As of April 1, 2025

# For entrants in AY 2025

Attachment Form 1

## Description of Major Program

Name of Faculty (Department) [School of Applied Biological Science (Department of Applied Biological Science)]

| Name of Program | Molecular Agro-Life Science Program |
|---|---|

1. Degree to be obtained: Bachelor of Agriculture

2.

The School of Applied Biological Science aims to educate students to acquire a wide range of knowledge and understanding in the realms of the natural and social sciences related to applied biology. Specifically, we provide education that allows students to ① acquire basic knowledge regarding food production, biotic resources, biological environment and biotechnology, ② gain experience in field science, ③ understand bioethics and engineering ethics, and ④ gain abilities in foreign languages, such as English, and in data processing.

In the Molecular Agro-Life Science Program, the education is provided by faculties involved in areas represented by five keywords (genome science, biological material, systemic life, health care, biotechnology) to students to develop the capability for casting light on the functionality of organisms from the view point related to low molecule chemical compounds and biopolymers such as genes and proteins. In this Program, furthermore, cells and organelles are characterized as an assembly of organic molecules and students study the natural phenomena generated by those molecules in a cell and an individual organism. This Program covers all the lives including microorganisms, animals and plants and tries to understand the lives of those organisms within the context of the entire ecosystem. The academic areas that constitute the core of this Program are characterized as "basic areas that constitute the base of practical science" that is evolved from the view point of molecular biology to the state-of-art technology in agricultural science. Students are allowed to start the course from the basics to acquire the capability of applying their knowledge and skills for development of innovative technologies in areas such as food resource production and health care when he/she graduates from the Program.

To carry out this Program, faculties of this Program establish a horizontal network to provide education that is oriented towards application of biology. Individual faculties in this Program have generated research results that are highly valued globally, therefore students are allowed to acquire the basic knowledge and skills while experiencing the cutting edge of findings and broaden the point of view to areas of application.

This Program educates students to become experts who have acquired a higher level of expertise in the graduate school after this program or a research worker and a specialist with an international point of view in such as a public office for agriculture and fisheries or in business fields related to agriculture, foods, and chemical and pharmaceutical products.

3. Diploma policy (policy for degree conferment and target to be achieved in program)

The Molecular Agro-Life Science Program aims to enable students to acquire the basic knowledge, expertise, and skills related to the natural phenomena generated by organic molecule, cell, individual organisms, and population that constitute the foundation of the applied biology to develop human resources who are capable of working as a scientist in such as a company, college, and public organization. Therefore, in this program, the degree of Bachelor of Agriculture

will be awarded to students who acquire the capabilities described below, earn the required credits and to satisfy the specified achievement level, and pass the examination that is administered by the School of Applied Biological Science.

● Through liberal arts education subjects:

(1) The ability to study autonomously; the ability to collect, analyze, and criticize data; and putting these abilities into practice;

(2) Insight, from a broad perspective, into the essentials and the background of phenomena, and the linguistic ability and concern about peace which are required for a citizen of the world;

(3) The ability to identify a problem based on broad knowledge, integrate findings to establish a "knowledge system" that is really useful for problem solving, and examine phenomena from a top-down perspective based on this integrated knowledge; and

(4) General and basic knowledge of science that enables the student to develop the knowledge and skills required for application in any of the specialty fields of applied biological science.

● Through the specialized fundamental subjects for specialized education, the student is required to acquire:

(5) The ability to understand cutting-edge topics, as well as the basic ideas related to organisms and the biosphere;

(6) The ability to understand the value orientation and relevance to a globalized society of applied biology, and the importance of communication and consensus building in relation to the application of scientific results; and

(7) Understanding of problems regarding research misconduct and the importance of research and engineering ethics.

● Through the specialized education in this program, the student is required to acquire:

(8) Systematic and hierarchical knowledge and understanding regarding physiology of microorganisms, plants, and animals and functionality of living bodies from the level of molecule and cell to that of the individual organism and ecosystem;

(9) Data collection and analysis capabilities and systematic skills for research in the academic fields regarding molecule, cell, functionality of living bodies, and ecosystem and ability to practically use and apply those fundamental skills; and

(10) Capability of applying such as the knowledge, skills, and attitude that he/she has obtained in an integrated manner to solve problems that he/she identifies and logically present the conclusion orally or in writing and discuss with the other persons in the area that studies functionality of a cell and living body from the molecular point of view.

４． Curriculum policy (policy for arranging and executing the educational courses)

To enable students to achieve the targets that are defined for the Molecular Agro-Life Science Program, the educational courses are organized and executed according to the following policies:

(1) Courses in the liberal arts education aim to develop a wide-ranging and in-depth education and general intelligence, and to foster in students a depth of humanity and desire for peace. They also aim to develop practical foreign language abilities, an international perspective, the ability to understand different cultures, and the ability to utilize information and communication. In addition to this, courses in fundamental subjects are incorporated into the liberal arts education in order to develop professionals with the basic scientific knowledge and skills required for application in any of the specialty fields of applied biological science.

(2) Courses in special education develop basic capabilities related to biology and the biosphere through the "specialized fundamental subjects" that are common for all courses at the School of Applied Biological Science. The courses include exercises abroad, internships, field exercises, and lectures regarding scientific and engineering

ethics in order to develop the ability to make a hypothesis and basic, practical capabilities required for activities undertaken in leading positions in the international and/or local community. The courses also aim to develop the ability to understand problems regarding research misconduct and the importance of research and engineering ethics.

