matters not specified in this regulation shall follow graduate school regulations and implementation rules.

10) Implementation Date

This regulation shall be enforced starting with the freshman class of 2023.

5. 2026-2027 Curriculum

Course Code	Course Title	Course Type	Degree Program	Credits	Lecture	Practice	Semester Offered
COE8026	Master's Thesis Study	Research Required	Master's	2	2	0	Offered Every semester
AIC6032	*Optimization for AI	Major Elective	Master's & Doctoral	3	3	0	2026-2
CCE0009	*Communication Protocol Engineering	Major Elective	Master's & Doctoral	3	3	0	2027-1
CIN6050	*Advanced Topics in Blockchain(FIR)	Major Elective	Master's & Doctoral	3	3	0	2027-2
CIN9079	*Introduction to Modern Cryptography	Major Elective	Master's & Doctoral	3	3	0	2026-1
CIN9094	*Data Compression(FIR)	Major Elective	Master's & Doctoral	3	3	0	2026-2
CIN9103	*Deep Learning-based Image Processing (FIR)	Major Elective	Master's & Doctoral	3	3	0	2027-2

Course Code	Course Title	Course Type	Degree Program	Credits	Lecture	Practice	Semester Offered
CIN9107	*Deep Learning-based Radar Signal Processing (FIR)	Major Elective	Master's & Doctoral	3	3	0	2027-2
CSE9114	*Deep Generative Models	Major Elective	Master's & Doctoral	3	3	0	2026-1
EMS6040	*Advanced Tide and Wave Mechanics	Major Elective	Master's & Doctoral	3	3	0	2027-1
IIE0003	C Language Programming	Major Elective	Master's & Doctoral	3	3	0	2027-1
IIE0005	Defense Software Quality Management	Major Elective	Master's & Doctoral	3	3	0	2026-1
RES8014	*Wireless Communication Systems	Major Elective	Master's & Doctoral	3	3	0	2027-1
IIE0004	Software Quality	Major Elective	Master's & Doctoral	3	3	0	2026-2
IIE0006	Research Methods in Intelligence and Information Engineering	Major Elective	Master's & Doctoral	3	3	0	Offered Annually (second semester)
IIE0007	Introduction to Human-Robot Interaction	Major Elective	Master's & Doctoral	3	3	0	2026-2
IIE0008	AI and Cybersecurity	Major Elective	Master's & Doctoral	3	3	0	2026-1
IIE0009	Physical and Numerical Modeling for Ocean Engineering	Major Elective	Master's & Doctoral	3	3	0	2026-2
IIE0010	Sonar System Engineering	Major Elective	Master's & Doctoral	3	3	0	2026-1
IIE0011	Pretrained Language Models	Major Elective	Master's & Doctoral	3	3	0	2027-2
IIE0012	Advanced Data Communications	Major Elective	Master's & Doctoral	3	3	0	2026-2
EMS8033	*Underwater Acoustic Signal Processing	Major Elective	Master's & Doctoral	3	3	0	2026-2
ROB0005	*Robotics	Major Elective	Master's & Doctoral	3	3	0	2027-1

Note: Courses marked with * are recognized as major credits from other departments.