# Detailed Enforcement Rules for the Graduate School Curriculum of the Department of Electronics and Information Convergence Engineering

Effective September 1, 2025

□ 학과명: 전자정보융합공학과(영문명: Department of Electronics and Information Convergence Engineering)
- 전자공학전공(영문명: Electronic Engineering)
- 생체의공학전공(영문명: Biomedical Engineering)
- 의료인공지능전공(영문명:Major of AI for Healthcare and Medicine)

□ 학위종: 공학석사/공학박사
(영문학위명: Master of Engineering/
Doctor of Philosophy in Electronics and Information Convergence Engineering)

## CHAPTER 1 GENERAL PROVISIONS

Article 1 (Purpose) ① The purpose of these Detailed Enforcement Rules is to specify the requirements for obtaining a degree in the aforementioned graduate program.

② Any person seeking to obtain a degree shall satisfy all requirements stipulated in the Graduate School Regulations, the Detailed Enforcement Rules of the Graduate School Regulations, the Internal Regulations of the Graduate School, and these Detailed Enforcement Rules.

Article 2 (Educational Objectives) ① The educational objectives of the department are as follows:

1. Core Foundational Education: Provide strengthened core foundational education to nurture experts in electronics and information convergence engineering capable of achieving sustainable growth
2. Self-Directed Education: Encourage proactive learning centered on PBL and discussions to foster leading talents in knowledge creation
3. Creative Convergence Education: Offer interdisciplinary education to cultivate leaders in electronics and information convergence engineering who can create and deliver value
4. Industrial Innovation Education: Promote industry-academia cooperation and deliver global education to develop innovative talents who will lead emerging industries

Article 3 (General Principles) ① Students enrolled in the Electronics and Information Convergence Engineering program must complete the required coursework as prescribed by these Detailed Enforcement Rules.

② Course selection shall be determined in consultation with the academic advisor.

③ Students are advised to review the eligibility criteria and the semester in which each course is offered, as

outlined in [Appendix 1] Curriculum.

Article 4 (Career and Employment Fields) ① Career and employment fields for graduates of the department include the following:

1. Equipment and Device Industry: Mobile phones, base stations, vehicle/drone terminals, tablets/TVs, AR/VR devices
2. Service Industry: Telecommunications, broadcasting, content, smart factories, and various Internet of Things (IoT) services
3. Component Industry: Communication components such as RF circuits and antennas, sensors, batteries, and wearable devices
4. Medical and Bio Industry: AI-powered human care and remote diagnosis services, and *in vitro* diagnostic biosensors

## CHAPTER 2 CURRICULUM BY MAJOR

Article 5 (Basic Structure of the Curriculum) ① Students who wish to graduate from the Department of Electronics and Information Convergence Engineering (or complete the program) must earn the required credits from required major courses, major elective courses, and common courses as specified in [Table 1]. At least 12 credits must be obtained from the designated curriculum specified in [Appendix 1].

② Students may take courses offered by other majors within the Department of Electronics and Information Convergence Engineering, and such courses may be recognized as major Elective credits.

③ Credits earned from courses offered by other departments may be recognized as major Elective credits within the transferable credit limit specified in [Table 1].

④ Thesis supervision credits and prerequisite course credits are not counted toward the graduation credit requirement.

[Table 1] Basic Structure of the Curriculum

| Department (Majors) | Program | Credits | | | | Allowable Credits from Courses for Other Majors |
|---|---|---|---|---|---|---|
| | | Required Major Courses | Major Elective Courses | Common Courses | Total | |
| Electronics and Information Convergence Engineering (Electronic Engineering, Biomedical Engineering, and AI for Healthcare and Medicine) | Master's Program | - | 24 | - | 24 | 24 |
| | Doctoral Program | - | 36 | - | 36 | 36 |
| | Integrated Master's and Doctoral Program | - | 60 | - | 60 | 60 |

Article 6 (Curriculum) ① The curriculum is as follows:

1. Curriculum : Refer to <Appendix 1. Curriculum>
2. Course Descriptions: Refer to <Appendix 2. Course Descriptions>

② Course selection shall be determined in consultation with their advisor and the department chair of the graduate school.

Article 7 (Prerequisite Courses) ① The following students shall complete prerequisite courses as specified below:

1. Students Concerned: a. Students admitted to a department (major) different from the department (major) of their lower-level degree program (non-cognate admissions)

b. Graduates of special graduate schools admitted before September 2022 (regardless of cognate/non-cognate status)

2. Required Prerequisite Credits: 9 credits for Master's program and 12 credits for Doctoral program and Integrated Master's-Doctoral program
3. List of Prerequisite Courses: Refer to major courses offered in the undergraduate programs of the Department of Electronic Engineering and Department of Biomedical Engineering at this university

② Notwithstanding the above paragraph, students may be granted partial or full exemption from additional prerequisite credit requirements if credits earned in a previous degree program are approved by the department head, following verification by their advisor and the department chair on the prescribed credit-recognition form.

③ Prerequisite credits shall not be counted toward graduation (completion) credit requirement.

④ Students required to complete prerequisite credits who fail to satisfy the requirements specified in Paragraph 1 of this Article shall not be eligible for program completion or graduation.

Article 8 (Recognition of Credits from Other Departments) ① With approval from their advisor and the department chair, students may take major courses from other departments within the General Graduate School, and the earned credits may be recognized as major elective course credits within the limit of transferable credits specified in [Table 1] Basic Structure of the Curriculum.

② If a student changes department or major through transfer, previously earned credits may be recognized toward graduation requirements within the limit of transferable credits upon approval by the department chair.

Article 9 (Common Courses of the Graduate School) When taking "common courses (convergence education courses)" offered by the Graduate School for all graduate students, credits may be recognized toward completion (graduation) requirements upon approval by the advisor and department chair.

Article 10 (Coursework at Other Graduate Schools) ① Students may earn credits at graduate schools within or outside the university through credit exchange programs.

② Matters concerning credit exchange shall follow the Detailed Enforcement Rules of Kyung Hee University Graduate School Regulations and the Internal Regulations of the General Graduate School.

Article 11 (Recognition of Credits Earned Prior to Admission) ① Credits earned prior to admission may be recognized toward graduation (completion) requirements upon submission of a credit recognition application and approval by the department chair and the head of the relevant division.

1. If courses equivalent to those in the current curriculum were completed in an equivalent degree program prior to admission: Up to 6 credits may be recognized for the Master's Program and up to 9 credits for the Doctoral Program.
2. For transfer students: Up to one-half of the credits required for graduation may be recognized from credits earned at the previous graduate school, upon approval following an evaluation.
3. - If a student completed courses offered by this university's General Graduate School during their undergraduate program and earned a grade of B or higher (limited to credits exceeding those required for the bachelor's degree): Up to 6 credits may be recognized.

