

Ph. D. Program in Human Biology

Common Subjects

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02RA010	Initiation Seminar	1	1.0	1	SprA	Intensive		Mitsuyasu Kato, Satoru Takahashi	Initiation Seminar aims to lead the students to learn the purpose of human resource development and program curricula of the Ph.D. Program in Human Biology. Listening to practical lectures by academic researchers, government administrators, and entrepreneurs or researchers who successfully work at business companies, the students will understand the diverse career paths possible after completion of the program. In this seminar, the students will have discussions with their classmates on their future career paths and study proposals, and write a report on their learning objectives and future directions of their study.	Lectures are conducted in English.
02RA015	Initiation Seminar	1	1.0	1	FallA	Intensive		Mitsuyasu Kato, Satoru Takahashi	Initiation Seminar aims to lead the students to learn the purpose of human resource development and program curricula of the Ph.D. Program in Human Biology. Listening to practical lectures by academic researchers, government administrators, and entrepreneurs or researchers who successfully work at business companies, the students will understand the diverse career paths possible after completion of the program. In this seminar, the students will have discussions with their classmates on their future career paths and study proposals, and write a report on their learning objectives and future directions of their study.	Lectures are conducted in English.
02RA020	World-science Leaders' Seminar	1	1.0	1	Annual	by appointment	22706	Akira Shibuya	The students attending this seminar should be able to learn basic knowledge and recent research trends related to the specialized fields of world-leading researchers. The students should also be able to develop their professional and 'Cognoscente' skills for research as well as acquire skills of research presentation and discussion by discussing with their mentoring instructors the above topics including related matters. In addition, they are expected to gain a better understanding of research procedures and develop abilities to conduct research by writing a report.	Lectures are conducted in English.
02RA030	Business Leaders' Seminar	1	1.0	1	Annual	by appointment		Akira Shibuya	In this seminar, the students will listen to business leaders' omnibus lectures and submit reports on the key points of the lectures for feedback for themselves.	Lectures are conducted in English.
02RA040	Lectures in Experimental Science	1	1.0	1	SprAB	Tue2	22706	Keiji Kimura	In terms of main the research ideas of the lecturers, the Lectures in Experimental Science course provides the opportunities for the students to think of what hypotheses the lecturers generate for the basis of their research programs and what experiments the lecturers use to prove their hypotheses. This course is omnibus led by young researchers.	Lectures are conducted in English.
02RA050	Serendipity in Human Biology	1	1.0	1	SprAB	Mon5	22706	Tomoki Chiba	Serendipity in Human Biology engages the students in the researches and processes which trigger "unexpected discoveries" and "the breakthrough experiments and ideas" in each special field of Human Biology. As well as participating in academic discussion of the ideas and significance of those breakthroughs, original papers of related fields are read and discussed with the supervisor and others so that a report can be created and understanding deepened. By performing training which engages in detail with various fields of Human Biology students accumulate knowledge, polish practical skills, and understand how surprising, unpredictable developments in research arise from a scientific background of logical conceptual development.	Lectures are conducted in English.