(3) The "specialized subjects" provided in the specialized education in this Program are categorized in "base subjects" in which students study molecular biology regarding organic molecule, cell, individual organism, and population and "advanced subjects"" in which the molecule biology is applied and developed to provide systematic education with continuity. They aim to develop capabilities for understanding natural phenomena from the view point of molecular biology and developing the understanding for practical science. In addition to that, this Program provides subjects of "exercise and practicum" in which Problem-based Learning (PBL) is conducted for identifying and solving problems to allow students to acquire skills and attitudes that he/she can widely use and apply in areas of agricultural science. In addition to that, students develop general capabilities for problem solving including skills for communication, presentation, and practical foreign language capability while preparing his/her "graduation thesis."

(4) Achievement in education is evaluated based on the grade scores for the subjects and the achievement level against the target defined for this program.

5． Start time and acceptance conditions

The School of Applied Biological Science holds the entrance examination collectively for the Department of Applied Biological Science. Students mainly take the liberal arts curricula that are held for the whole of the university (seminar for developing intelligence, subject regarding peace, introduction to university education, foreign language study, data processing study, disciplinary subjects, and subject regarding health & sports) in the first and second semesters of the first year and the first semesters of the second year. Assignment of students to the Molecular Agro-Life Science Program is actually conducted in the second semester of the second year.

Students study the fundamental subjects for one year after entering the university to acquire the basic knowledge required for studying the expertise. Then they mainly study the specialized fundamental subjects common for the all students of School of Applied Biological Science in the second semester of the second year. Particularly, they take the subjects of Laboratory Work in General Chemistry, Laboratory Work in General Physics, and Laboratory Work in General Biology I & II (including computer exercise) as those regarding experiments that are common for all students of the School of Applied Biological Science that consist of to get basic training for experiments in a wide area that is commonly required for the students of the School of Applied Biological Science. Students acquire a wide range of intelligence, capability in foreign languages such as English, data processing skills, basic knowledge common for the students of the School of Applied Biological Science, understanding for bioethics and ethics of science by the first semester of the second year to allow themselves to understand the aim and characteristics of each major program and select the most appropriate program.

Students are allocated either of four major programs (Integrative Hydrospheric Science Program, Applied Animal & Plant Science Program, Food Science Program, and Molecular Agricultural Biology Program) based on his/her wish and achievement level in the second semester of the second year. Students who enter the university in the fiscal year are equally divided into four programs in principle. The digits after a decimal point are rounded up.

The student must meet the specified "requirements for allocation to the program" if he/she wishes to be allocated to the program.

6. Available qualification

(1) Curator License

(2) Appointment qualification for food sanitation supervisor and food sanitation inspector

* For details of acquisition of those qualifications, refer to the "Students Handbook."

(3) Qualification for examination for Class A hazardous materials engineer

7.Class subjects and their contents

* For the class subjects, refer to the subject table in Attachment 1.

* For the details of the class subjects, refer to the syllabus that is published for each academic year.

| Achievement evaluation | Numerical conversion |
|---|---|
| S (Excellent: 90 or more points) | 4 |
| A (Very good: 80 - 89 points) | 3 |
| B (Good: 70 - 79 points) | 2 |
| C (Passed: 60 - 69 points) | 1 |

8.Academic achievement

The evaluation criteria are specified for each academic achievement evaluation item, and the achievement level against the criteria is determined at the end of the semester.

The evaluation score for each evaluation item is converted to a numerical value (S = 4, A = 3, B = 2, and C = 1), and the evaluation standard for academic achievement, from when the student entered the university to the end of the semester, is determined using these values while applying weightings. The evaluation standards consist of three levels, i.e. Excellent, Very Good, and Good.

| Study achievement | Evaluation standard |
|---|---|
| Excellent | 3.00 - 4.00 |
| Very Good | 2.00 - 2.99 |
| Good | 1.00 - 1.99 |

* Refer to the relationship between evaluation items and evaluation criteria described in Attachment 2.

* Refer to the relationship between evaluation items and class subjects described in Attachment 3.

* Refer to the curriculum map in Attachment 4.

9.Graduation thesis (graduation research) (meaning, student allocation, timing, etc.)

(1) Purpose

The graduation research in this program (Graduate Thesis) aims to allow the student to dedicate himself/herself to cutting-edge research in order to systematically gain understanding of problems and their background in the field of applied biological science, as well as to acquire comprehensive capabilities while analyzing and considering the obtained results and presenting the results in English both orally and in writing.

(2) Overview and meaning

Students conduct the graduate research under the guidance of their supervisor. Through their graduation research, students engage with the process consisting of understanding the situation (comprehension ability and intelligence), identification of problems (analysis ability and insight), and presentation of the results (proposal and execution ability), and, by doing so, they acquire the capability and skills required to work as experts after their graduation.

Students learn the basic concepts and attitude fundamentally required for research activities, establish a plan for their research, study methods for the research and experiments, and carry out the research under the instruction of their supervisor. Furthermore, students review the results obtained in the research and define targets for the further research. Students experience a series of research processes in order to have the chance to observe research activities at the cutting edge. They prepare a graduation thesis based on the study results and submit it before the specified date.

(3) Timing and method for determining the supervisor

① The supervisor is determined in the 2nd semester of the 3rd academic year.

② The supervisor is determined under the guidance of the tutor. The tutor holds a guidance seminar for students to explain the specialties of each member of faculty. The tutor also instructs students to attend the presentation assembly for graduation theses and Masters theses in order to understand the details of research done by faculty members. Students visit a faculty member who he/she wants to choose as supervisor, and learn about the details of the graduation thesis and environment of the laboratory. Supervisors are designated after the tutor considers students' wishes and makes adjustments. Then the faculty committee of the program approves the designated supervisors.

