

Basic Biology

Course Code	Course	Credit	Content of Subject
40COM003**	Practical Spoken English 1	1	The course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM004**	Practical Spoken English 2	1	Following "Practical Spoken English 1", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM005**	Practical Spoken English 3	1	Following "Practical Spoken English 2", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM006**	Practical Spoken English 4	1	Following "Practical Spoken English 3", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM007**	Practical Spoken English 5	1	Following "Practical Spoken English 4", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM008**	Practical Spoken English 6	1	Following "Practical Spoken English 5", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM009**	Practical Spoken English 7	1	Following "Practical Spoken English 6", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM010**	Practical Spoken English 8	1	Following "Practical Spoken English 7", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM011**	Practical Spoken English 9	1	Following "Practical Spoken English 8", the course focuses on improving and building the communication and presentation skills necessary for researchers.

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40COM012**	Practical Spoken English 10	1	Following "Practical Spoken English 9", the course focuses on improving and building the communication and presentation skills necessary for researchers.
40COM013**	Life Science Retreat I	1	Students and faculty members who are involved in life science research gather for academic exchanges. First-year students in the Five-year Doctoral Program present their research plan and progress.
40COM014**	Life Science Retreat II	1	Students and faculty members who are involved in life science research gather for academic exchanges. Second-year students in the Five-year Doctoral Program present their research progress.
40COM015**	Life Science Retreat III	1	Students and faculty members who are involved in life science research gather for academic exchanges. Third-year students in the Five-year Doctoral Program or first-year students in the Three-year Doctoral Program present their research plan and/or progress.
40COM016**	Life Science Retreat IV	1	Students and faculty members who are involved in life science research gather for academic exchanges. Fourth-year students in the Five-year Doctoral Program or second-year students in the Three-year Doctoral Program present their research progress.
40COM017**	Life Science Retreat V	1	Students and faculty members who are involved in life science research gather for academic exchanges. Fifth-year students in the Five-year Doctoral Program or third-year students in the Three-year Doctoral Program present their research progress.

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40BBL001**	Developmental and Regenerative Biology	1	<p>Multicellular organisms develop from a single cell, a fertilized egg through many rounds of cell division, cell differentiation regulated by complex but precise interactions of tissues, and three-dimensional morphogenesis, and produce progeny by reproduction. In this course, lectures regarding to the formation of body axes, mechanism of cell differentiation, cell movements during development, metabolic regulation, which are all essential processes for the morphogenesis of multicellular organisms. In addition, a number of fundamental questions during the course of reproduction will be lectured using a variety of organisms such as animals, plants, and unicellular eukaryotes. Further, mechanisms of regeneration in multicellular organisms are also discussed while comparing with developmental events.</p>
40BBL002**	Evolution and Environmental Biology 1	1	<p>(Mitsuyasu Hasebe) The basic principle of diversity formation and evolution in Bryophytes, Lycophytes, Pteridophytes, and Spermatophytes will be discussed. (Miyo Terao Morita) An overview of the transport and signaling of the phytohormone auxin, which plays an important role in the gravity response of plants. (Yasuhiro Kamei) An overview of the molecular mechanisms of cells against temperature, and introduction of an application method using the mechanism to biological research. (Kenji Takizawa) An overview of the coevolution of planetary environments and photosynthetic organisms.</p>

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40BBL003**	Evolution and Environmental Biology 2	1	The course will introduce seven topics on modern evolutionary biology covering the fundamentals of the methods for comparative genomics analyses. The first topic includes variant detection, orthology analysis, whole genome comparison and detection of selection signature. Continuously, it will introduce the evolutionary mechanism that brings about the diversity of organisms. Turnovers of sex determination genes have frequently happened during the evolution of vertebrates. Genetic and genomic basis of this phenomenon will be discussed using fish as models. The evolutionary novelties acquired by insects through evolution will be discussed. Flagella in eukaryotes are the molecular machinery composed of tubulins and other proteins. Roles of tubulin superfamily genes will be discussed in relation with microtubule and flagella structures. Arbuscular mycorrhiza and root nodule symbioses are mutually successful and beneficial interactions on earth. The evolution of plant-microbe symbioses by recruiting or neo-functionalizing common factors will be discussed.
40BBL004**	Bioimaging	1	This course will introduce various methodologies in modern bioimaging that visualize biological structures and phenomena in molecular, cellular, tissue and organism levels, and also image processing/analysis techniques to extract useful information from the obtained digital image data.
40BBL005**	Bioinformatics	1	This two-day intensive course will cover the fundamentals of bioinformatics, with a primary focus on sequence analysis. Topics will range from the basic algorithms used in sequence analysis to the application of bioinformatics in genomic and transcriptomic analyses. The course will consist of both lectures and hands-on activities.
40BBL006**	Introduction to Basic Biology 1	2	Introduction of the research conducted at NIBB by all professors, associate professors, and assistant professors. The 1st part will be offered in the first semester.
40BBL007**	Introduction to Basic Biology 2	2	Introduction of the research conducted at NIBB by all professors, associate professors, and assistant professors. The 2nd part will be offered in the second semester.

