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| | for degree conferment and target to be achieved in program) |
| The Molecular - | Togram and to endote stadents to acquire are caste movinedge, experies, and |
| _ | henomena generated by organic molecule, cell, individual organisms, and population that |
| constitute the foundation of th | ne applied biology to develop human resources who are capable of working as a scientist in |

such as a company, college, and public organization. \Box

- (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. | | | | | |
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(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."

| 5. | | | | | |
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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, 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.

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| 6. Available qualification |
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| (1) Educational personnel certification: Type 1 License for High School Teacher (science) |
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(1) $2\square$

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

| | | | | | | | | | | Year | in wh | ich th | e subje | ect is | taken | | | | | | | | |
|----------|---------------------------------------|--|---|------------------------------------|--|--|--------------------|-----------------------------------|----------------|--------------|-------------------------------|--------|------------------------------------|--------------|----------|------|---|--|--|--|--|--|--|
| Туре | | Su | bject | type | Required No. of credits | Class subjects | No. of credits | Type of course registration | Springs | rade Lall | 2 nd gg Springs | rade | Springs ^{2 pr} | rade Lall | Springs | rade | | | | | | | |
| | Pe | ace S | cience | e Courses | 2 | | 2 | Required | | | | | | | | | | | | | | | |
| | ses in | | for F | ory Seminar irst-Year idents | 2 | Introductory Seminar for First-Year Students | 2 | Required | | | | | | | | | | | | | | | |
| | Basic Courses in | Un | | luction to ty Education | 2 | Introduction to University Education | 2 | Required | | | | | | | | | | | | | | | |
| | | Development Seminar Basic English | | - | 0 | (Note3) | 1 | | | | | | | | | | | | | | | | |
| | | | | | | Communication Basic I | 1 | | | | | | | | | | | | | | | | |
| | | | English Usage Communic ation I | | 2 | Communication Basic II | 1 | Required | | | | | | | | | | | | | | | |
| | | Solution I Solution I Solution I Solution I Solution I Communic | | 2 | Communication I A Communication I B | 1 | Required | | | | | | | | | | | | | | | | |
| | | es | Eng | Communic | 2 | Communication II A | 1 | Required | | | | | | | | | | | | | | | |
| | | guag | Non-E Langu (Select | Non- | ation II | 2 | Communication II B | 1 | Kequirea | | | | | | | | ļ | | | | | | |
| ation | | ign Lan | | | on-English | - | | Basic Foreign Language I | 1 | | | | | | | | | | | | | | |
| rts Educ | Liberal Arts Education subjects | Foreigr | | oreign anguages | | Basic Foreign Language II | 1 | Elective | | | | | | | | | | | | | | | |
| iberal A | abjects | | | ect one | 4 | Basic Foreign Language III | 1 | Required | | | | | | | | | | | | | | | |
| | Common Subjects | | (Not | e2) | | Basic Foreign Language IV | 1 | | | | | | | | | | | | | | | | |
| | Col | | Information and Data | | 4 | Introduction to Information and Data Sciences(Note3) | 2 | Required | | | | | | | | | | | | | | | |
| | | | Science Courses | Science Courses | Science Courses | Science Courses | cience Courses | cience Courses | cience Courses | | | | Fundamental Data Science(Note3) | 2 | Required | | | | | | | | |
| | | | Area | Courses | 12 | (Note3) | 1 or 2 | Elective/ Required | | | | | | | | | | | | | | | |
| | Eng? Social Cooperation Courses | | (Note3) | 0 | | | | | | | | | | | | | | | | | | | |
| | | H | | and Sports ourses | 2 | (Note4) | 1 or 2 | Elective Required | | | | | | | | | | | | | | | |
| | Found | latior | ı Cour | ses | 6 | Organic Chemistry | 2 | | | | | | | | | | | | | | | | |
| | | | | | | Cell Science | 2 |] | | | | | | | | | | | | | | | |

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

O 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 "Field Research in the English-speaking World" that is earned through such as a short-term study abroad and that 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.