10. Responsibility

(1) Responsibility for PDCA (plan, do, check, and act) cycle

① The education affairs committee of school and the faculty members who provide the lectures are engaged in the processes of "plan" and "do"

② The faculty committee of the program plans and executes the major program on their own responsibility. A chief faculty member is designated as the supervisor of the program.

③ The education affairs committee of the school exercises control over the major programs provided in the school.

④ The education affairs committee of the department consists of members who are elected for each program, a chairman who is chosen by the school, and another member.

⑤ The education reform promotion committee is engaged in the process of "check."

⑥ The education reform promotion committee consists of members who are elected in each program, a chairman who is chosen by the school, the chairman of the education affairs committee of the school, an assistant chief of the graduate course, and the other member(s).

⑦ The education reform promotion committee reviews and evaluates the major programs provided in each program, reports the results to the education affairs committee of the school and the programs, and provides advice and recommendations.

⑧ The faculty committee of the program that takes the responsibility for execution of the major program is engaged in the process of "act."

⑨The faculty committee of the program and the education affairs committee of the school prepare and execute a plan for improvement taking the report, advice, and recommendations that are provided by the education reform promotion committee after the check process into consideration.

⑩ A tutor is designated for each program to provide direction regarding study and life.

⑪ A supervisor is designated in to each student in the program to provide guidance regarding the graduation thesis. The mentor guides the students through the process of the graduation research until they graduate.

The faculty committee of the program, the education affairs committee of the school, and the education reform promotion committee cooperate with each other to execute their roles with responsibility in the cycle of "plan",

"do", "check", and "act" to improve the education provided at the school.

(2) Evaluation of program

① Viewpoints for evaluation of program

The Molecular Agro-Life Science Program is evaluated from the viewpoints of "educational effectiveness" and "social effectiveness."

The "educational effectiveness" is evaluated by effects of the program execution on educational achievement in students.

The "social effectiveness" is evaluated by effects of the educational achievement in the program on the society.

② Evaluation method

In this program, the achievement in the program is evaluated from the viewpoints described above for students in the second semester of the fourth year. For the "educational effectiveness", the results and achievement of the students who took the program are evaluated comprehensively by the group of faculty members who are engaged in the execution of the program. Also, the level of achievement of all the students is evaluated and reviewed. The "social effectiveness" is evaluated based on such things as the rate of employment in corporations that have a close connection with the contents of this program and the pass rate in public servant examinations. We regularly request a human resources staff member of a company that employs mainly students of this program to evaluate this program. In addition to that, we request graduates of this program to evaluate both their own achievement and that of the program. The staff in the company and graduates are requested to provide evaluation and advice regarding whether the class subjects and their contents in this program were effective for social activities, whether the contents of class appropriately corresponded to the changes in science, technology, and society, and any class subjects that would be required for the future.

③ Policy and method for feedback to students

The education reform promotion committee regularly conducts inquiries and interviews for students to review and evaluate the program, improve the contents of the program, and provide advice and recommendations for improvement.

Table of Registration Standards (Liberal Arts Education Subjects)

(Integrative Hydrospheric Science Program, Applied Animal and Plant Science Program, Food Science Program, Molecular Agro-Life Science Program)

| Type | Subject type | | | Required No. of credits | Class subjects | No. of credits | Type of course registration | Year in which the subject is taken | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1st grade | | 2nd grade | | 3rd grade | | 4th grade | |
| | | | | | | | | Springs | Fall | Springs | Fall | Springs | Fall | Springs | Fall |
| Liberal Arts Education | Peace Science Courses | | | 2 | | 2 | Required | ○ | | | | | | | |
| | Common Subjects | Basic Courses in University Education | Introductory Seminar for First-Year Students | 2 | Introductory Seminar for First-Year Students | 2 | Required | ◎ | | | | | | | |
| | | | Introduction to University Education | 2 | Introduction to University Education | 2 | Required | ◎ | | | | | | | |
| | | | Development Seminar | 0 | (Note3) | 1 | | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | | Foreign Languages | English(Note2) Basic English Usage | 2 | Communication Basic I | 1 | Required | ◎ | | | | | | | |
| | | | | | Communication Basic II | 1 | | | ◎ | | | | | | |
| | | | English(Note2) Communication I | 2 | Communication I A | 1 | Required | ◎ | | | | | | | |
| | | | | | Communication I B | 1 | | ◎ | | | | | | | |
| | | | English(Note2) Communication II | 2 | Communication II A | 1 | Required | | ◎ | | | | | | |
| | | | | | Communication II B | 1 | | | ◎ | | | | | | |
| | | | Non-English Foreign Languages (Select one language) (Note2) | 4 | Basic Foreign Language I | 1 | Elective Required | ◎ | | | | | | | |
| | | | | | Basic Foreign Language II | 1 | | ◎ | | | | | | | |
| | | | | | Basic Foreign Language III | 1 | | | ◎ | | | | | | |
| | | | | | Basic Foreign Language IV | 1 | | | ◎ | | | | | | |
| | | Information and Data Science Courses | | 4 | Introduction to Information and Data Sciences(Note3) | 2 | Required | ◎ | | | | | | | |
| | | | | | Fundamental Data Science(Note3) | 2 | Required | | ◎ | | | | | | |
| | | Area Courses | | 12 | (Note3) | 1 or 2 | Elective/ Required | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | | Social Cooperation Courses | | 0 | (Note3) | | | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | | Health and Sports Courses | | 2 | (Note4) | 1 or 2 | Elective Required | ○ | ○ | | | | | | |
| | Foundation Courses | | | 6 | Organic Chemistry | 2 | Required | | ◎ | | | | | | |
| | | | | | Cell Science | 2 | | | ◎ | | | | | | |
| | | | | | “Basic Laboratory Work | 1 | | ◎ | ◎ | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | in Chemistry" or "Experimental Methods and Laboratory Work in Chemistry I" (Note5) | | | | | | | | | | | |
| | | | "Experimental Methods and Laboratory Work in Biology I" | 1 | | | ◎ | | | | | | | |
| | Total | 40 | | | | | | | | | | | | |