## CHAPTER 3 GRADUATION REQUIREMENTS

Article 12 (Program Completion) ① Students who satisfy all of the following requirements shall be recognized as having completed the program:

1. Completed all required registrations for the standard program duration of the respective program
2. Completed all required credits specified in Article 5 for the relevant curriculum
3. Attained a cumulative GPA of 2.7 or higher
4. Fulfilled all other requirements specified in higher-level regulations such as Graduate School Regulations and Internal Regulations

② Students required to complete prerequisite courses must earn the prescribed prerequisite credits. However, prerequisite credits shall not be counted toward the credits required for program completion.

③ For credits recognized from other departments and common courses, only the credits specified in each of the above provisions shall be counted toward the credits required for program completion.

Article 13 (Graduation) ① To obtain a degree from the Department of Electronic and Information Convergence Engineering, all graduation requirements specified in [Table 2] must be satisfied.

② Only students who have fulfilled or are expected to fulfill all requirements in [Table 2] may submit and request examination of their thesis/dissertation for degree conferral.

[Table 2] Graduation Requirements

| Department (Major) | Program | Graduation Requirements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Completion Requirements | | | | | | | | | |
| | | Credits Required for Graduation (Completion) | | | | | Prerequisite Credits (Limited to non-cognate admissions) | Qualifying Exam | Research Registration | Publication Requirement | Thesis/Dissertation |
| | | Program Duration | Major Required | Major Elective | Common | Total | | | | | |
| Electronics and Information Convergence Engineering (Electronic Engineering, Biomedical Engineering, and AI for Healthcare and Medicine) | Master's Program | 2 years (4 semesters) | - | 24 | - | 24 | 9 | Pass (see Article 14) | Payment required (for students who have completed the coursework) | Pass (see Article 16) | Pass (see Article 15) |
| | Doctoral Program | 2 years (4 semesters) | - | 36 | - | 36 | 12 | | | | |
| | Integrated Master's and Doctoral Program | 4 years (8 semesters) | - | 60 | - | 60 | 12 | | | | |

1. Students admitted through early admission or an integrated bachelor's and master's program may reduce the required period of study by one semester upon satisfying completion requirements.
2. Students in the integrated master's and doctoral program may reduce the required period of study by one semester upon satisfying completion requirements.
3. Students in the integrated master's and doctoral program may obtain a master's degree upon satisfying the completion and degree requirements equivalent to the standalone master's program (graduation/completion requirement: 30 credits).
4. Students admitted with non-cognate degrees must complete additional prerequisite credits pursuant to Article 7 (prerequisite credits are not counted toward graduation/completion credit requirements).

③ Research registration applies only to students who have completed all coursework, and the fee must be paid once

after program completion and before the submission of the thesis/dissertation for degree conferral.

Article 14 (Qualifying Examination) ① For doctoral programs, students must pass the qualifying examination (public presentation) before requesting dissertation examination. Students who fail cannot submit their dissertation for degree conferral.

② The qualifying examination (public presentation) must satisfy the following conditions:

- The student may take the examination in the semester in which the dissertation is submitted.
- The public presentation must be attended by at least three full-time faculty members from the department, including the advisor. However, if there are fewer than three full-time faculty members in the department, faculty members appointed by the advisor may attend.
- The public presentation shall be open to everyone.
- Attending faculty members or observers may pose questions related to the dissertation to the presenter, and the presenter must respond to such questions.

③ The qualifying examination (public presentation) shall be evaluated on a Pass (P) or Fail (N) basis.

④ The result of passing the qualifying examination (public presentation) shall remain valid for a total of 5 semesters including the semester in which the student passed the examination. After this period, the student must retake the qualifying examination (public presentation).

⑤ Qualifying examinations (public presentations) are not administered for master's programs.

## CHAPTER 4 DEGREE CONFERRAL

Article 15 (Thesis/Dissertation Examination for Degree Conferral) ① Students who have satisfied or are expected to satisfy all requirements specified in Articles 13 and 14 in the current semester may submit their thesis/dissertation and request examination thereof for degree conferral. However, students submitting their thesis/dissertation under a "program completion" status must request examination only after completing research registration.

② Thesis/dissertation examination shall consist of review and oral examination.

③ Thesis/dissertation approval requires the affirmative vote of at least two-thirds of examination committee members for a master's degree and at least four-fifths for a doctoral degree.

④ The chair of thesis/dissertation examination committee shall submit the result of the thesis/dissertation examination to the head of the relevant division within the prescribed period after completing the examination.

⑤ All other matters related to the thesis/dissertation examination shall follow the Internal Regulations of the General Graduate School.

Article 16 (Publication Requirements) ① To obtain the relevant degree, paper publication records shall be submitted separately from the submission of the thesis/dissertation for degree conferral.

② Publication requirements for each type of program are as follows:

| Degree Program | Category | Details |
|---|---|---|
| Master's Program | National Research Foundation of Korea | Publication (including submission) in KCI-listed or KCI-candidate journals |
| | International journals | Publication (including submission) in journals indexed in SCIE, SSCI, A&HCI, ESCI, or SCOPUS |
| | Presentations at conferences | Presentation at international conferences or conferences of societies that publish journals listed as KCI or KCI-candidate |
| Doctoral Program | International journals | Publication (including accepted for publication) in journals indexed in SCIE, SSCI, or A&HCI<br>* Those who submit acceptance certificates must submit offprints of the published paper within 30 days of publication. Failure to submit offprints may result in degree revocation through established procedures. |

* Conference presentations and publications specified in Article 16, Paragraph 2 must list Kyung Hee University as the author's institutional affiliation. Recognition is granted only when the student's advisor is the corresponding author.
* No double counting: Publications submitted as graduation requirements under various regulations such as those of the graduate school or the department shall not be recognized if they have already been used to obtain financial support (e.g., journal publication scholarships) from other funding sources.

③ For doctoral programs, in the case of co-authored publications, the student must be either the first author or the corresponding author.

Article 17 (Degree Conferral) ① A degree shall be conferred only upon students who have received approval through the thesis/dissertation examination process specified in Article 15.

② Students approved for degree conferral must submit the required publication records under Article 16 and all necessary graduation documents to the head of the relevant division in accordance with the prescribed procedures.

## CHAPTER 5 SUPPLEMENTARY PROVISIONS

Article 18 (Other Matters) ① Journal articles submitted by international students to meet graduation requirements shall include the advisor as a co-author.

② International students shall participate in (advisor-led) departmental projects in addition to undertaking individual studies.

③ Credits earned from courses taken from undergraduate programs shall not be recognized as major elective course credits.