(PP. 30 - 31, Liberal Arts)

Note 3: It is 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.

It is allowed to include up to 4 credits for society-related subjects as credits for the Human & Social Science Subjects.

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 Chemis

Table of Registration Standards(Specialized Fundamental Subjects)

Integrative Hydrospheric Science Program, Applied Animal and Plant Science Program, Food

| | | | | | | Ye | ar in w | hich th | e subje | ct is tal | ken | |
|------------------------|------------------------------------|-------------------|----------------------------|-------------------|-------------------|------|-------------------|---------|-------------------|-----------|-------------------|------|
| | | Required | of Class subjects | | 1 st g | rade | 2 nd g | rade | 3 rd g | rade | 4 th g | rade |
| Туре | Subject type | No. of credits | Class subjects | No. of credits | Springs | Fall | Springs | Fall | Springs | Fall | Springs | Fall |
| | | | Introduction to Applied | 2 | | | | | | | | |
| | | | Biological Sciences | | | | | | | | | |
| | | | Introduction to | 2 | | | | | | | | |
| | | | Microbiology | | | | | | | | | |
| | | | Introduction to Molecular | 2 | | | | | | | | |
| | | | Biochemistry | | | | | | | | | |
| | ~ | | Agricultural Production | 2 | | | | | | | | |
| | ects | | Resources | | | | | | | | | |
| S | ich | | Physics for Applied | 2 | | | | | | | | |
| ect | l S | | Biological Science | | | | | | | | | |
| įduč | ent a | | Ethics of Science and | 2 | | | | | | | | |
| s þe | dame | 24 | Technology | | | | | | | | | |
| Special i zed Subjects | Fun | 24 | Statistics in Biology | 2 | | | | | | | | |
| cia | jed | | Environmental Sciences | 2 | | | | | | | | |
| Spe | aliz | | for Bioproduction | | | | | | | | | |
| | Special i zed Fundanærtal Subjects | | Laboratory Work in | 1 | | | | | | | | |
| | Sp | | General Biology I | | | | | | | | | |
| | | | Laboratory Work in | 1 | | | | | | | | |
| | | | General Biology II | | | | | | | | | |
| | | | Laboratory Work in | 1 | | | | | | | | |
| | | | General Chemistry | | | | | | | | | |
| | | | Laboratory Work in | 1 | | | | | | | | |
| | | | General Physics | | | | | | | | | |
| | | | Requi | red Subj | ects: | Tota | al 20 (| credit | S | | | |

Science Program, Molecular Agro-Life Science Program

| Seminar in Field | Science 2 | | | | | | |
|------------------|----------------------|------------|-----------|---------|------------|-----------|-----|
| Research Front | of 2 | | | | | | |
| Bioresource Sci | ences | | | | | | |
| Research Front | of Food 2 | | | | | | |
| and AgriLife Sc | ience | | | | | | |
| Introduction to | 2 | | | | | | |
| Physiology | | | | | | | |
| Public Health | 2 | | | | | | |
| | Elective | e Required | d Subject | S | | | |
| | Take 6 cred | its from a | bove sub | ojects | | | |
| (Redundant cre | edits over 6 credits | move t | o Electiv | e Subje | cts in eac | ch Progra | am) |

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| | | | I gpq o g Uekgpeg KK | 4 | | | | | | | | |
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| vdlge | vdlge | | Citq/nkhg Uekgpeg K | | | | | | | | | |
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| | | gngevkxg uwdlgevu0 | | | | | |
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| | | hqt itcfwcvkqp0 | | | | | |
| | | Etgfkvu qdvckpgf htq o Nkdgten Ctvu | Gfwecvkqp Uw | dlgevu cpf u | wdlgevu tgncvg | gf vq vjg vgce | jkpi |
| | | rtqiguukqp ecppqv dg kpenwfgf kp vj | g etg fkvu tg sw | ktgf hqt itcf | fwcvkqp0 | | |
| Vqvcn | 346 | | | | | | |