## ○ Instruction regarding credits

Note 1: The year indicated with a circle mark represents that in which students typically take the subject. The year with a double circle mark indicates the year in which students are highly recommended to take the subject. Students are allowed to take the subject in any year after that indicated with a circle or double circle mark. It is required to confirm the semester in which the subject is provided in the class schedule for liberal arts education subjects in the Students' Handbook because some subjects might be provided in different semester from that which is provided in this document.

Note 2: The credit for "Online English Seminar I," "Online English Seminar II," and "Online English Seminar III" that is earned through a self-study, are accepted as the credit for English required for graduation. Achievement in a foreign language skill test and language training might be accepted as a credit. For further information, refer to the description regarding English subjects in the liberal arts education and the item "Credit based on Achievement in Foreign Language Skill Test" in the Students Handbook.

Note 3: Area Courses are required to earn 4 credits or more for the natural science subjects and 4 credits or more for the human & social science subjects.

However, "Fundamentals of Biology" of the natural science subjects is a subject for which students are requested to take if he/she did not take biology subjects in the entrance exam (including the University Testing Center Examination).

For the other students, the credit for the subject "Fundamentals of Biology" is not accepted as that for graduation.

Credits earned in Information and Data Science Courses exceeding 4 credits may be included in Natural Sciences. Up to 4 credits of Social Cooperation Courses may be included in Humanities/Social Sciences. Development Seminars may be included in Area Courses.

Note 4: For health & sports subjects, it is recommended to take a practicum in sports.

Note 5: It is required to take “Basic Laboratory Work in Chemistry” that is provided in the first semester in the first year. Only when failing to earn the credit for “Basic Laboratory Work in Chemistry”, it is allowed to take the subject “Experimental Methods and Laboratory Work in Chemistry I” that is provided in the second semester in the first year.

Table of Registration Standards(Specialized Fundamental Subjects)

(Integrative Hydrospheric Science Program, Applied Animal and Plant Science Program, Food Science Program, Molecular Agro-Life Science Program)

| Type | Subject type | Required No. of credits | Class subjects | No. of credits | Year in which the subject is taken | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1st grade | | 2nd grade | | 3rd grade | | 4th grade | |
| | | | | | Springs | Fall | Springs | Fall | Springs | Fall | Springs | Fall |
| Specialized Subjects | Specialized Fundamental Subjects | 26 | Introduction to Applied Biological Sciences | 2 | ○ | | | | | | | |
| | | | Introduction to Microbiology | 2 | ○ | | | | | | | |
| | | | Introduction to Molecular Biochemistry | 2 | | ○ | | | | | | |
| | | | Agricultural Production Resources | 2 | | ○ | | | | | | |
| | | | Physics for Applied Biological Science | 2 | | ○ | | | | | | |
| | | | Ethics of Science and Technology | 2 | | ○ | | | | | | |
| | | | Statistics in Biology | 2 | | | ○ | | | | | |
| | | | Environmental Sciences for Bioproduction | 2 | | | ○ | | | | | |
| | | | Laboratory Work in General Biology I | 1 | | | ○ | | | | | |
| | | | Laboratory Work in General Biology II | 1 | | | ○ | | | | | |
| | | | Laboratory Work in General Chemistry | 1 | | | ○ | | | | | |
| | | | Laboratory Work in General Physics | 1 | | | ○ | | | | | |
| | | | Required Subjects: Total 20 credits | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Seminar in Field Science | 2 | | ○ | | | | | | |
| | | | Research Front of Bioresource Sciences | 2 | | ○ | | | | | | |
| | | | Research Front of Food and AgriLife Science | 2 | | ○ | | | | | | |
| | | | Introduction to Physiology | 2 | | | ○ | | | | | |
| | | | Public Health | 2 | | | | | | ○ | | |
| | | | Elective Required Subjects<br>Take 6 credits from above subjects<br>(Redundant credits over 6 credits move to Elective Subjects in each Program) | | | | | | | | | |

Table of Registration Standards(Specialized Subjects)