[Addenda 1]

① Effective Date: July 1, 2020

② Transitional Measures: Students admitted before the effective date of these Detailed Enforcement Rules shall follow the former curriculum of the relevant department; however, the new curriculum may be applied when necessary.

[Addenda 2]

① Effective Date: These internal regulations shall take effect on March 1, 2021.

② Transitional Measures: Students admitted before the effective date of these Detailed Enforcement Rules shall follow the former curriculum of the relevant department; however, the new curriculum may be applied when necessary.

[Addenda 3]

① Effective Date: These internal regulations shall take effect on March 1, 2022.

[Addenda 4]

① Effective Date: These internal regulations shall take effect on March 1, 2023.

② Transitional Measures: Students admitted before the effective date of these Detailed Enforcement Rules shall follow the former curriculum of the relevant department; however, the new curriculum may be applied when necessary.

[Addenda 5]

① Effective Date: These internal regulations shall take effect on March 1, 2024.

② Transitional Measures: Students admitted before the effective date of these Detailed Enforcement Rules shall follow the former curriculum of the relevant department; however, the new curriculum may be applied when necessary.

[Addenda 6]

① Effective Date: These internal regulations shall take effect on March 1, 2025.

② Transitional Measures: Students admitted before the effective date of these Detailed Enforcement Rules shall follow the former curriculum of the relevant department; however, the new curriculum may be applied when necessary.

[Addenda 7]

① Effective Date: September 1, 2025

② Transitional Measures:

1. Students admitted before the effective date of these Detailed Enforcement Rules shall follow the former curriculum of the relevant department; however, the new curriculum may be applied when necessary.

[Appendix 1]

# Curriculum (Electronic Engineering Major & Biomedical Engineering Major)

| No. | Course Type | Course Number | Course | Credits | Applicability | | Class Type | | | | Available Semester | | Remarks | Course Category | Operation by Semester |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Master's | Doctoral | Theory | Lab | Practice | Design | 1st Semester | 2nd Semester | | | |
| 1 | Major Elective | - | Research Ethics | 3 | ○ | ○ | ○ | | | | ○ | ○ | | Common | 3/3classes |
| 2 | Major Elective | EIC7003 | Master's Thesis Research | 3 | ○ | | ○ | | | | ○ | ○ | | Major Research | |
| 3 | Major Elective | EIC8001 | Doctoral Dissertation Research | 3 | | ○ | ○ | | | | ○ | ○ | | | |
| 4 | Major Elective | EIC7004 | Communication Mathematics 1 | 3 | ○ | ○ | ○ | | | | ○ | | | Major Core | 2classes (2 lecturers/ class) |
| 5 | Major Elective | EIC7005 | Communication Mathematics 2 | 3 | ○ | ○ | ○ | | | | ○ | | | | |
| 6 | Major Elective | EIC7038 | Digital Communication Systems | 3 | ○ | ○ | ○ | | | | | ○ | | | |
| 7 | Major Elective | EIC7039 | Signal Processing for Communications | 3 | ○ | ○ | ○ | | | | ○ | | | | |
| 8 | Major Elective | EIC7007 | Artificial Intelligence | 3 | ○ | ○ | ○ | | | | | ○ | | | |
| 9 | Major Elective | EIC7008 | Electromagnetics and Microwave Engineering | 3 | ○ | ○ | ○ | | | | | ○ | | | |
| 10 | Major Elective | EIC7009 | Communication Integrated Circuits | 3 | ○ | ○ | ○ | | | | ○ | | | | |
| 11 | Major Elective | EIC7010 | Optoelectronics and Optical Communication | 3 | ○ | ○ | ○ | | | | ○ | | | | |
| 12 | Major Elective | EIC7011 | Biosignal Measurements | 3 | ○ | ○ | ○ | | | | | ○ | | | |
| 13 | Major Elective | EIC7012 | Wireless Communications | 3 | ○ | ○ | ○ | | | ○ | ○ | | | Major Intensive | 3classes |
| 14 | Major Elective | EIC7013 | Mobile Communication Systems | 3 | ○ | ○ | ○ | | | ○ | ○ | | | | |
| 15 | Major Elective | EIC7040 | Wireless Networks | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 16 | Major Elective | EIC7045 | Distributed Networks | 3 | ○ | ○ | ○ | | | | ○ | | | | |
| 17 | Major Elective | EIC7048 | Ultra-Realistic Media Transmission Systems (TTA Standards Expert Training Program) | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 18 | Major Elective | EIC7049 | Ultra-Realistic Media Compression Systems (TTA Standards Expert Training Program) | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 19 | Major Elective | EIC7015 | Optimization Theory and Applications | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 20 | Major | EIC7016 | Machine Learning and | 3 | ○ | ○ | ○ | | | ○ | ○ | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Elective | | Pattern Recognition | | | | | | | | | | | | |
| 21 | Major Elective | EIC7046 | Machine Learning and Pattern Recognition | 3 | ○ | ○ | ○ | | | | | ○ | | | |
| 22 | Major Elective | EIC7047 | Deep-Learning Programming (formerly, EIC7017 Information and Coding Theory) | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 23 | Major Elective | EIC7018 | Advanced Electromagnetics | 3 | ○ | ○ | ○ | | | ○ | ○ | | | | |
| 24 | Major Elective | EIC7019 | Antenna Engineering | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 25 | Major Elective | EIC7041 | RF Integrated Circuit Design | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 26 | Major Elective | EIC7021 | Quantum Electronics | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 27 | Major Elective | EIC7023 | Biophotonics and Biosensor Technology | 3 | ○ | ○ | ○ | | | ○ | ○ | | | | |
| 28 | Major Elective | EIC7024 | Wireless Communication Convergence | 3 | ○ | ○ | ○ | | | ○ | ○ | | | Major Convergence | 5classes (over 3 lectures /class) |
| 29 | Major Elective | EIC7025 | Wireless Network Convergence | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 30 | Major Elective | EIC7044 | Quantum Communication Convergence | 3 | ○ | ○ | ○ | | | ○ | ○ | | | | |
| 31 | Major Elective | EIC7027 | Wireless Energy Convergence | 3 | ○ | ○ | ○ | | | ○ | ○ | | | | |
| 32 | Major Elective | EIC7028 | Communication Circuit Convergence | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 33 | Major Elective | EIC7029 | Communication Sensor Convergence | 3 | ○ | ○ | ○ | | | ○ | ○ | | | | |
| 34 | Major Elective | EIC7043 | Human ICT Convergence | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 35 | Major Elective | EIC7031 | Future Communication Convergence Engineering | 3 | ○ | ○ | ○ | | | ○ | | ○ | | | |
| 36 | Major Elective | EIC7032 | Convergence Future Communication Project 1 | 3 | ○ | ○ | | | | ○ | ○ | | | | |
| 37 | Major Elective | EIC7033 | Convergence Future Communication Project 2 | 3 | ○ | ○ | | | | ○ | | ○ | | | |
| 38 | Major Elective | EIC7036 | Convergence Future Communication Colloquium 1 (P/F) | 3 | ○ | ○ | ○ | | | | | ○ | P/F evaluation | | |
| 39 | Major Elective | EIC7037 | Convergence Future Communication Colloquium 2 (P/F) | 3 | ○ | ○ | ○ | | | | ○ | | P/F evaluation | | |