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02RA060	CITI: Required Education for Human Research Participants (General Foundation)	1	1.0	1	Annual	by request		Mitsuyasu Kato	CITI: Required Education for Human Research Participants (General Foundation) provides the opportunities for the students to learn ethical and legal knowledge required for human science research studies through e-learning systems hosted by the Collaborative Institutional Training Initiative (CITI).	Lectures are conducted in English.
02RA061	CITI: Required Education for Human Research Participants (Elective)	0	2.0	2	Annual	by request		Mitsuyasu Kato	CITI: Required Education for Human Research Participants (Elective) provides the opportunities for the students to learn ethical and legal knowledge required for human science research studies through e-learning systems hosted by the Collaborative Institutional Training Initiative (CITI). In the Elective course, the students will select a subject of study from Bio-Safety and Bio-Security, Animal Care and Use, etc.	Lectures are conducted in English.
02RA070	Communication in Human Biology I	2	1.0	1	SprBC	Mon2		Kiong Ho	A literature-based, seminar-type course for the students to evaluate and review the latest scientific breakthroughs and classical topics that significantly impact Human Biology.	Lectures are conducted in English.
02RA080	Communication in Human Biology II	2	1.0	1	FallAB	Mon2	4F204	Kiong Ho	Consists of a literature-based, seminar-type course for the students to evaluate and review the latest scientific breakthroughs and classical topics that have significant impact on Human Biology.	Lectures are conducted in English.
02RA090	International Discussion on Human Biology I	4	1.0	1	SprAB	Fri2,3		Kenji Irie, Ryosuke Ohniwa	Focusing on molecular biology of the cell, International Discussion on Human Biology I provides the opportunities for the students to have interactive online distance learning with the National Taiwan University and Kyoto University, and to engage in thesis presentation and discussion conducted in English. In this course, the students should be able to understand basic knowledge of life sciences and acquire scientific communication skills in English.	Lectures are conducted in English.
02RA100	International Discussion on Human Biology II	4	1.0	1	FallABC	Wed1,2		Kenji Irie, Ryosuke Ohniwa	Focusing on cancer biology, International Discussion on Human Biology II provides opportunities for the students to have interactive online distance learning with the National Taiwan University and Kyoto University, and to engage in thesis presentation and discussion conducted in English. In this course, the students should be able to understand basic knowledge of life sciences and acquire scientific communication skills in English.	Lectures are conducted in English.
02RA101	Research Presentation and Discussion	2	1.0	2	SprABC	Wed2	4F305	Hiroyuki Suzuki	In this course, every student will make a presentation in English about their own research plan and achievements. In addition, students can examine the world situation of relevant fields and discuss in English results published in English that are broadly related to human biology.	Lectures are conducted in English.
02RA102	Home Internship (Omics Analysis)	3	1.0	2	SprABC	by appointment		Takaaki Sato, Takashi Shimada	Home Internship engages the students in on-campus internships. Attending laboratory activities led by researchers working at business companies, the students should be able to understand research principles in business circles, and understand a variety of research approaches regarding recent social needs.	Lectures are conducted in English.
02RA103	Home Internship (Integrative Physiology)	3	1.0	2	SprABC	by appointment	2Z706	Yukihiro Yada	Home Internship engages the students in on-campus internships. Attending laboratory activities led by researchers working at business companies, the students should be able to understand research principles in business circles, and understand a variety of research approaches regarding recent social needs.	Lectures are conducted in English.