（Molecular Agro-Life Science Program）

| Type | Subject type | Required No. of credits | Class subjects | No. of credits | Year in which the subject is taken | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1st grade | | 2nd grade | | 3rd grade | | 4th grade | |
| | | | | | Springs | Fall | Springs | Fall | Springs | Fall | Springs | Fall |
| Specialized Subjects | Specialized Subjects | 58 | Genome Science I | 2 | | | | ○ | | | | |
| | | | Genome Science II | 2 | | | | ○ | | | | |
| | | | Bioorganic Chemistry | 2 | | | | ○ | | | | |
| | | | Chemistry of Natural Organic Compounds | 2 | | | | ○ | | | | |
| | | | Molecular Cell Biology | 2 | | | | ○ | | | | |
| | | | Bio-Analytical Science | 2 | | | | ○ | | | | |
| | | | Reading of Foreign Literature in Molecular Agro-Life Science | 2 | | | | ○ | | | | |
| | | | Laboratory Work in Molecular Agro-life Science I | 1 | | | | ○ | | | | |
| | | | Laboratory Work in Molecular Agro-life Science II | 1 | | | | ○ | | | | |
| | | | Laboratory Work in Molecular Agro-life Science III | 1 | | | | ○ | | | | |
| | | | Systemic Life Science | 2 | | | | ○ | | | | |
| | | | Problem Based Learning for Molecular Agro-Life Science I | 1 | | | | | ○ | | | |
| | | | Problem Based Learning for Molecular Agro-Life Science II | 1 | | | | | ○ | | | |
| | | | Graduation Thesis I | 2 | | | | | | ○ | | |
| | | | Graduation Thesis II | 2 | | | | | | | ○ | |
| | | | Graduation Thesis III | 2 | | | | | | | | ○ |
| | | | Required Subjects: Total 27credits | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cell Technology | 2 | | | | ○ | | |
| | | | Reproductive Biology | 2 | | | | ○ | | |
| | | | Plant Molecular Biology | 2 | | | | ○ | | |
| | | | Food Microbiology | 2 | | | | ○ | | |
| | | | Bioresource Utilization Science | 2 | | | | ○ | | |
| | | | Nutrition | 2 | | | | ○ | | |
| | | | Hydrospheric Biochemistry | 2 | | | | ○ | | |
| | | | Pathology | 2 | | | | ○ | | |
| | | | Applied Extremophilic Life Science | 2 | | | | | ○ | |
| | | | Animal Breeding and Genetics | 2 | | | | | ○ | |
| | | | Food Biochemistry | 2 | | | | | ○ | |
| | | | Food Hygiene | 2 | | | | | ○ | |
| | | | Aquaculture I | 2 | | | | | ○ | |
| | | | Elective Required Subjects: Take 12 credits from above subjects (Redundant credits over 12 credits move to Elective Subjects) | | | | | | | |
| | | | Elective Subjects: At least 19 credits must be obtained.<br>・Specialized subjects from other Applied Biological Science programs can be included in the elective subjects.<br>・Up to 12credits obtained from specialized subjects at another School and from subjects offered by the AIMS Program completed at the dispatch destination can be included in the credits required for graduation.<br>・Credits obtained from Liberal Arts Education Subjects and subjects related to the teaching progession cannot be included in the credits required for graduation. | | | | | | | |
| Total | | 124 | | | | | | | | |

[Credits required for graduation] 124 credits (40 credits for liberal arts education subjects + 26 credits for specialized fundamental subjects + 58 credits for specialized subjects)

Attachment 2

# Results of study in Molecular Agro-Life Science Program

## Relation between evaluation items and evaluation criteria

| Study achievement | | | Evaluation criteria | | |
|---|---|---|---|---|---|
| Evaluation items | | | Excellent | Very Good | Good |
| Knowledge & understanding | (1) | Ability for comprehensive and cross-disciplinary thinking and knowledge / understandings required to see a phenomena from a broad, top-down perspective and to take action for solving problems regarding the specialized area. | Has superior ability for comprehensive and cross-disciplinary thinking and capability to see a phenomenon from a broad, top-down perspective and to take action for solving problems regarding the specialized area. | Has sufficient ability for comprehensive and cross-disciplinary thinking and capability to see a phenomenon from a broad, top-down perspective and to take action for solving problems regarding the specialized area. | Has basic ability for comprehensive and cross-disciplinary thinking and capability to see a phenomenon from a broad, top-down perspective and to take action for solving problems regarding the specialized area. |
| | (2) | Basic knowledge and understanding required for acquiring expertise | Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of explaining this knowledge while associating it with items related to other areas. | Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of sufficiently explaining this knowledge while associating it with items related to other areas. | Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of providing basic explanation of this knowledge while associating it with items related to other areas. |
| | (3) | Knowledge and understanding regarding organic molecule, cell, individual organism, and population | Has basic knowledge of areas regarding organic molecule, cell, individual organism, and population and is capable of sufficiently understanding, explaining, and applying the knowledge. | Has basic knowledge of areas regarding organic molecule, cell, individual organism, and population and is capable of sufficiently understanding and explaining the knowledge. | Has basic knowledge and understandings of areas regarding organic molecule, cell, individual organism, and population. |
| Abilities & skills | (1) | Basic ability in communication, information processing, and physical activities required for acquiring expertise | Has superior ability in all the elements regarding communication, information processing, and physical activities required for acquiring expertise. | Has sufficient ability in all the elements regarding communication, information processing, and physical activities required for acquiring expertise. | Has basic ability in all the elements regarding communication, information processing, and physical activities required for acquiring expertise. |
| | (2) | Basic experimentation abilities and skills required for acquiring expertise | Has sufficient basic experimentation abilities and skills required for acquiring expertise, and is capable of autonomously applying them. | Has sufficient basic experimentation abilities and skills required for acquiring expertise, and is capable of autonomously applying them under instruction. | Generally has sufficient basic experimentation abilities and skills required for acquiring expertise, and is capable of supporting their execution. |
| | (3) | Intellectual ability and techniques in study fields regarding organic molecule, cell, individual organism, and population | Has sufficiently acquired intellectual ability and techniques in areas regarding organic molecule, cell, individual organism, and population and is capable of applying them. | Has acquired intellectual ability and techniques in areas regarding organic molecule, cell, individual organism, and population and is capable of applying them. | Has intellectual ability and techniques in areas regarding organic molecule, cell, individual organism, and population. |
| | (4) | Ability regarding scientific English that is required as a basis for understanding technical English manuals | Has a basic ability for reading English texts and capable of sufficiently understanding technical manuals to explain to the others. | Has a basic ability for reading English texts and capable of understanding technical manuals to explain to the others. | Has a basic ability for reading English texts and capable of understanding technical manuals. |