[Appendix 1-1]

# Curriculum (AI for Healthcare and Medicine Major)

| No. | Course Type | Course Number | Course | Credits | Applicability | | Class Type | | | | Available Semester | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Master's | Doctoral | Theory | Lab | Practice | Design | 1st Semester | 2nd Semester | |
| 1 | Major Elective | AI7059 | Advanced Natural Language Processing | 3 | ○ | ○ | 3 | | | | ○ | | |
| 2 | Major Elective | AI7060 | Multimodal Information Retrieval | 3 | ○ | ○ | 3 | | | | | ○ | |
| 3 | Major Elective | AI7061 | Integrated Medical Research Methodology 2 | 3 | ○ | ○ | 3 | | | | ○ | | |
| 4 | Major Elective | BME783 | Bio-Health Data Computing | 3 | ○ | ○ | 3 | | | | ○ | | |
| 5 | Major Elective | DPM7055 | Computational Thinking and Algorithms | 3 | ○ | ○ | 3 | | | | | ○ | |
| 6 | Major Elective | BME785 | Digital Medical Devices and Systems | 3 | ○ | ○ | 3 | | | | ○ | | |
| 7 | Major Elective | BME780 | Applications in Deep Learning | 3 | ○ | ○ | 3 | | | | | ○ | |
| 8 | Major Elective | BME751 | Bio Signal Processing | 3 | ○ | ○ | 3 | | | | ○ | | |
| 9 | Major Elective | EIC7016 | Machine Learning and Pattern Recognition | 3 | ○ | ○ | 3 | | | | | ○ | |
| 10 | Major Elective | DPM7056 | Python-based AI Programming | 3 | ○ | ○ | 3 | | | | ○ | | |
| 11 | Major Elective | DPM7057 | Python-based AI programming | 3 | ○ | ○ | 3 | | | | ○ | | |
| 12 | Major Elective | BME787 | AI Programming | 3 | ○ | ○ | 3 | | | | | ○ | |
| 13 | Major Elective | DPM7058 | Big Data Processing | 3 | ○ | ○ | 3 | | | | | ○ | |
| 14 | Major Elective | DPM7059 | Integrative Medicine Research Methodology | 3 | ○ | ○ | 3 | | | | | ○ | |
| 15 | Major Elective | DPM7060 | Biohealth Data Technology Colloquium | 3 | ○ | ○ | 3 | | | | ○ | | |
| 16 | Major Elective | DPM7061 | Medical Data and AI Modeling | 3 | ○ | ○ | 3 | | | | | ○ | |
| 17 | Major Elective | DPM7062 | AI-based Medical Decision and Prediction | 3 | ○ | ○ | 3 | | | | ○ | | |
| 18 | Major Elective | DPM7063 | Automatic Processing and Analysis of Medical Data | 3 | ○ | ○ | 3 | | | | ○ | | |
| 19 | Major Elective | DPM7064 | Integrative Medical AI | 3 | ○ | ○ | 3 | | | | | ○ | |

| No. | Course Type | Course Number | Course | Credits | Applicability | | Class Type | | | | Available Semester | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Master's | Doctoral | Theory | Lab | Practice | Design | 1st Semester | 2nd Semester | |
| 20 | Major Elective | DPM7064 | Corporate Associated Project | 3 | ○ | ○ | 3 | | | | ○ | | |
| 21 | Major Elective | BME823 | Internation Research 1 | 3 | ○ | ○ | 3 | | | | ○ | | |
| 22 | Major Elective | BME786 | Multimodal AI for Integrative Medicine | 3 | ○ | ○ | 3 | | | | ○ | | |
| 23 | Major Elective | BME784 | Multimodal AI for Emergency Medicine | 3 | ○ | ○ | 3 | | | | | ○ | |

[별표2]

# 교과목 해설

• 연구윤리 (Research Ethics)
본 과목은 대학원 공통과목으로 연구윤리에 대한 일반교육으로 진행된다.
This course introduces general ethics of science for a rational research environment and culture.

• 석사논문연구 (Master Thesis Research)
본 과목은 융합미래통신 분야 석사학위 연구를 위해 지도교수 연구지도로 진행된다.
Students are advised by their advisors for MS degree thesis on emerging communication convergence technologies.

• 박사논문연구 (Doctoral Dissertation Research)
본 과목은 융합미래통신 분야 박사학위 연구를 위해 지도교수 연구지도로 진행된다.
Students are advised by their advisors for PhD degree thesis on emerging communication convergence technologies.

• 통신수학1 (Communication Mathematics I)
본 과목은 통신응용 확률론, 랜덤신호, 검출, 추정 개념모듈별 전문교육으로 진행된다.
This course covers statistics topics on communications, including probability theory, random signals, detection and inference, and so on.

• 통신수학2 (Communication Mathematics 2)
본 과목은 통신응용 선형대수, 선형·비선형최적화 개념모듈별 전문교육으로 진행된다.
This course covers applied mathematics topics on communications, including linear algebra, linear and nonlinear optimization, and so on.

• 디지털통신시스템 (Digital Communication Systems)
본 과목은 디지털 통신 기본 이론과 디지털통신 시스템 설계 기초 개념모듈별 전문교육으로 진행된다.
This course covers basic principles and designs of digital communication systems.

• 통신신호처리 (Signal Processing for Communications)
본 과목은 디지털 신호처리와 통신 신호처리 기법에 대한 기초 개념모듈별 전문교육으로 진행된다.
This course covers digital signal processing and signal processing techniques for communications.

• 인공지능 (Artificial Intelligence)
본 과목은 머신러닝, 패턴인식 및 인공지능 기초 개념모듈별 전문교육으로 진행된다.
This course covers fundamental topics on artificial intelligence, including machine learning and pattern recognition.

• 전자기학및초고주파 (Electromagnetics and Microwave Engineering)
본 과목은 전자기학, 초고주파회로 해석·설계 개념모듈별 전문교육으로 진행된다.
This course covers academic modules including electromagnetics, microwave circuit analysis and design.