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
O2RA110	Introduction to Appropriate Technology	4	1.0	1	SprABC	Intensive		Kenji Irie	Through a series of lectures and discussions, Introduction to Appropriate Technology provides opportunities for the students to gain the basic knowledge required for studying a wide range of appropriate technology subjects, such as appropriate technology training, current social circumstances in developing countries, and field activities.	Lectures are conducted in English. 7/11-7/12
O2RA111	International research rotation	3	5.0	2	FallABC	by request		Mitsuyasu Kato	This course offers the students the opportunity to select one or two laboratories that they are interested in from those hosted by the faculty members of the Ph.D. Program in Human Biology. The students will then engage in their own research in the laboratories for 1-2 months and discuss with their instructors its objectives, procedures and results. In this course, they should be able to acquire a wide range of research techniques and develop their skills for analysis of research results and get an international mindset.	Lectures are conducted in English.
O2RA112	Internship in Overseas Companies	3	5.0	2	FallABC	by request		Akira Shibuya	In this course, the students are expected to find a possible overseas company for internship and work on-site	Lectures are conducted in English.
O2RA113	Appropriate Technology	3	5.0	2	FallABC	by request		Kenji Irie	In terms of local needs, cultures, environments, and people, Appropriate Technology provides opportunities for the students to develop the optimum technology needed for targeted communities and to generate problem-solving skills, improvisational capabilities, and entrepreneurial abilities for future social needs.	Lectures are conducted in English.
O2RA114	Entrepreneurship Training	2	5.0	2	FallAB	Intensive		Yoshinori Harada, Osamu Ohneda	Entrepreneurship Training aims to lead the students to nurture the mindset and skill required for application of their technical seeds and ideas to society. Invited lecturers who have successfully started their own business will instruct the students to understand ideas and skills from the standpoints of social needs, entrepreneurial activities, and business continuity. In addition, the students will study success and failure in business cases.	Lectures are conducted in English.
O2RA115	Advanced International Research Rotation	1	10.0	3 - 5	Annual	by request		Mitsuyasu Kato	This course offers the students the opportunity to select one or two overseas laboratories that they are interested from those hosted by the faculty members in Ph.D. Program in Human Biology and conduct research there for 6-18 months. The students will then proceed with the writing of their doctoral dissertation during their research period and discuss with their instructors the objectives, procedures, results and future policy of their research. In this course, they should be able to acquire abilities to conduct and guide research and develop professional research skills and an international mindset.	Lectures are conducted in English.
O2RA116	Advanced Internship in Overseas Companies	1	10.0	3 - 5	Annual	by request		Akira Shibuya	In this course, the students are expected to negotiate with an overseas company for the internship's design and plan, and implement the plan.	Lectures are conducted in English.
O2RA117	Advanced Appropriate Technology	3	10.0	3 - 5	Annual	by appointment		Kenji Irie	Based on practical skills obtained from the Appropriate Technology course, Advanced Appropriate Technology further aims to lead the students to conduct field experiments and address technological developments for starting a new business in targeted communities.	Lectures are conducted in English.

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02RA118	Advanced Entrepreneurship Practice	3	10.0	3 – 5	Annual	Intensive		Yoshinori Harada	Advanced Entrepreneurship Practice is designed for the students who have completed Entrepreneurship Training to learn the basic mindset and skills required for application of their technical seeds and ideas to society. With the support of advisors, the students will develop proposals and practical scenarios (scripts) to start and sustain new business with regards to existing research subjects. Projects that attract entrepreneurial funding will be launched as bio-ventures.	Lectures are conducted in English.

Basic Specialized Subjects

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02RA120	Human Anatomy and Embryology	1	2.0	1	Fall/ABC	Mon3, 4	2Z706	Satoru Takahashi, Hisashi Oishi	Human Anatomy and Embryology engages the students in the developmental program of human beings. The students will learn how human beings are organisms and how the bodies of human beings consist of cells, tissues, vital organs, and internal organs.	Lectures are conducted in English.
02RA121	Human Pathology and Oncology	1	2.0	2	Spr/BC	Wed5, 6		Mitsuyasu Kato	Human Pathology and Oncology provides opportunities for the students to learn about the basic disease entities of circulatory disorders (i.e., edema, thrombosis, and infarction), inflammation, and neoplasia, in terms of the causes, pathogenesis, and morphological changes of human diseases. Examining pathological specimen of common diseases, the students should be able to understand various human in vivo phenomena.	Lectures are conducted in English.
02RA122	Human Infection and Immunology	1	2.0	2	Spr/AB	Mon3, 4	4F204	Akira Shibuya	Human Infection and Immunology provides the opportunity for the students to understand infectious diseases through interrelationships between pathogenic microbes and human beings, and study roles of immune systems. The roles of immune systems are to protect the human body from infectious disease.	Lectures are conducted in English.
02RA123	Human Endocrinology and Metabolism	1	2.0	2	Spr/ABC	Tue3, 4		Hitoshi Shimano	This course aims to develop the students' abilities to understand the theory of the pathophysiology of human endocrine and metabolic disease through learning 1) development, anatomy and function of endocrine tissue, 2) glucose and lipid metabolism, and 3) physiological functions of hormones and pathological conditions caused by their failure.	Lectures are conducted in English.
02RA124	Environmental Medicine	1	1.0	2	Spr/ABC	Wed4		Yoshito Kumagai	This course aims to lead the students to acquire 1) better understanding of the condition of environmental substances existing in the air, water, soil and food products, and their biological effects on organisms and 2) skills for discussing the mechanisms of related adverse reactions.	Lectures are conducted in English.
02RA130	Biochemistry and Molecular Biology	1	1.0	1	Spr/AB	Mon1	4F204	Yasunori Kanaho	This course is designed for the students to learn about 1) the structure, function and metabolism of human biomolecules to understand life phenomena at the molecular level and 2) the structure and function of human cells to understand their molecular function in life phenomena at the cellular level.	Lectures are conducted in English.
02RA140	Molecular Cell Biology	1	1.0	1	Fall/AB	Tue3	2Z706	Tomoki Chiba	In this course, the students will learn about the molecular mechanisms underlying the fundamental cellular events and discuss the latest topics in the field.	Lectures are conducted in English.
02RA150	Pharmacology	1	1.0	1	Fall/C	Mon/Wed/Fri7		Masashi Yanagisawa	In this course, the students should be able to deepen their understanding of the background, content, and method of studies in pharmacology by reading, summarizing, and reporting on highly-influential original papers in the field. The student should also be able to understand the implementation of pharmacological studies by discussing the pharmacological significance of discoveries made by the studies and their influence on clinical practice.	Lectures are conducted in English.

