내 규 제 정(안)

<대학원 합성생물학 융합전공>

합성생물학 융합전공

Interdisciplinary Major Program in Synthetic Biology

교육목표

합성생물학 융합전공은 21세기 바이오기술 혁신을 주도할 차세대 연구인력 양성을 목표로 한다. 생명과학의 기초 원리와 공학적 설계 사고를 융합하여 자연계의 한계를 뛰어넘는 새로운 생물학적 시스템을 창조할 수 있는 창의적 역량을 배양하며, 이를 통해 바이오의약품, 바이오에너지, 바이오소재 등 미래 산업의 핵심 기술을 개발할 수 있는 실무 능력을 갖춘 전문가를 육성한다. 특히 합성생물학이 가져올 사회적 파급효과와 윤리적 책임을 깊이 이해하고, 인류와 환경에 도움이 되는 방향으로 기술을 발전시킬 수 있는 성숙한 연구자로서의 자질을 함양하여, 글로벌 바이오산업을 선도하고 학제간 융합 연구의 새로운 패러다임을 제시할 수 있는 리더급 인재를 배출하고자 한다.

전공내규

1. 융합전공의 구분: 추가이수형 및 전공변경형

2. 융합전공 전공협의회 및 주임교수 추천

(1) 본 융합전공을 원활하게 운영하기 위해서 4인 이상의 교수로 구성된 융합전공협의회를 둔다. 협의회 위원은 합성생물학 융합전공 참여교원으로 하고 임기는 2년으로 한다.

(2) 융합전공 주임교수는 융합전공협의회의 회의를 거쳐 호선으로 정한다.

3. 주관대학(원) 및 주관학과: 생명과학대학 일반대학원 융합생명공학과

4. 참여학과: 공과대학 화공생명공학과, 생명과학대학 환경생태공학과, 생명과학대학 식물생명공학과

5. 교육과정 편성: 교과과정 편성표

이수구분	학수번호	교과목명	학점(시간)	비고
기초공통	IBT501	생명공학세미나1	1(1)	융합생명공학과
기초공통	IBT502	생명공학세미나2	1(1)	융합생명공학과
기초공통	IBT503	생명공학세미나3	1(1)	융합생명공학과
기초공통	IBT504	생명공학세미나4	1(1)	융합생명공학과
기초공통	IBT505	연구윤리및논문작성법1	3(3)	융합생명공학과
기초공통	IBT506	연구윤리및논문작성법2	3(3)	융합생명공학과
전공	ISB801	합성생물학개론 I	3(3)	융합전공
전공	ISB802	합성생물학개론 II	3(3)	융합전공
전공	ISB803	합성생물학세미나 I	3(3)	융합전공
전공	ISB804	합성생물학세미나 II	3(3)	융합전공
전공	IBT610	최신계산유전체학	3(3)	융합생명공학과
전공	IBT611	합성생물학특론	3(3)	융합생명공학과
전공	IBT614	바이오연료및바이오리파이너리	3(3)	융합생명공학과
전공	IBT615	합성및산업미생물학	3(3)	융합생명공학과
전공	IBT618	최신시스템생물공학	3(3)	융합생명공학과
전공	IBT619	단백질설계이론	3(3)	융합생명공학과
전공	IBT716	유전자치료공학	3(3)	융합생명공학과
전공	IBT723	DNA나노기술과응용	3(3)	융합생명공학과
전공	IBT724	DNA바코드및응용	3(3)	융합생명공학과
전공	IBT744	종양면역학특론	3(3)	융합생명공학과
전공	IBT935	약물설계공학	3(3)	융합생명공학과
전공	CBE633	대사공학특론	3(3)	화공생명공학과
전공	CBE636	대사공학개론	3(3)	화공생명공학과
전공	LED576	미생물생태학특론	3(3)	환경생태공학과
전공	LED625	분자환경미생물학	3(3)	환경생태공학과
전공	LED627	이차대사물질특론	3(3)	환경생태공학과
전공	LED817	바이오매스특론	3(3)	환경생태공학과
전공	LED870	지속가능에너지공학특론	3(3)	환경생태공학과
전공	LED871	자원순환공학특론	3(3)	환경생태공학과
전공	PBG566	육종기술론	3(3)	식물생명공학과
전공	PBG811	식물유전공학실용화연구	3(3)	식물생명공학과

6. 지도교수 및 공동지도교수

(1) 학생은 입학 후 참여학과의 주임교수와 서면 또는 대면의 형태로 집단 혹은 단독 면담을 통해 전공 참여교원 중 가장 적절한 지도교수를 추천 받고 해당 교수의 승낙을 통하여 지도교수를 선정한다.