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40BBL008**	Advanced Conference 1	1	Attending an international meeting held at NIBB, students are exposed to frontier research topics and engage in discussion about them. As the international meeting will focus on a different research theme every year, the course is offered once every five years as the Advanced Conference 1, and in other years as the Advanced Conference 2 through 5.
40BBL009**	Advanced Conference 2	1	Attending an international meeting held at NIBB, students are exposed to frontier research topics and engage in discussion about them. As the international meeting will focus on a different research theme every year, the course is offered once every five years as the Advanced Conference 2, and in other years as the Advanced Conference 1, 3 through 5.
40BBL010**	Advanced Conference 3	1	Attending an international meeting held at NIBB, students are exposed to frontier research topics and engage in discussion about them. As the international meeting will focus on a different research theme every year, the course is offered once every five years as the Advanced Conference 3, and in other years as the Advanced Conference 1, 2, 4 and 5.
40BBL011**	Advanced Conference 4	1	Attending an international meeting held at NIBB, students are exposed to frontier research topics and engage in discussion about them. As the international meeting will focus on a different research theme every year, the course is offered once every five years as the Advanced Conference 4, and in other years as the Advanced Conference 1 through 3, and 5.
40BBL012**	Advanced Conference 5	1	Attending an international meeting held at NIBB, students are exposed to frontier research topics and engage in discussion about them. As the international meeting will focus on a different research theme every year, the course is offered once every five years as the Advanced Conference 5, and in other years as the Advanced Conference 1 through 4.

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Course Code	Course	Credit	Content of Subject
40BBL013**	Basic Biology Seminar I	1	Attend seminars held in NIBB and participate in their discussions. Choose 5 or more of the seminars, and write reports on their content and the points which draw your interest. The goal of Basic Biology Seminar I to V is to acquire a wide range of knowledge over different fields and to develop logical thinking skills by contacting with the cutting-edge research seminars, as well as to develop skills of scientific discussions. Year 1 students are recommended to attend many seminars that are closely related to their own research theme to cultivate a better understanding.
40BBL014**	Basic Biology Seminar II	1	Attend seminars held in NIBB and participate in their discussions. Choose 5 or more of the seminars, and write reports on their content and the points which draw your interest. The goal of Basic Biology Seminar I to V is to acquire a wide range of knowledge over different fields and to develop logical thinking skills by contacting with the cutting-edge research seminars, as well as to develop skills of scientific discussions. Year 2 students are recommended not only to listen passively, but also actively ask questions, and write down the content in their reports.
40BBL015**	Basic Biology Seminar III	1	Attend seminars held in NIBB and participate in their discussions. Choose 5 or more of the seminars, and write reports on their content and the points which draw your interest. The goal of Basic Biology Seminar I to V is to acquire a wide range of knowledge over different fields and to develop logical thinking skills by contacting with the cutting-edge research seminars, as well as to develop skills of scientific discussions. Year 3 students are recommended to participate in seminars in a wide variety of fields to broaden your horizons.

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40BBL016**	Basic Biology Seminar IV	1	Attend seminars held in NIBB and participate in their discussions. Choose 5 or more of the seminars, and write reports on their content and the points which draw your interest. The goal of Basic Biology Seminar I to V is to acquire a wide range of knowledge over different fields and to develop logical thinking skills by contacting with the cutting-edge research seminars, as well as to develop skills of scientific discussions. Year 4 students are recommended to participate in seminars to find out what will contribute to their own research.
40BBL017**	Basic Biology Seminar V	1	Attend seminars held in NIBB and participate in their discussions. Choose 5 or more of the seminars, and write reports on their content and the points which draw your interest. The goal of Basic Biology Seminar I to V is to acquire a wide range of knowledge over different fields and to develop logical thinking skills by contacting with the cutting-edge research seminars, as well as to develop skills of scientific discussions. Year 5 students are recommended to participate in as wide a range of seminars as possible, keeping in mind that they will be useful for consideration in choosing career path and research content after obtaining PhD degree.
80BBL001**	Basic Biology Progress I A	2	Receive guidance and advice on research progress and future directions at meetings with their assigned Progress Committee members. I to V correspond to the grades, taken in the order of A and B.
80BBL002**	Basic Biology Progress I B	2	
80BBL003**	Basic Biology Progress II A	2	
80BBL004**	Basic Biology Progress II B	2	
80BBL005**	Basic Biology Progress III A	2	

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Course Code	Course	Credit	Content of Subject
80BBL006**	Basic Biology Progress III B	2	Receive guidance and advice on research progress and future directions at meetings with their assigned Progress Committee members. I to V correspond to the grades, taken in the order of A and B.
80BBL007**	Basic Biology Progress IV A	2	
80BBL008**	Basic Biology Progress IV B	2	
80BBL009**	Basic Biology Progress V A	2	
80BBL010**	Basic Biology Progress V B	2	
80BBL011**	Basic Biology Reading Seminar I A	2	Participate in journal clubs held by researchers in your laboratory and related fields to introduce, explain, and discuss the latest life science articles. I to V correspond to the grades, taken in the order of A and B.
80BBL012**	Basic Biology Reading Seminar I B	2	
80BBL013**	Basic Biology Reading Seminar II A	2	
80BBL014**	Basic Biology Reading Seminar II B	2	
80BBL015**	Basic Biology Reading Seminar III A	2	
80BBL016**	Basic Biology Reading Seminar III B	2	
80BBL017**	Basic Biology Reading Seminar IV A	2	
80BBL018**	Basic Biology Reading Seminar IV B	2	
80BBL019**	Basic Biology Reading Seminar V A	2	
80BBL020**	Basic Biology Reading Seminar V B	2	