• 통신집적회로 (Communication Integrated Circuits)
본 과목은 통신변조, 아날로그 회로, RF회로 개념모듈별 전문교육으로 진행된다.
This course covers essential circuit components used for communication such as signal modulation, analog circuits, and RF circuits.

• 광전자및광통신 (Optoelectronics and Optical Communication)
본 과목은 광및반도체, 광통신, 통신용 광전자소자 개념모듈별 전문교육으로 진행된다.
This course covers academic modules on optical communication including optics and semiconductors, and optoelectronic devices.

• 생체신호계측 (Biosignal Measurements)
본 과목은 계측용 센서, 신호처리, 생체모델링 개념모듈별 전문교육으로 진행된다.
This course covers biosignal measurement techniques including measurement sensors, signal processing, and biosystems modeling.

• 무선통신 (Wireless Communication)
본 과목은 최신 무선통신 기법 심화학습과 실제 응용에 대한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on wireless communication and its applications.

• 이동통신시스템 (Mobile Communication Systems)
본 과목은 이동통신시스템과 표준에 관련하여 산학협력을 통한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures with industrial collaborations on mobile communication systems and standardization.

• 무선통신네트워크 (Wireless Networks)
본 과목은 무선 및 이동 네트워크에 대한 심화학습과 최신 기술에 대해 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on wireless and mobile networks and their recent developments.

• 분산네트워크 (Distributed Networks)
본 과목은 엣지 컴퓨팅, 무선 캐싱, 분산 학습 등 최신 분산 기술들을 학습하고, 이를 통합할 수 있는 분산 시스템의 설계 사례에 대한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on modern techniques for distributed networks such as edge computing, wireless caching, and distributed learning, toward the distributed system integrating them.

• 최적화이론및응용 (Optimization Theory and Applications)
본 과목은 최적화이론의 심화내용과 통신 및 기타 응용에 대한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on mathematical optimization theory and its applications on communication systems and other engineering disciplines.

• 머신러닝및패턴인식 (Machine Learning and Pattern Recognition)
본 과목은 머신러닝과 패턴인식 심화내용과 응용에 대한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on machine learning and its applications on pattern recognition.

• 강화학습 (Reinforcement Learning)
본 과목은 마르코프 결정 과정, 강화학습의 기초 이론부터 다양한 심층 강화학습 알고리즘에 대해 학습하며 PLB 강의로 진행된다.
This course contains a series of PLB type lectures on Markov decision process, basic reinforcement learning theory, and deep reinforcement learning algorithms.

• 딥러닝프로그래밍 (Deep-Learning Programming) (구. 정보및코딩이론)
본 과목은 딥러닝의 기초와 딥러닝을 위한 프로그래밍 방법을 학습하는 PLB 강의로 진행된다.
This course contains a series of PLB type lectures on deep learning fundamentals and programming methods for deep learning.

• 고급전자기학 (Advanced Electromagnetics)
본 과목은 무선통신의 전자파 분포 및 전파에 대한 다양한 해석적 방법을 학습한다.
This course covers a variety of analytic techniques for understanding electromagnetic wave distribution and propagation.

• 안테나공학 (Antenna Engineering)
본 과목은 안테나공학 이론을 기반으로 배열안테나를 설계하는 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on antenna engineering and array antenna design.

• RF집적회로설계 (RF Integrated Circuit Design)
본 과목은 RF 회로설계 및 무선통신시스템 구현에 대한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on RF circuit design and wireless communication systems implementation.

• 양자전자공학 (Quantum Electronics)
본 과목은 양자역학의 심화학습과 광학과 레이저 응용에 대한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on applied quantum electronics, optics, and laser applications.

• 생체광학및센서기술 (Biophotonics and Biosensor Technology)
본 과목은 광학 기술의 바이오 센서 시스템에의 응용에 대한 PBL 강의로 진행된다.
This course contains a series of PBL type lectures on optics applications to biophotonics and biosensor systems.

• 무선통신융합 (Wireless Communication Convergence)
본 과목은 5G, 테라헤르츠, 머신러닝응용 개념모듈별 융합교육으로 진행된다.
This course covers convergence engineering technologies from 5G technologies, terahertz waves, and machine learning applications.

• 무선네트워크융합 (Wireless Network Convergence)
본 과목은 통신네트워크, 인공지능, 최적화응용 개념모듈별 융합교육으로 진행된다.
This course covers convergence engineering technologies from communication networks, artificial intelligence, applied optimization, and so on.

• 양자통신융합 (Quantum Communication Convergence)
본 과목은 양자물리, 정보이론, VLC, 양자통신 개념모듈별 융합교육으로 진행된다.
This course covers convergence engineering technologies from quantum physics, VLC, quantum communication, and so on.

• 무선에너지융합 (Wireless Energy Convergence)
본 과목은 무선전력전송, 에너지하베스팅 개념모듈별 융합교육으로 진행된다.

This course covers convergence engineering technologies from wireless power transmission, energy harvesting, and so on.

• 통신회로융합 (Communication Circuit Convergence)
본 과목은 5G, 테라헤르츠, 초고주파회로에 대한 개념모듈별 융합교육으로 진행된다.
This course covers convergence engineering technologies from 5G technologies, terahertz wave, microwave circuits, and so on.

• 통신센서융합 (Communication Sensor Convergence)
본 과목은 저전력통신, 웨어러블센서, 생체인터넷 개념모듈별 융합교육으로 진행된다.
This course covers convergence engineering technologies from low-power communication, wearable sensors, and biomedical IoT devices.

• 휴먼ICT융합 (Human ICT Convergence)
본 과목은 5G, ICT 및 인공지능 기반 휴먼케어에 대한 개념모듈별 융합교육으로 진행된다.
This course covers convergence engineering technologies from 5G technologies and AI-based human-care technologies.

• 미래통신융합공학 (Future Communication Convergence Engineering)
본 과목은 융합미래통신 전 분야에 대한 개념모듈별 통섭교육으로 진행된다.
This course covers miscellaneous convergence engineering technologies on emerging communication fields.

• 융합미래통신프로젝트1 (Convergence Future Communication Project 1)
본 과목은 팀기반으로 기초융합문제를 해결하기 위해 PBL기반 능동학습으로 진행된다.
This course is based on active PBL type team projects for solving fundamental issues in convergence future communication technologies.

• 융합미래통신프로젝트2 (Convergence Future Communication Project 2)
본 과목은 팀기반으로 심화융합문제를 해결하기 위해 PBL기반 능동학습으로 진행된다.
This course is based on active PBL type team projects for solving advanced problems in convergence future communication technologies.

• 융합미래통신콜로키움1 (Convergence Future Communication Colloquium 1)
본 과목은 융합미래통신 분야 최신이론과 산업동향을 논의하는 세미나로 진행된다.
This colloquium contains a series of seminars discussing the current theoretical developments and industrial trends on convergence future communication technologies.