(2) 지도교수는 학생과의 상담을 통하여 공동지도교수 1인을 선정하는 것을 권장한다.

(3) 지도교수와 공동지도교수는 일반대학원 시행세칙 제34조 및 35조의 기준을 충족하여야 한다.

7. 이수과목 및 학점취득

(1) 융합전공은 추가이수형과 전공변경형 중 하나를 선택하여 이수할 수 있으며, 각각의 특징과 이수학점은 표 1과 같다.

표 1. 융합전공의 이수형태

형태	추가이수형	전공변경형
학적	학과 및 원전공 유지	학과 유지, 전공은 융합전공으로 변경
이수학점	원전공 (석사 24, 박사 30, 석박통합 48학점) + 융합전공 (석사 12, 박사 15학점, 석박통합 15학점) 추가 이수 6학점 이내로 원전공과 중복 인정	융합전공에서 요구하는 학점 이수 (석사 24학점, 박사 30학점, 석박통합 48학점) 전공변경 전 취득한 학점 인정 가능
학위기	대학원 학사운영 규정 제16조 준용: 학위명(학과명)	
증명서	원전공+융합전공 함께 표기	융합전공만 표기

(2) 이수과목은 지도교수가 지정하고 전공주임의 승인을 얻어서 선정한다.

(3) 타 학과 과목 이수 시에는 지도교수 및 학과주임의 승인을 받은 후 수강신청을 할 수 있다.

(4) 학생의 원전공 학과의 내규를 따른다. 전공변경형 학생은 융합전공 전공과목인 다음 2개 과목을 필수로 이수해야 한다. - 합성생물학개론 I, II

8. 종합시험

(1) 추가이수형 학생은 원전공 학과에서 치르는 것으로 대신하고 원전공 내규를 따른다.
(2) 전공변경형 학생은 지도교수가 지정하고 전공주임의 승인을 얻어 종합시험의 과목을 정하며 그 수는 다음과 같다.
- 석사: 전공과목 중 3과목
- 박사: 전공과목 중 4과목 또는 구술시험
(3) 종합시험 불합격자는 다음 학기에 과락한 과목에 대해서 재시험을 시행한다.

9. 학위논문 제출 자격 및 규정

(1) 석사과정

학위과정 중에 국내외 학회에서 주저자(고려대학교 소속)로 1건 이상의 학술발표를 하거나, 국내외 전문 학술지 주저자(고려대학교 소속) 또는 공동저자(고려대학교 소속)의 논문 1편 이상 게재함을 원칙으로 한다. 단, 논문은 학위청구논문 제출 시 학위청구논문 신청서류 제출기간까지 최소한 논문게재승인 심사결과가 있어야 하며, 학술발표 또한 학위청구논문 신청서류 제출기간까지 발표를 완료해야 한다. 또한 전일제 학생은 지도교수가(공동지도교수 경우 1인도 가능) 반드시 주저자로 명시되어야 하며 비전일제 학생(학연협동과정생 포함)은 지도교수가 저자에 포함되어야 한다.

(2) 박사과정/석박사통합과정

학위과정 중에 주저자로 SCI(E) 논문의 Impact Factor 총합이 5 이상을 게재하여야 한다.

① Impact Factor는 5년 Impact Factor를 기준으로 한다(기준일 : 논문 출판일 또는 논문심사원 제출일 기준).

② 전일제 학생은 지도교수가(공동지도교수 경우 1인도 가능) 반드시 주저자로 명시되어야 하며, 비전일제 학생(학연협동과정생 포함)은 지도교수가 저자에 포함되어야 한다.

③ 공동주저자가 n명인 논문의 경우, Impact Factor 혹은 논문 편수를 1/n로 계산한다.

④ 논문에 고려대학교 소속이 명시되어야 한다.

⑤ 박사학위 논문심사 청구 시 학위청구논문 신청서류 제출기간까지 논문 별쇄본 또는 게재승인 서류를 제출하여야 한다.

(3) 학위 논문은 영어로 작성해야하는 것을 원칙으로하며 석사과정은 전공분야 교수 3인, 박사과정은 전공분야 교수 5인의 심사를 받는다.

10. 기타

(1) 본 내규에 명시되지 않은 내용은 대학원 학칙 및 대학원학칙 일반대학원 시행세칙을 따른다.

부 칙

① (시행일) 본 내규는 2025학년도 9월 1일부터 시행한다.