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Results of study in Food Science Program

Relation between evaluation items and evaluation criteria

| | | Study achievement | | Evaluation criteria | |
|---|-----|---|---|--|---|
| | | Evaluation items | Excellent | Very Good | Good |
| | (1) | | 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. |
| | | 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 | Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of sufficiently explaining this knowledge | Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of providing basic explanation of this |
| | (3) | | | | |
| - | | 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. |
| - | | 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. |
| | | 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. |
| | | 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. |
| | | 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. |

comprehension based on those ideas, logically represent own conclusion orally or representing own conclusion orally or in a 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.

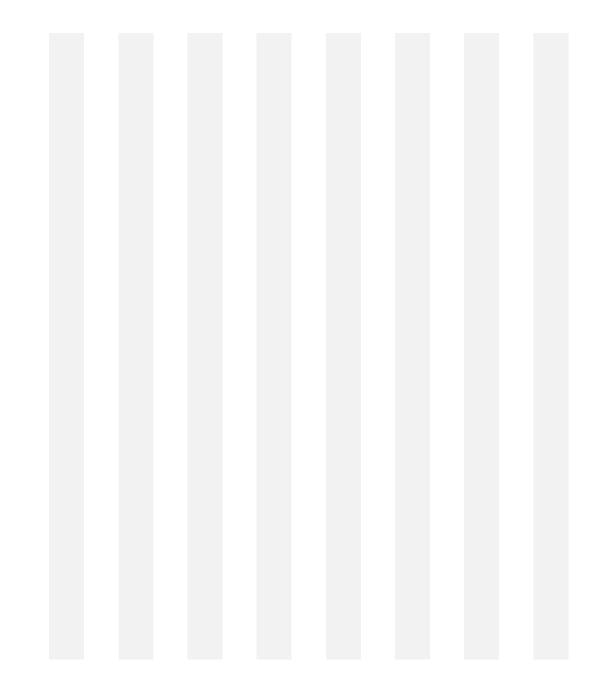
Ability to organize own ideas, demonstrate Capable of organizing own ideas, demonstrating comprehension based on those ideas, logically document, and exchanging advanced ideas in areas in which themes regarding functions of organic

| | | | | | evaluati on item | Weighti ng for evaluati | evaluati on item | ng for evaluati | evaluati on item | Weighti ng for evaluati | evaluati on item | Weighti ng for evaluati | evaluati on item | Weighti ng for evaluati on item | evaluati on item | ng for evaluati | evaluati on item | ng for evaluati | evaluati on item | ng for evaluati | on item | ng for evaluati | |
|---------------------------------------|---|----|------------------------------------|------------------------|---------------------|-------------------------------|---------------------|--------------------|---------------------|-------------------------------|---------------------|-------------------------------|---------------------|--|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------|--------------------|-----|
| 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 | | | | | | | | 100 | 1 | | | | | | | | | | | 100 |
| Liberal arts education subjects | Information and Data Science Courses | 4 | Required | 1st - 2th semesters | | | | | | | 100 | 1 | | | | | | | | | | | 100 |

Liberal arts

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| 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 | | | | | | | 1 | 100 | 1 | | | | | 100 |
| Specialized subjects | Laboratory Work in General Biology II | 1 | Required 3rd semester | | | | | | | 1 | 100 | 1 | | | | | 100 |
| Specialized subjects | Laboratory Work in General Chemistry | 1 | Required 3rd semester | | | | | | | 1 | 100 | 1 | | | | | 100 |
| Specialized subjects | Laboratory Work in General Physics | 1 | Required 3rd semester | | | | | | | 1 | 100 | 1 | | | | | 100 |
| Specialized subjects | Seminar in Field Science | 2 | Elective Øû d semester required | | | 100 | 1 | | | | | | | | | | 100 |
| Specialized subjects | Research Front of Bioresource Sciences | 2 | | | | | | | | | | | | | | | |