| | | | | | |
|---|---|---|---|---|---|
| Comprehensive capability | (1) | Ability to collect information related to peripheral disciplines to complement the knowledge regarding the specialized area and comprehensively consider functions of organic molecule, cell, individual organism, and population from view points related to molecules | Capable of collecting information related to peripheral disciplines to complement the knowledge regarding the specialized area, comprehensively considering functions of organic molecule, cell, individual organism, and population from view points related to molecules, explaining to others, and applying the information. | Capable of collecting information related to peripheral disciplines to complement the knowledge regarding the specialized area, comprehensively considering functions of organic molecule, cell, individual organism, and population from view points related to molecules, and explaining to others. | Capable of collecting information related to peripheral disciplines to complement the knowledge regarding the specialized area and comprehensively considering functions of organic molecule, cell, individual organism, and population from view points related to molecules. |
| | (2) | Ability to organize own ideas, demonstrate comprehension based on those ideas, logically represent own conclusion orally or in a document, and exchange ideas in areas in which themes regarding functions of organic molecule, cell, individual organism, and population are discussed from view points related to molecules. | Capable of organizing own ideas, demonstrating comprehension based on those ideas, logically representing own conclusion orally or in a document, and exchanging advanced ideas in areas in which themes regarding functions of organic molecule, cell, individual organism, and population are discussed from view points related to molecules. | Capable of organizing own ideas, demonstrating comprehension based on those ideas, logically representing own conclusion orally or in a document, and sufficiently exchanging ideas in areas in which themes regarding functions of organic molecule, cell, individual organism, and population are discussed from view points related to molecules. | Capable of organizing own ideas, demonstrating comprehension based on those ideas, logically representing own conclusion orally or in a document, and exchanging ideas in areas in which themes regarding organic molecule, cell, individual organism, and population are discussed from view points related to molecules. |

## Role of liberal arts education in this program

The liberal arts education in this program aims to build both the language skills and the academic foundation required for the specialized education. It develops not only a capability for studying autonomously and a scientific intelligence based on the ability to collect, analyze and criticize data, but also language skills that allow the student to exchange ideas with others in English. Also, it enhances insight from a broad perspective for the essentials and the background of phenomena, and the linguistic ability and concern for peace which are required for a citizen of the world. It enables students to acquire the ability to integrate findings and establish a "knowledge system" that is really useful for problem solving, and to examine phenomena using a top-down perspective based on this integrated knowledge.