Interdisciplinary Major Program in Synthetic Biology

Educational Objectives

The Interdisciplinary Program in Synthetic Biology aims to cultivate next-generation researchers who will lead biotechnology innovation in the 21st century. The program fosters creative capabilities to create new biological systems that transcend natural limitations by integrating fundamental principles of life sciences with engineering design thinking. This approach nurtures specialists equipped with practical abilities to develop core technologies for future industries such as biopharmaceuticals, bioenergy, and biomaterials. In particular, the program seeks to produce leader-level talent who can lead the global biotechnology industry and present new paradigms for interdisciplinary convergence research. We cultivate mature researchers who deeply understand the social impact and ethical responsibilities that synthetic biology brings and can develop technology in directions that benefit humanity and the environment.

Major Regulations

1. Types of Interdisciplinary Majors: Additional Coursework type and Major Change type.

2. Interdisciplinary Major Coordination Committee and Recommendation of Supervising Professor

(1) To facilitate the smooth operation of this interdisciplinary major, an interdisciplinary major coordination committee composed of four or more professors will be established. The committee members will be participating faculty in the targeted degradation-based innovative therapeutics major, and their term will be two years.
(2) The chair professor of the interdisciplinary major will be selected through an election process after a discussion of the interdisciplinary major coordination committee.

3. Host College and Department: College of Life Sciences and Biotechnology, Graduate School, Department of Biotechnology

4. Participating Departments: College of Engineering (Department of Chemical and Biological Engineering), College of Life Sciences and Biotechnology (Department of Environmental Science and Ecological Engineering, Department of Plant Biotechnology)

5. Curriculum Organization: Course Schedule

Classification	Course Code	Course Title	Credits (Hours)	Remarks
Basic Common	IBT501	SEMINAR IN BIOTECHNOLOGY1	1(1)	Department of Biotechnology
Basic Common	IBT502	SEMINAR IN BIOTECHNOLOGY2	1(1)	Department of Biotechnology
Basic Common	IBT503	SEMINAR IN BIOTECHNOLOGY3	1(1)	Department of Biotechnology
Basic Common	IBT504	SEMINAR IN BIOTECHNOLOGY4	1(1)	Department of Biotechnology
Basic Common	IBT505	ETHICS IN RESEARCH FOR PUBLICATION1	3(3)	Department of Biotechnology
Basic Common	IBT506	ETHICS IN RESEARCH FOR PUBLICATION2	3(3)	Department of Biotechnology
Major	ISB801	Introduction to Synthetic Biology I	3(3)	Interdisciplinary Major
Major	ISB802	Introduction to Synthetic Biology II	3(3)	Interdisciplinary Major
Major	ISB803	Seminar in Synthetic Biology I	3(3)	Interdisciplinary Major
Major	ISB804	Seminar in Synthetic Biology II	3(3)	Interdisciplinary Major
Major	IBT610	CURRENT TRENDS IN COMPUTATIONAL GENOMICS	3(3)	Department of Biotechnology
Major	IBT611	ADVANCED SYNTHETIC BIOLOGY	3(3)	Department of Biotechnology
Major	IBT614	CURRENT STUDIES OF BIOFUELS & BIOREFINERY	3(3)	Department of Biotechnology
Major	IBT615	SYNTHETIC & INDUSTRIAL MICROBIOLOGY	3(3)	Department of Biotechnology
Major	IBT618	CURRENT TRENDS IN SYSTEMS BIOTECHNOLOGY	3(3)	Department of Biotechnology
Major	IBT619	THEORY IN PROTEIN DESIGN	3(3)	Department of Biotechnology
Major	IBT716	GENE THERAPY	3(3)	Department of Biotechnology
Major	IBT723	DNA NANOTECHNOLOGY AND APPLICATIONS	3(3)	Department of Biotechnology
Major	IBT724	DNA BARCODE AND APPLICATION	3(3)	Department of Biotechnology
Major	IBT744	ADVANCED TUMOR IMMUNOLOGY	3(3)	Department of Biotechnology
Major	IBT935	DRUG DESIGN ENGINEERING	3(3)	Department of Biotechnology
Major	CBE633	ADVANCED METABOLIC ENGINEERING	3(3)	Department of Chemical and Biological Engineering
Major	CBE636	INTRODUCTION TO METABOLIC ENGINEERING	3(3)	Department of Chemical and Biological Engineering
Major	LED576	ADVANCED MICROBIAL ECOLOGY	3(3)	Department of Environmental Science and Ecological Engineering
Major	LED625	MOLECULAR ENVIRONMENTAL MICROBIOLOGY	3(3)	Department of Environmental Science and Ecological Engineering
Major	LED627	SPECIAL TOPICS ON SECONDARY METABOLITIES	3(3)	Department of Environmental Science and Ecological Engineering
Major	LED817	ADVANCED BIOMASS	3(3)	Department of Environmental Science and Ecological Engineering
Major	LED870	ADVANCED SUSTAINABLE ENERGY ENGINEERING	3(3)	Department of Environmental Science and Ecological Engineering
Major	LED871	ADVANCED SUSTAINABLE RESOURCE MANAGEMENT	3(3)	Department of Environmental Science and Ecological Engineering
Major	PBG566	CROP BREEDING TECHNOLOGY	3(3)	Department of Plant Biotechnology
Major	PBG811	PLANT GENETIC ENGINEERING	3(3)	Department of Plant Biotechnology