• 융합미래통신콜로키움2 (Convergence Future Communication Colloquium 2)
본 과목은 융합미래통신 분야 최신이론과 산업동향을 논의하는 세미나로 진행된다.
This colloquium contains a series of seminars discussing the current theoretical developments and industrial trends on convergence future communication technologies.

• 초실감미디어전송시스템 (TTA 표준 전문가 양성 과정) (Hyper-realistic media transmission system)
본 과목은 초실감미디어의 고품질 전송기술을 중심으로 TTA 표준 전문가 양성 교육으로 진행된다.
This course covers high-quality transmission technologies for hyper-realistic media based on the TTA education

framework.

• 초실감미디어압축시스템 (TTA 표준 전문가 양성 과정) (Hyper-realistic media compression system)
본 과목은 초실감미디어의 차세대 압축기술을 중심으로 TTA 표준 전문가 양성 교육으로 진행된다.
This course covers next-generation compression technologies for hyper-realistic media based on the TTA education framework.

**• 자연언어학습특론 (Advanced Natural Language Processing)**
본 과목에서는 챗봇, 질의응답 시스템, 기계 번역과 같은 자연어 처리(NLP) 문제 해결을 위한 고급 모델 학습 방법을 배운다.
This course introduces advanced model training methods for tackling various natural language processing (NLP) problems, including chatbots, question-answering systems, and machine translation.

**• 멀티모달정보검색 (Multimodal Information Retrieval)**
본 과목에서는 텍스트, 이미지, 오디오 등 다양한 형태(모달리티)의 정보를 효과적으로 검색하기 위한 다양한 모델과 기법들을 익힌다.
This course introduces the models and techniques for effectively retrieving information across diverse modalities such as text, images, and audio.

**• 융합의학연구방법론 2 (Integrated Medical Research Methodology 2)**
의료 인공지능 발전을 위한 융합 연구 방법론을 탐구하며, 근거 기반 의학, 고급 통계 분석, 머신러닝 알고리즘 및 의료 데이터 과학 기술을 학습한다.
This course explores advanced integrated research methodologies crucial for advancing medical AI, covering evidence-based medicine, advanced statistical analysis, machine learning algorithms, and data science techniques for healthcare.

**•바이오헬스데이터컴퓨팅 (Bio-Health Data Computing)**
이 과목은 바이오헬스 분야에서 생성되는 대규모 복합 데이터를 효과적으로 처리하고 분석하기 위한 컴퓨팅 기술을 학습하는 것을 목적으로 한다. 주요 내용은 의료 및 생명과학 데이터를 위한 전처리, 시각화, 통계 분석, 기계학습 기반 모델링, 그리고 클라우드 기반 데이터 처리 기술 등을 포함한다. 수강생들은 실제 바이오헬스 데이터를 활용한 프로젝트를 통해 데이터 기반 의사결정 능력을 함양한다.
This course aims to learn computing technologies for effective handling and analysis of large-scale and complex data generated in the bio-health field. Topics include preprocessing, visualization, statistical analysis, machine learning-based modeling, and cloud-based data processing for biomedical and life science data. Through hands-on projects using real-world bio-health data, students will enhance their data-driven decision-making skills.

**•컴퓨팅사고력과알고리즘 (Computational Thinking and Algorithms)**
이 강좌는 문제 해결을 위한 컴퓨팅 사고력을 기르고, 알고리즘 설계 및 구현의 기본 개념을 학습하는 것을 목표로 한다. 핵심 주제로는 자료구조, 재귀적 사고, 탐색과 정렬 알고리즘, 알고리즘 복잡도 분석 등이 포함된다. 프로그래밍 실습을 통해 실제 문제를 해결하며, 논리적 사고 및 추상화 능력을 강화한다.
This course is designed to develop computational thinking and foundational knowledge in algorithm design and implementation. Core topics include data structures, recursive thinking, search and sorting algorithms, and complexity analysis. Students will enhance their logical reasoning and abstraction skills by solving real-world problems through programming exercises.

**•디지털의료기기/의료시스템 (Digital Medical Devices and Systems)**

이 과목은 디지털 기술을 기반으로 하는 의료기기 및 의료정보시스템의 설계, 개발, 응용에 대해 다룬다. 주요 내용은 의료기기 하드웨어/소프트웨어 구성, 디지털 센서, 무선 통신, 의료 데이터 표준, 전자의무기록 시스템, 스마트 헬스케어 플랫폼 등이 포함된다. 이 강좌는 디지털 헬스케어 산업에 필요한 융합형 인재 양성을 목표로 한다.

This course covers the design, development, and application of digital medical devices and healthcare information systems. Topics include hardware/software components of medical devices, sensors, wireless communication, medical data standards, electronic medical records, and smart healthcare platforms. The course aims to cultivate interdisciplinary professionals equipped for the digital healthcare industry.

**•파이썬기반인공지능프로그래밍 (Python-based AI programming)**

이 과목은 파이썬을 활용한 인공지능 프로그래밍의 기초와 실습 중심의 프로젝트를 통해 핵심 개념과 구현 방법을 학습하는 것을 목표로 한다. 주요 내용은 파이썬 기반 데이터 전처리, 기계학습 알고리즘 구현, 딥러닝 프레임워크 실습 등을 포함한다.

This course introduces the fundamentals of artificial intelligence programming using Python. It focuses on hands-on implementation of data preprocessing, machine learning algorithms, and deep learning frameworks such as PyTorch or TensorFlow through practical projects.

**•머신러닝을이용한의학진단 (Python-based AI programming)**

이 과목은 의료 데이터를 기반으로 한 머신러닝 기법을 이용하여 질병 진단을 수행하는 이론과 실제를 다룬다. 수강생은 분류, 회귀, 클러스터링 등의 알고리즘을 학습하며, 의료영상, 유전체 데이터 등 다양한 데이터를 다룬다.

This course covers theoretical and practical aspects of disease diagnosis using machine learning techniques on medical data. Students will learn classification, regression, and clustering algorithms, and work with various types of healthcare data such as medical images and genomic data.

**•인공지능프로그래밍 (AI programming)**

이 강의는 AI의 핵심 알고리즘과 프로그래밍 구현을 포괄적으로 다룬다. 주요 주제는 탐색, 최적화, 신경망, 강화학습 등을 포함하며, 실습을 통해 다양한 응용 사례를 구현한다.

This course provides a comprehensive overview of core AI algorithms and their implementation. Topics include search algorithms, optimization, neural networks, and reinforcement learning, with practical exercises for real-world applications.