Attachment 4

Curriculum map for Food Science Program

| ac | Study achievementStudy hievementStudy 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 | |
| | ①Ability for comprehensive and | Seminar for developing intelligence (©) | Research Front of Food and AgriLife Science (O) | | | | | | | |
| | required to see a phenomena from a broad, top-down | (©) | Research Front of Bioresource Sciences (O) | | | | | | | |
| | erspective and to take action for olving problems regarding the pecialized area. | Peace Science | Introduction to Molecular Biochemistry(©) | | | | | | | |
| | | | | | subjects (O) | | | | | |
| K | | Introduction to Applied Biological Science(©) | Organic Chemistry (©) | Environmental Sciences for Bioproduction(©) | | | Public Health(O) | | | |
| o w | | Introduction to Microbiology (©) | Cell Science (⁽) | Statistics in Biology (©) | | | | | | |
| l e d | ②Basic knowledge and | Introduction to Applied Biological Science(©) | Agricultural Production Resources(©) | | | | | | | |
| g e | understanding required for acquiring expertise | Introduction to Microbiology (©) | Physics for Applied Biological Science(©) | Introduction to Physiology (O) | | | | | | |
| & | & | | Ethics of Science and Technology(©) | | | | | | | |
| u n d e r | | | Seminar in Field Science (O) | | | | | | | |

| s t a | Introduction to Molecular Biochemistry(©) | Genome Science I (©) | Cell Technology(O) | Animal Breeding and Genetics(O) | |
|--|---|---|--|---------------------------------|--|
| d i n g | | Genome Science II (⊚) Bioorganic Chemistry | Reproductive Biology (〇) Plant Molecular | | |
| ③Knowledge and understanding regarding organic molecule, cell, individual organism, and | | (◎) Chemistry of natural organic compounds (◎) | Biology(O) Food Microbiology (O) | | |
| population | | Molecular Cell Biology (©) | Bioresource Utilization Science (O) | | |
| | | Bio-Analytical Science | Nutrition(O) | | |
| | | Systemic Life Science (©) | Hydrospheric Biochemistry(O) Pathology (O) | | |
| | | | Applied extremophilic life science(O) | | |

| ①Basic ability in communication, information | Foreign Languages (C | | | | |
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| processing, and physical activities required for acquiring expertise | Health and Sports Cou | rses (O) | | | |
| A b | | | Laboratory Work in General Biology I & II (©) | | |
| ②Basic experimentation abilities and skills required for acquiring expertise | "Basic Laboratory Work in Chemistry" | | Laboratory Work in General Chemistry (©) | | |
| e s & | | "Experimental Methods and Laboratory Work in Biology I" | Laboratory Work in General Physics (©) | | |
| s k i I | | | | Laboratory Work in Molecular Agro-life Science I(©) | Problem Based Learning for Molecular Agro-Life Science I(©) |
| S ③Intellectual ability and techniques in study fields regarding organic molecule, cell, individual organism, and population | | | | 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(©) | |

| O ①Ability to collect information related to peripheral disciplines to complement the knowledge r regarding the specialized area and comprehensively consider h functions of organic molecule, cell, individual organism, and population from view points related to molecules | | Foo | od Biochemistry(O) od Hygiene(O) uaculture I(O) | | |
|--|--|-------------|---|-----------------------------|----------------------------|
| QAbility 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. | | Grad (⊚) | | Graduation Thesis II (⊚) | Graduation Thesis Ⅲ (ⓒ) |

(Example) Liberal arts subjects Specialized fundament Specialized subjects Graduation thesis (⁽)) Required subjects (O) Elective required (Δ) Elective subjects

| Name of faculty | Name of program and position | Extension number | Laboratory | Mail address |
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| | Professor | | | @ |
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List of Faculty Members of the Molecular Agro-Life Science Program