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02RA160	Basic Toxicology	1	1.0	1	FallABC	Wed4		Yoshito Kumagai	In this course, the students will learn 1) dose-response relations that are fundamental in toxicology and understand the onset mechanism of toxicity caused by chemical substances at the molecular level, and 2) the biological defense system against chemical substances and understand basic toxicology.	Lectures are conducted in English.
02RA170	Human Chemical Biology	1	1.0	1	FallIBC	Tue4	2Z706	Masaki Kita	Human Chemical Biology provides the opportunity for the students to understand human beings biologically, and learn basic knowledge and concepts of chemistry through studying organic chemistry, biochemistry and instrumental analysis. They are all important to learn chemical biology based on knowledge of organic compounds. Moreover, students will study the forefront of applied analysis research to develop useful new materials such as therapeutic medication and diagnostic drugs.	Lectures are conducted in English.
02RA180	Frontier Science in Drug Discovery	1	1.0	1	FallABC	Wed5	4F204	Satoru Takahashi, Hisashi Oishi	In this course, the students will be able to grasp the basic concepts of the logical process of drug discovery by using computational simulation technology. They will learn chemosynthesis, by using in silico screening of lead compounds, molecular design, and combinatorial chemistry methods, and current pharmacokinetics studies to deepen their knowledge of linkages between medical and pharmaceutical sciences.	Lectures are conducted in English.
02RA190	Mathematics for Biology	1	1.0	1	FallIAB	Mon5	2Z706	Kazuhiro Kawamura	Mathematics for Biology engages the students in a review of elementary calculus and linear algebra. The students will further learn the mathematics focusing on biological study, such as analysis of systems settled by differential and difference equations in particular.	Lectures are conducted in English.
02RA200	Application of Information Technology in Science	1	1.0	1	FallIC	Intensive	2Z706	Takeshi Nagata	In this course, students will learn 1) application of information technology to biology from overviewing computational science including numerical analysis, statistical analysis, and image analysis and 2) practical programming by using Excel, Matlab (Octave), and the C language.	Lectures are conducted in English.
02RA210	Basic Computational Biology	1	2.0	1	FallIBC	Thu1,2	3B301	Tetsuya Sakurai, Yuji Inagaki, Mitsuo Shoji, Shoji Makino, Mitsuhiisa Sato	In this lecture, the students will learn 1) basic methods to solve a wide variety of problems by using a program in the field of biology and 2) molecular phylogenetic analysis molecular dynamics method, modelization and algorithm of a phenomenon, high-performance computation (HPC), and component analysis.	Lectures are conducted in English.
02RA215	Computational Algorithms	4	2.0	1	FallIAB	Fri3,4	3Z1001	Tetsuya Sakurai, Hiroto Tadano	In this lecture, the students will study calculation algorithms which are necessary for estimating and analyzing phenomena, particularly focusing on large-scale linear computation.	Lectures are conducted in English.
02RA220	High Performance Computing Technology	1	2.0	1	FallIAB	Wed2,3	3Z1001	Taisuke Boku	This class focuses and lectures on the overview and detailed issues to support today's advanced scientific computing named high performance computing technologies. The covered topics include parallel processing fundamentals, processor architecture, interconnection network, numerical algorithm, performance optimization and typical applications. The state-of-the-art high-end computing systems are also introduced as the up-to-date information.	Lectures are conducted in English.
02RA230	Reproductive Biology	2	2.0	1	FallIBC	Tue5,6	2Z706	Tadashi Baba	The essential significance of "reproduction" will be considered under the current social conditions in the world. Reproductive technology for the future will be also be discussed as an ethical issue. Students need to have a fundamental grounding in reproductive biology before taking this class.	Lectures are conducted in English.