**•빅데이터처리기법 (Big data processing)**

이 과목은 대규모 데이터를 수집, 저장, 분석, 시각화하는 기술을 학습하며, 분산 처리 기술과 함께 머신러닝 기반 분석 기법의 활용을 배운다.

This course focuses on techniques for collecting, storing, analyzing, and visualizing large-scale data. They learn distributed computing tools along with machine learning-based analytical methods.

**•융합의학연구방법론1 (Integrative medicine research methodology)**

본 과목은 의료 인공지능 및 융합기술 연구 수행을 위한 기초 연구 역량 강화를 목표로 한다. 연구 주제 설정, 문헌 검색, IRB 등 연구 윤리, 실험 설계 및 통계적 검정 방법에 대한 이론과 실습을 병행한다. 데이터 기반 융합 연구 수행을 위한 기초 지식과 프레임워크를 제공하며, 실제 논문 작성 프로젝트를 통해 학습 내용을 통합한다.

This course aims to enhance students' foundational research capabilities for medical AI and interdisciplinary technologies. It includes discovering research topics, conducting a literature review, understanding research ethics (including IRB), designing experiments, and performing statistical hypothesis tests. Through a term project involving academic paper writing, students will integrate the theoretical knowledge into a practical

research design and analysis.

**•바이오헬스데이터기술콜로키움 (Biohealth data technology colloquium)**

바이오헬스 분야에서 최신 데이터 기반 기술의 동향을 학습하기 위한 세미나형 수업이다. 의료영상, 유전체, 디지털 헬스케어, 원격의료 등 다양한 주제에 대해 국내외 전문가의 초청 강연과 발표가 진행되며, 학생은 그 내용을 바탕으로 정리 보고서 및 팀 토론을 수행한다. 업계-학계 간 연결을 위한 실질적인 토대를 마련하는 데 중점을 둔다.

This course introduces the latest trends in data-driven technologies in the bio-health field. Topics include medical imaging, genomics, digital healthcare, and telemedicine. Invited lectures by industry and academic experts are combined with group discussions and reports. The course emphasizes real-world perspectives and encourages professional engagement.

**•의료데이터융합및AI모델링 (Medical data and AI modeling)**

의료데이터융합 및 AI모델링 과목은 서로 다른 유형의 의료 데이터를 통합하고, 이를 기반으로 인공지능 모델을 설계·개발하는 능력을 배양하는 데 목적이 있다. 영상, 생체신호, 임상 텍스트, 유전체 정보 등 이기종 데이터를 구조화하고 정합성 있는 통합을 수행하는 방법을 학습하며, 이후 다층 신경망, 앙상블 모델, 멀티모달 딥러닝 구조 등을 구현해본다. 실습 중심의 수업 구성으로, 수강생은 실데이터 기반의 융합 AI 모델링 프로젝트를 수행한다.

This course on Medical Data Integration and AI Modeling aims to cultivate the ability to integrate heterogeneous healthcare data types—such as imaging, biosignals, clinical text, and genomics—and develop AI models based on them. Students will learn data harmonization techniques, data fusion pipelines, and implement models including deep neural networks, ensemble methods, and multimodal architectures. The course emphasizes hands-on practice through projects using real-world datasets to build integrated AI models for medical applications.

**•AI기반의료의사결정및예측 (AI-based medical decision and prediction)**

이 과목은 AI 기술을 활용하여 임상 진단, 치료 결정, 환자 예후 예측 등에 적용 가능한 의료 의사결정 지원 시스템(CDSS)을 설계하고 분석하는 방법을 다룬다. 정형 및 비정형 의료데이터를 기반으로 한 예측 모델, 설명 가능한 AI(XAI), 임상적 민감도 및 특이도 해석, 리스크 분석 및 시계열 예측이 주요 주제이다. 의료현장에서 실제 적용 가능한 예측 모델을 구현하는 실습도 포함된다.

This course on AI-Based Medical Decision Making and Prediction focuses on designing and analyzing clinical decision support systems (CDSS) using artificial intelligence. Topics include predictive modeling with structured and unstructured medical data, explainable AI (XAI), clinical sensitivity/specificity analysis, risk stratification, and time-series forecasting. Students will implement real-world prediction models applicable to clinical practice and interpret their outcomes in clinical circumstances.

**•의료데이터자동처리및분석 (Automatic processing and analysis of medical data)**

본 과목은 대량의 의료 데이터를 효율적으로 수집, 처리, 저장, 분석하는 자동화된 데이터 파이프라인 설계 및 구현 기술을 중심으로 한다. 주요 내용으로는 ETL(Extract-Transform-Load) 프로세스, 의료 텍스트 및 시계열 데이터 자동 정제, AI 기반 자동 판독, 그리고 HL7/FHIR 등 의료표준 기반 데이터 연동 기법을 포함한다. 실습을 통해 자동화 시스템을 설계하고 적용한다.

This course on Automated Processing and Analysis of Medical Data focuses on designing and implementing end-to-end data pipelines for efficient handling of large-scale medical data. Topics include ETL (Extract-Transform-Load) processes, automated cleaning of medical text and time-series data, AI-based interpretation systems, and interoperability using healthcare standards such as HL7 and FHIR. Students will practice building automated processing frameworks tailored to healthcare environments.

**•융합의료AI (Integrative medical AI)**

이 과목은 공학, 의학, 생명과학 간 융합을 통해 실제 의료 문제를 해결할 수 있는 AI 기반 솔루션을 기획하고 구현하는 데 초점을 맞춘다. 주요 주제는 융합형 데이터셋 구축, 병원 현장의 수요 기반 문제 정의, AI 알고리즘 선택 및 검증, 윤리적 고려사항 등이며, 다학제적 팀 프로젝트를 중심으로 실습이 진행된다.
This course aims to develop interdisciplinary AI solutions that address real-world clinical needs by integrating knowledge from engineering, medicine, and the life sciences. Topics include construction of integrated datasets, clinical problem identification, selection and validation of suitable AI algorithms, and ethical and regulatory considerations. The course emphasizes collaborative team projects to simulate real-world deployment scenarios.

**•기업연계프로젝트 (Corporate associated project)**
산업체 또는 병원과의 협업을 통해 실제 의료 또는 헬스케어 분야의 문제를 해결하는 프로젝트형 과목이다. 수강생은 실제 기업·기관에서 제시한 주제에 대해 문제 분석, 데이터 수집 및 전처리, 모델링, 결과 도출, 발표에 이르는 전 과정을 수행하며, 기술과 실무의 연결고리를 체험한다.
The Industry-Collaborative Project course engages students in solving practical healthcare challenges in collaboration with industry or clinical partners. Students will follow a full project cycle—from problem definition and data acquisition to modeling, validation, and result communication—on topics proposed by partner organizations. This course bridges academic knowledge and industry requirements through real-world data and projects.