6. Advisors and Co-Advisors

(1) After admission, the student will receive a recommendation for the most suitable advisor among the faculty members in their major through a group or individual interview, either written or face-to-face, with the department chair of the participating department. The advisor is then selected with the advisor's consent.
(2) The advisor is encouraged to select one co-advisor through consultation with the student.
(3) Both the advisor and the co-advisor must meet the criteria specified in Articles 34 and 35 of the Graduate School Regulations.

7. Course Completion and Credit Acquisition

(1) Students can choose between additional coursework and major change options for their interdisciplinary major, and the characteristics and required credits for each are shown in Table 1.

Table 1. Interdisciplinary Major Completion Types

Type	Additional Course	Major Change
Status	Maintain department and original major	Maintain department and change major to interdisciplinary major
Required Credits	Original Major (Master 24, PhD 30, Intergrated MS and PhD 48 credits) + Interdisciplinary Major (Master 12, PhD 15, Intergrated MS and PhD 15 credits) additional credits. Up to 6 credits can overlap with original major	Interdisciplinary major required credits (Master 24, PhD 30, Integrated MS and PhD 48 credits). Credits earned before changing major can be recognized
Degree Certificates	Follows Article 16 of the Graduated School Academic Regulations: Degree Title (Department Name)	
Transcript	Both original major and interdisciplinary major indicated	Only the interdisciplinary major indicated

(2) Courses to be completed are designated by the advisor and approved by the department chair.
(3) When taking courses from other departments, students must obtain approval from the advisor and the department chair before registering.
(4) Students must follow the internal regulations of their original major department. Students who change their major to the interdisciplinary major are required to complete the following two courses as mandatory subjects of the interdisciplinary major:
- Introduction to Synthetic Biology I, II

8. Comprehensive Examination

(1) Students choosing the additional coursework type will follow the original major department's regulations and take the exam there.

(2) Students choosing the major change type will have the subjects of the comprehensive examination designated by the advisor and approved by the department chair, as follows.

Master's: 3 subjects from the major

Ph.D.: 4 subjects from the major or an oral examination

(3) Students who fail the comprehensive examination must retake the failed subjects in the following semester.

9. Qualification and Regulations for Thesis Submission

(1) Master's Program

During the degree program, the student must present at least one paper as the primary author (affiliated with Korea University) at a domestic or international conference, or publish at least one paper as the primary author (affiliated with Korea University) or co-author (affiliated with Korea University) in a domestic or international academic journal. For thesis submission, the paper must have at least been accepted for publication by the submission deadline, and the presentation must be completed by the thesis submission deadline. Full-time students must have their advisor (in the case of co-advisors, at least one) listed as the primary author, while part-time students (including those in industry-academia cooperative programs) must have their advisor included as an author.

(2) Ph.D. and Integrated Master and Ph.D. Program

During the degree program, the student must publish papers with a total Impact Factor of 5 (sum) or higher as the primary author in SCI(E) journals.

① The Impact Factor is based on the 5-year Impact Factor (as of the publication date or the thesis review application date).

② Full-time students must have their advisor (in the case of co-advisors, at least one) listed as the primary author, while part-time students (including those in industry-academia cooperative programs) must have their advisor included as an author.

③ For papers with multiple primary authors, the Impact Factor or the number of papers is calculated as 1/n.

④ The paper must indicate affiliation with Korea University.

⑤ At the time of applying for the doctoral thesis review, a reprint of the paper or a document indicating acceptance for publication must be submitted by the thesis submission deadline.

(3) The thesis should be written in English, and the evaluation will be conducted by 3 faculty members for the Master's program and 5 faculty members for the Ph.D. program, who specialize in the field.

10. Others

(1) Any matters not specified in these regulations will follow the general rules and detailed regulations of the Graduate School.

Supplementary Provisions

(1) (Effective Date) These regulations will be effective from September 1, 2025.