# Attachment 3

Relation between evaluation items and class subjects

| Subject category | Name of class subject | Number of credits | Required or Electivee | Semester when the class is provided | Core subject | Evaluation item | | | | | | | | | | | | | | | | | | Total of weightings for evaluation items for the subject |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Knowledge & understanding | | | | | | Ability & skills | | | | | | | | Comprehensive capability | | | | |
| | | | | | | (1) | | (2) | | (3) | | (1) | | (2) | | (3) | | (4) | | (1) | | (2) | | |
| | | | | | | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | Weighting for evaluation item for the subject | Weighting for evaluation item | |
| Liberal arts education subjects | Peace Science Courses | 2 | Required | 1st - 4th semesters | | 100 | 1 | | | | | | | | | | | | | | | | | 100 |
| Liberal arts education subjects | Introductory Seminar for First-Year Students | 2 | Required | 1st semester | ○ | 100 | 1 | | | | | | | | | | | | | | | | | 100 |
| Liberal arts education subjects | Introduction to University Education | 2 | Required | 1st semester | | 100 | 1 | | | | | | | | | | | | | | | | | 100 |
| Liberal arts education subjects | Foreign Languages | 10 | Required / Elective required | 1st - 2th semesters | | | | | | | | 100 | 1 | | | | | | | | | | | 100 |
| Liberal arts education subjects | Information and Data Science Courses | 4 | Required | 1st - 2th semesters | | | | | | | | 100 | 1 | | | | | | | | | | | 100 |
| Liberal arts education subjects | Area Courses | 12 | Elective required | 1st - 6th semesters | | 100 | 1 | | | | | | | | | | | | | | | | | 100 |
| Liberal arts education subjects | Health and Sports Courses | 2 | Elective required | 1st - 2nd semesters | | | | | | | | 100 | 1 | | | | | | | | | | | 100 |
| Liberal arts education subjects | Organic Chemistry | 2 | Required | 2nd semester | | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Liberal arts education subjects | Cell Science | 2 | Required | 2nd semester | | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Liberal arts education subjects | Basic Laboratory Work in Chemistry | 1 | Required | 1st semesters | | | | | | | | | | 100 | 1 | | | | | | | | | 100 |
| Liberal arts education subjectsLiberal arts education subjects | "Experimental Methods and Laboratory Work in Biology I" | 1 | Required | 2nd semesters | | | | | | | | | | 100 | 1 | | | | | | | | | 100 |
| Specialized subjects | Introduction to Applied Biological Science | 2 | Required | 1st semester | ○ | | | 100 | 1 | | | | | | | | | | | | | | | 100 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specialized subjects | Introduction to Microbiology | 2 | Required | 1st semester | ○ | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Introduction to Molecular Biochemistry | 2 | Required | 2nd semester | ○ | 60 | 1 | | | 40 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Agricultural Production Resources | 2 | Required | 2nd semester\ | ○ | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Physics for Applied Biological Science | 2 | Required | 2nd semester | ○ | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Ethics of Science and Technology | 2 | Required | 2nd semester | ○ | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Statistics in Biology | 2 | Required | 3rd semester | ○ | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Environmental Sciences for Bioproduction | 2 | Required | 3rd semester | ○ | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Laboratory Work in General Biology I | 1 | Required | 3rd semester | ○ | | | | | | | | | 100 | 1 | | | | | | | | | 100 |
| Specialized subjects | Laboratory Work in General Biology II | 1 | Required | 3rd semester | ○ | | | | | | | | | 100 | 1 | | | | | | | | | 100 |
| Specialized subjects | Laboratory Work in General Chemistry | 1 | Required | 3rd semester | ○ | | | | | | | | | 100 | 1 | | | | | | | | | 100 |
| Specialized subjects | Laboratory Work in General Physics | 1 | Required | 3rd semester | ○ | | | | | | | | | 100 | 1 | | | | | | | | | 100 |
| Specialized subjects | Seminar in Field Science | 2 | Elective required | 2nd semester | | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Research Front of Bioresource Sciences | 2 | Elective required | 2nd semester | | 100 | 1 | | | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Research Front of Food and AgriLife Science | 2 | Elective required | 2nd semester | | 100 | 1 | | | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Introduction to Physiology | 2 | Elective required | 3rd semester | | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Public Health | 2 | Elective required | 6th semester | | | | 100 | 1 | | | | | | | | | | | | | | | 100 |
| Specialized subjects | Genome Science I | 2 | Required | 4th semester | ○ | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Genome Science II | 2 | Required | 4th semester | ○ | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Bioorganic Chemistry | 2 | Required | 4th semester | ○ | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Chemistry of Natural Organic Compounds | 2 | Required | 4th semester | ○ | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Molecular Cell Biology | 2 | Required | 4th semester | ○ | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Bio-Analytical Science | 2 | Required | 4th semester | ○ | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Reading of Foreign Literature in Molecular Agro-Life Science | 2 | Required | 4th semester | ○ | | | | | | | | | | | | | | | 100 | 1 | | | 100 |
| Specialized subjects | Laboratory Work in Molecular Agro-life Science I | 1 | Required | 4th semester | ○ | | | | | | | | | | | 100 | 1 | | | | | | | 100 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specialized subjects | Laboratory Work in Molecular Agro-life Science II | 1 | Required | 4th semester | ○ | | | | | | | | | | | 100 | 1 | | | | | | | 100 |
| Specialized subjects | Laboratory Work in Molecular Agro-life Science III | 1 | Required | 4th semester | ○ | | | | | | | | | | | 100 | 1 | | | | | | | 100 |
| Specialized subjects | Systemic Life Science | 2 | Required | 4th semester | ○ | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Problem Based Learning for Molecular Agro-Life Science I | 1 | Required | 5th semester | ○ | | | | | | | | | | | 100 | 1 | | | | | | | 100 |
| Specialized subjects | Problem Based Learning for Molecular Agro-Life Science II | 1 | Required | 5th semester | ○ | | | | | | | | | | | 100 | 1 | | | | | | | 100 |
| Specialized subjects | Graduation Thesis I | 2 | Required | 6th semester | ○ | | | | | | | | | | | | | | | | | 100 | 1 | 100 |
| Specialized subjects | Graduation Thesis II | 2 | Required | 7th semester | ○ | | | | | | | | | | | | | | | | | 100 | 1 | 100 |
| Specialized subjects | Graduation Thesis III | 2 | Required | 8th semester | ○ | | | | | | | | | | | | | | | | | 100 | 1 | 100 |
| Specialized subjects | Cell Technology | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Reproductive Biology | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Plant Molecular Biology | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Food Microbiology | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Bioresource Utilization Science | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Food Nutrition | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Hydrospheric Biochemistry | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Pathology | 2 | Elective required | 5th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Applied Extremophilic Life Science | 2 | Elective required | 6th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Animal Breeding and Genetics | 2 | Elective required | 6th semester | | | | | | 100 | 1 | | | | | | | | | | | | | 100 |
| Specialized subjects | Food Biochemistry | 2 | Elective required | 6th semester | | | | | | | | | | | | | | | | | | 100 | 1 | 100 |
| Specialized subjects | Food Hygiene | 2 | Elective required | 6th semester | | | | | | | | | | | | | | | | | | 100 | 1 | 100 |
| Specialized subjects | Aquaculture I | 2 | Elective required | 6th semester | | | | | | | | | | | | | | | | | | 100 | 1 | 100 |