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02RA231	Gene Engineering and Genetically Modified Mice	2	1.0	2	SprABC	Tue5	4A104	Satoru Takahashi	Gene Engineering and Genetically Modified Mice provides the opportunity for the students to study fundamental techniques of gene engineering and principle of making generating transgenic mice which is application of gene engineering. In addition, the students will debate how to use this lecture for their researches.	Lectures are conducted in English.
02RA232	Epigenome Physiology	2	1.0	2	SprC	Mon5, 6	2Z706	Akiyoshi Fukamizu	In this course, the students should be able to grasp the outline of the biological consequences of two genetic codes, genome and epigenome. The students give a presentation on the theme related to these codes and get a better understanding of them by asking and answering questions.	Lectures are conducted in English.
02RA233	Signal Transduction and Drug Design	1	1.0	2	SprBC	Thu2	2Z706	Yasunori Kanaho	This course is designed to assist the students to learn about intracellular reactions controlling cellular function, i.e. signal transduction and diseases caused by failure in signal transduction. They should then be able to acquire the basic knowledge of drug discovery research through learning about developed drugs and strategies for development of new drugs.	Lectures are conducted in English.
02RA234	Stem Cell Therapy	2	1.0	2	SprBC	Thu3	4F204	Osamu Ohneda, Masumi Nagano, Toshiharu Yamashita	Stem Cell Therapy engages the students in basic knowledge and application of human stem cells. The students will learn current existing stem cell therapy and also have discussions on future directions of stem cell therapy.	Lectures are conducted in English.
02RA235	Analysis of Machineries in Human Biology	1	1.0	2	SprABC	Wed3		Takaaki Sato	The students studying in this course should be able to acquire basic knowledge of biomarker research essential for diagnosis and treatment of diseases such as cancer and cardiac disease and its application by mainly using the cutting-edge mass spectrometry system along with metabolomic and proteomic analysis. The students should also be able to foster better understanding of analytical methods applied to drug discovery in life sciences and the environmental field.	Lectures are conducted in English.
02RA236	Environmental Health Science, Toxicology and Exposure Assessment	1	1.0	2	SprB	Intensive	2Z706	Tomoya Yamada	This course focuses on 1) behavior of various chemicals emitted into the global environment as a result of industrial activities, 2) toxicity tests for examining the hazards caused by those chemicals influencing human beings and all the other living organisms, 3) risk assessment on human beings and other living organisms based on hazards and their exposure level, 4) examination of extrapolation of the toxicity test results on laboratory animals to human cases taking account of physiological differences in species between them, and 5) development of new methods of risk assessment to improve its efficiency and accuracy.	Lectures are conducted in English.

