For students enrolled since the second semester 2024 academic years and onward

International College

Synthetic Biology (International Program)

Program Master of Science Program in Synthetic Biology (International Program)

Degree Master of Science (Synthetic Biology), M.S. (Synthetic Biology)

Plan 1 Option A 1:

Total credits required: minimum 36 credits

(1) Major courses: minimum 7 credits (audit)

- Seminar: 2 credits (audit)

01930597	Seminar	1,1

- Major requirements: 5 credits (audit)

01930511	Synthetic Biology Roadmap	2(2-0-4)
01930591	Research Methodology in Synthetic Biology	3(3-0-6)

(2) Thesis: minimum 36 credits

01930599	Thesis	1-36

Plan 1 Option A 2:

Total credits required: minimum 36 credits

(1) Major courses: minimum 24 credits

- Seminar: 2 credits

01930597	Seminar	1,1

- Major requirements: 16 credits

01051502	Trends and Opportunities in Bio-Industry	2(2-0-4)
01416551	Genetic Engineering II	3(2-3-6)
01416561	Bioinformatics	3(1-6-5)
01423573	Systems Biology	3(3-0-6)
01930511	Synthetic Biology Roadmap	2(2-0-4)
01930591	Research Methodology in Synthetic Biology	3(3-0-6)

- Major electives: minimum 6 credits

Students are required to choose at least 6 credits from the list of courses below. Students must receive approvals from the main thesis advisor, the Head of Department, and the Dean of the Graduate School.

01251531	Immunology of Aquatic Animals	3(2-2-5)
01251532	Application of Chemicals and Drugs in Aquaculture	3(3-0-6)

01402581	Protein Engineering	2(2-0-4)
01930513	Internship	1-3
01930596	Body of Knowledge from Oversea Studies	1-10

(2) Thesis: minimum 12 credits

01930599	Thesis	1-12

Course Description

Courses in the field

01930511 Synthetic Biology Roadmap **2(2-0-4)**

Definition and scope of synthetic biology. Advanced technologies in synthetic biology. Policies and regulations. Entrepreneurship. Bioethics in synthetic biology. Case studies.

01930513 Internship **1-3**

Practice in synthetic biology at a laboratory or factory or department related to synthetic biology in government or private sectors.

01930591 Research Methodology in Synthetic Biology **3(3-0-6)**

Research principles and methods in Synthetic Biology. Problem analysis for research topic identification, Data collection for research planning. Identification of samples and techniques. Analysis, interpretation and discussion; of research result report. Writing for presentation and publication.

01930596 Body of Knowledge from Oversea Studies **1-10**

Knowledge in synthetic biology at master's degree level taken in overseas University. Credit equivalence according to Kasetsart University regulation.

01930597 Seminar **1**

Presentation and discussion on current interesting topics in synthetic biology at the master's degree level.

01930599 Thesis **1-36**

Research at the master's degree level and compile into thesis.

Courses in other fields

01051502 Trends and Opportunities in Bio-Industry **2(2-0-4)**

Overview of bio-industry. Importance of bio-industry for economic development of Thailand. Innovation creativity and application of biotechnological knowledge to establish bio-industries. Biosafety bioethics and case studies of bio-industry in agriculture, food industry, medical field, and environmental sector. Current situation of bio-industry.

01251531 Immunology of Aquatic Animals **3(2-2-5)**

Principles of immunology in aquatic animals. Mechanisms of immune systems. Preparation and application of vaccine and problems involved the usage of vaccine with economically valued aquatic animals.

01251532 Application of Chemicals and Drugs in Aquaculture **3(3-0-6)**

Chemicals and drugs used in aquaculture for improving water quality and prevention and control of diseases. Mode of action and effect of water quality on mode of action of chemicals and drugs. Effect of chemicals and drugs on pond ecosystem.

01402581 Protein Engineering **2(2-0-4)**

Techniques for protein engineering technology. Applications of protein engineering in biosensor. Therapeutic and biomaterials.

01416551 Genetic Engineering II **3(2-3-6)**

Basic techniques in molecular cloning. RT- PCR technique for DNA amplification. Construction of recombinant DNA. Gene transformation and screening techniques. Site-directed mutagenesis. DNA sequencing and gene analysis. Protein expression. Bio-safety guideline. Property right.

01416561 Bioinformatics **3(1-6-5)**

Biological database retrieval and analysis. Computer software usage for prediction of gene structure, genome and protein. Nucleotide sequence and amino acid sequence alignments. Primer design. Data mining application. Genome mapping. Gene expression analysis.

01423573 Systems Biology **3(3-0-6)**

Basic concepts in systems biology. Experimental methods in systems biology. Data acquisition from high throughput experimentation. Topological properties of biological networks. Metabolic and regulatory networks. Static and dynamic modelling methods. Complex systems analysis.