**•융합의료 멀티모달AI (Multimodal AI for integrative medicine)**
본 과목은 멀티모달 인공지능 기술을 융합의료에 적용하는 이론과 실습을 다룬다. 다양한 의료데이터의 병렬 활용과 공동 학습을 위한 멀티모달 딥러닝 모델 아키텍처, cross-attention, late/early fusion, modality alignment 등의 기술을 학습한다. 실제 의료 사례 기반의 프로젝트를 통해 멀티모달 AI 모델을 설계하고 평가한다.
This course on Multimodal AI for Healthcare explores theoretical and practical aspects of applying multimodal deep learning to integrated medical data. Students will learn architectures that combine clinical images and text data using techniques such as cross-attention, early/late fusion, and modality alignment. A focus is placed on designing and evaluating multimodal AI systems using real-world clinical cases.

**•응급의료 멀티모달AI (Multimodal AI for emergency medicine)**
이 과목은 응급의료 환경에서 생성되는 다양한 실시간 데이터를 통합하여 긴급 상황에 대응할 수 있는 인공지능 시스템을 설계한다. 영상, 생체신호, 환자 기록 등 멀티모달 데이터를 기반으로 한 예측 모델, 신속한 분류 및 triage 시스템, Edge AI 및 경량화 모델링 기법, 응급 현장 적용을 위한 실시간성 평가 등이 포함된다.
This course on Multimodal AI in Emergency Medicine focuses on designing AI systems capable of integrating real-time multimodal data—including images, biosignals, and patient records—for rapid decision support in emergency care. Topics include triage prediction models, lightweight Edge AI deployment, multimodal fusion strategies, and evaluation of latency-critical applications in urgent clinical scenarios.

• 해외공동심화연구1 (Internation Research 1)
이 과목은 학생들이 해외 대학 또는 연구기관에 파견하여 해당 기관의 지도교수와 협력하여 심화 연구를 수행할 수 있도록 기회를 제공한다. 본 과목의 목적은 글로벌 연구 환경에서의 경험을 통해 연구 역량을 강화하고, 다양한 학문적 관점을 이해하며, 국제적인 연구 네트워크를 구축하는 데 있다. 과목에 참여하는 학생들은 해외 연구기관의 지도교수와 협력하여 독자적인 연구 목표를 설정 하고, 목표 달성을 위한 이론과 방법론을 개발한다. 파견 전 국내 지도교수와 함께 연구 계획을 수립하며, 이를 기반으로 현지 연구를 진행한다. 학기 동안 학생들은 정기적으로 국내 지도교수와 소통하며 연구 진행 상황을 공유하고 피드백을 받을 수 있다. 학기 말에는 해외 지도교수와 국내 지도교수의 공동 평가를 위해 기술적 보고서를 작성하여 제출해야 한다. 이 보고서는 학생의 연구 목표, 수행한 연구 내용, 결과, 그리고 해외 연구 경험에서 얻은 학문적·개인적 성장을 포괄적으로 다룰 것이다.

주요 특징 및 요구 사항 :
1. 연구 계획 수립 : 파견 전, 연구 목표 및 방법론을 국내 지도교수와 함께 설계
2. 해외 연구 활동 : 해당 연구기관에서 현지 지도교수의 지도 하에 연구 수행
3. 정기 보고 : 국내 지도교수와의 정기적인 온라인 회의를 통해 연구 진행 상황 공유
4. 최종 보고서 : 학기 말에 기술적 형식의 연구 보고서 제출
본 과목은 해외에서의 독립적인 연구 수행을 통해 학생들이 글로벌 연구자로 성장하는 데 필요한 경험과 통찰력을 제공하는 것을 목표로 한다.
This course provides an opportunity for students to be dispatched to international universities or research institutions to conduct advanced research in collaboration with faculty supervisors at the host institutions. The primary objective of this course is to enhance students' research capabilities through experience in a global research environment, gain insights into diverse academic perspectives, and build international research networks.
Students participating in this course will work closely with faculty supervisors at the host institutions to establish independent research goals and develop theories and methodologies to achieve these objectives. Before departure, students will create a research plan in consultation with their domestic faculty supervisors, which will serve as the foundation for their research activities abroad. During the semester, students are required to maintain regular communication with their domestic faculty supervisors to share updates on their progress and receive feedback.
At the end of the semester, students must submit a technical report for joint evaluation by both the overseas and domestic faculty supervisors. This report will comprehensively cover the research objectives, the work conducted, the results achieved, and the academic and personal growth gained from the international research experience.
Key Features and Requirements :
1. Research Plan Development : Prior to departure, students will design research objectives and methodologies in collaboration with their domestic faculty supervisors.
2. International Research Activities : Students will carry out research under the guidance of faculty supervisors at the host institutions.
3. Regular Progress Reports : Students will share updates and discuss progress through regular online meetings with their domestic faculty supervisors.
4. Final Report Submission : At the end of the semester, students will submit a technical report summarizing their research.

This course aims to provide students with the necessary experience and insights to grow into global researchers by engaging in independent research in an international setting.

• 딥러닝응용특론 (Applications in Deep Learning)
이 과정은 딥러닝의 기본원리를 바탕으로 다양한 딥러닝 모델에 대해서 학습한다. 이 과정은 기존의 지도학습을 포함하여 적대적 생성 네트워크(GANs) 등의 비지도 학습 등을 학습하게 되며, 이론을 기반으로 코드를 구현하게 된다. 이 과정은 다양한 이미지 및 신호 등의 데이터를 이용하여 딥러닝 응용 분야에 대한 이해를 넓힘과 동시에 새로운 인공지능의 패러다임을 선도할 수 있는 전문가로 양성하고자 한다.
This course aims to cover various deep learning models based on the basic principles of deep learning. In this course, students will learn unsupervised learning such as adversarial generative networks(GANs), including existing supervised learning, and implement the code based on the theory. This course aims to broaden the understanding of deep learning applications using data such as various images and signals, and to cultivate experts who can lead a new paradigm of artificial intelligence.

• 생체신호처리특론 (Bio Signal Processing)
이 수업은 결정론적 및 확률적 신호의 분석 방법 및 systems 분석의 기초 이론을 다루고 있다. 주제는 푸리에 변환, Laplace, z-변환, 랜덤 변수, 랜덤 프로세스, 확률 밀도 함수, 상관 함수, 스펙트럼 분석, 시계열 분석 등이 있다.

This class covers basic theories of deterministic and probabilistic methods of signals and ystems analysis. Topics include Fourier transform, Laplace transform, z-transform, random variables, random process, probability density functions, correlation functions, spectral analysis, and time-series analysis.