Attachment 4

## Curriculum map for Molecular Agro-Life Science Program

| Study achievement | | 1st year | | 2nd year | | 3rd year | | 4th year | |
|---|---|---|---|---|---|---|---|---|---|
| Evaluation items | | 1st semester | 2nd semester | 3rd semester | 4th semester | 5th semester | 6th semester | 7th semester | 8th semester |
| Knowledge & understanding | ①Ability for comprehensive and cross-disciplinary thinking and knowledge / understandings required to see a phenomena from a broad, top-down perspective and to take action for solving problems regarding the specialized area. | Seminar for developing intelligence (◎) | Research Front of Food and AgriLife Science (○) | | | | | | |
| | | Introduction to University Education (◎) | Research Front of Bioresource Sciences (○) | | | | | | |
| | | Peace Science Courses (◎) | Introduction to Molecular Biochemistry(◎) | | | | | | |
| | | Area Courses subjects (○) | | | | | | | |
| | ②Basic knowledge and understanding required for acquiring expertise | Introduction to Applied Biological Science(◎) | Organic Chemistry (◎) | Environmental Sciences for Bioproduction(◎) | | | Public Health(○) | | |
| | | Introduction to Microbiology (◎) | Cell Science (◎) | Statistics in Biology (◎) | | | | | |
| | | Introduction to Applied Biological Science(◎) | Agricultural Production Resources(◎) | | | | | | |
| | | Introduction to Microbiology (◎) | Physics for Applied Biological Science(◎) | Introduction to Physiology (○) | | | | | |
| | | | Ethics of Science and Technology(◎) | | | | | | |
| | | | Seminar in Field Science (○) | | | | | | |
| | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| s t a n d i n g | ③Knowledge and understanding regarding organic molecule, cell, individual organism, and population | | Introduction to Molecular Biochemistry(◎) | | Genome Science I(◎) | Cell Technology（○） | Animal Breeding and Genetics（○） | | |
| | | | | | Genome Science II(◎) | Reproductive Biology（○） | Applied extremophilic life science（○） | | |
| | | | | | Bioorganic Chemistry (◎) | Plant Molecular Biology（○） | | | |
| | | | | | Chemistry of natural organic compounds (◎) | Food Microbiology（○） | | | |
| | | | | | Molecular Cell Biology (◎) | Bioresource Utilization Science（○） | | | |
| | | | | | Bio-Analytical Science (◎) | Nutrition（○） | | | |
| | | | | | Systemic Life Science (◎) | Hydrospheric Biochemistry（○） | | | |
| | | | | | | Pathology（○） | | | |
| | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Abilities & skills | ①Basic ability in communication, information processing, and physical activities required for acquiring expertise | Foreign Languages (◎) | | | | | | | |
| | | Introcuction to Information and Data Scieces (◎) | Fundamental Data Science (◎) | | | | | | |
| | | Health and Sports Courses (〇) | | | | | | | |
| | ②Basic experimentation abilities and skills required for acquiring expertise | | | Laboratory Work in General Biology I & II (◎) | | | | | |
| | | "Basic Laboratory Work in Chemistry" (◎) | | Laboratory Work in General Chemistry (◎) | | | | | |
| | | | "Experimental Methods and Laboratory Work in Biology I" (◎) | Laboratory Work in General Physics (◎) | | | | | |
| | ③Intellectual ability and techniques in study fields regarding organic molecule, cell, individual organism, and population | | | | Laboratory Work in Molecular Agro-life Science I(◎) | Problem Based Learning for Molecular Agro-Life Science I (◎) | | | |
| | | | | | Laboratory Work in Molecular Agro-life Science II(◎) | Problem Based Learning for Molecular Agro-Life Science II (◎) | | | |
| | | | | | Laboratory Work in Molecular Agro-life Science III(◎) | | | | |
| | ④Ability regarding scientific English that is required as a basis for understanding technical English manuals | | | | Reading of Foreign Literature in Molecular Agro-Life Science(◎) | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Comprehensive capability | ①Ability to collect information related to peripheral disciplines to complement the knowledge regarding the specialized area and comprehensively consider functions of organic molecule, cell, individual organism, and population from view points related to molecules | | | | | | Food Biochemistry（○） | | |
| | | | | | | | Food Hygiene（○） | | |
| | | | | | | | Aquaculture I（○） | | |
| | ②Ability to organize own ideas, demonstrate comprehension based on those ideas, logically represent own conclusion orally or in a document, and exchange ideas in areas in which themes regarding functions of organic molecule, cell, individual organism, and population are discussed from view points related to molecules. | | | | | | Graduation Thesis I（◎） | Graduation Thesis II（◎） | Graduation Thesis III（◎） |

(Example) Liberal arts subjects | Specialized fundamental subjects | Specialized subjects | Graduation thesis

(◎) Required subjects　(○) Elective required subjects　(△) Elective subjects

# Attachment 5

List of Faculty Members of the Molecular Agro-Life Science Program

| Name of faculty | Name of program and position | Extension number | Laboratory | Mail address |
|---|---|---|---|---|
| Masayuki Shimada | Professor | 7899 | B211 | mashimad@hiroshima-u.ac.jp |
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| Koichi Funato | Professor | 7923 | A706 | kfunato@hiroshima-u.ac.jp |
| Hiroyuki Horiuchi | Professor | 7970 | B312-2 | hhori10@hiroshima-u.ac.jp |
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| Wakana Tanaka | Associate Professor | 7927 | A710 | wakanat@hiroshima-u.ac.jp |
| Yukichi Fujikawa | Associate Professor | 7928 | A720 | fujikawa@hiroshima-u.ac.jp |
| Masashi Ikutani | Assistant Professor | 7086 | A510 | mikutani@hiroshima-u.ac.jp |
| Jun Tominaga | Assistant Professor | 7961 | B203 | jtom@hiroshima-u.ac.jp |
| Sotaro Fujii | Assistant Professor | 4045 | A702 | sofuji@hiroshima-u.ac.jp |
| Mei Matsuzaki | Assistant Professor | 7967 | B312-1 | meimatsu@hiroshima-u.ac.jp |
| NGUYEN Van Quan | Assistant Professor | 7917 | B103 | nvquan@hiroshima-u.ac.jp |

* To call a direct phone number, dial the extension number after "082-424."