Specialized Subjects

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02RA240	Basic Experiments in Human Biology	3	4.0	1	SprAB	by request		Akira Shibuya	Through working in the laboratories run by the faculty members, the students should be able to understand the outline of the members' researches and the principles of the fundamental experimental techniques involved. They will also practice the techniques learnt.	Lectures are conducted in English.
02RA241	Basic Experiments in Human Biology	3	4.0	1	FallAB	by request		Akira Shibuya	Through working in the laboratories run by the faculty members, the students should be able to understand the outline of the members' researches and the principles of the fundamental experimental techniques involved. They will also practice the techniques learnt.	Lectures are conducted in English.

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02RA250	Special Lectures in Human Biology I	1	1.0	1	Fall/ABC	by request		Akira Shibuya	Special Lectures in Human Biology I provides opportunities for the students to attend the research progress meetings of many laboratories which offer candidate areas of study that the students will aspire to focus on. Featuring the latest research presentations, the students will have discussions on the research achievements, learn professional knowledge, and develop their skills to proceed with research activities.	Lectures are conducted in English.
02RA260	Special Seminars in Human Biology I	2	1.0	1	Fall/ABC	by request		Akira Shibuya	Special Seminars in Human Biology I provides the opportunity for the students to attend the journal clubs of many laboratories which offers candidate areas of study that the students will aspire to focus on. Featuring the latest original research papers, the students should be able to understand the research objectives, methods, and results, and also have discussions on the meanings, problems, and issues facing the research.	Lectures are conducted in English.
02RA270	Special Research in Human Biology I	3	1.0	1	Fall/ABC	by request		Akira Shibuya	In the Special Research in Human Biology I course, the students gain practical understanding of the principles and methods of research skills in many laboratories which offer candidate areas of study that the students will aspire to focus on.	Lectures are conducted in English.
02RA271	Special Lectures in Human Biology II	1	1.0	2	Spr/ABC	by request		Akira Shibuya	Special Lectures in Human Biology II provides the opportunity for the students to attend the research progress meetings of the particular laboratories which offers specialized areas of study that the students will aspire to focus on. Featuring the latest research presentations, the students will have discussions on research achievements, learn professional knowledge, and develop their advanced skills to proceed with research activities.	Lectures are conducted in English.
02RA272	Special Seminars in Human Biology II	2	1.0	2	Spr/ABC	by request		Akira Shibuya	Special Seminars in Human Biology II engages the students in the journal club of the particular laboratory which offers the specialized area of study that the students will aspire to focus on. Featuring the latest original theses, the students should be able to understand the research objectives, methods, and results, and also have advanced discussions on the meanings, problems, and issues facing the research.	Lectures are conducted in English.
02RA273	Special Research in Human Biology II	3	1.0	2	Spr/ABC	by request		Akira Shibuya	In the Special Research in Human Biology II course, the students will gain practical understanding of the principles and methods of advanced research skills in the particular laboratory which offers the specialized area of study that the students will aspire to focus on.	Lectures are conducted in English.
02RA280	Special Practice in Human Biology I	2	2.0	1	Fall/ABC	by request		Akira Shibuya	In this course, the students will learn methods to acquire basic knowledge required for selecting a topic for their dissertation through tutorials with their mentoring instructors. The students will also select the subject for their research through discussion, determine approaches for conducting the research, go through application procedures necessary for the research such as animal experiments and genetic recombination, and then plan their dissertation.	Lectures are conducted in English.
02RA281	Special Practice in Human Biology II	6	10.0	2	Annual	by request		Akira Shibuya	In this course, the students should be able to acquire 1) methods for evaluation of each result of their research leading to their dissertation writing, 2) skills to develop and modify their research plan and conduct their research based on the plan, and 3) skills to write their dissertation from accumulated research results.	Lectures are conducted in English.