

基礎科目(必修)

科目番号	科目名	授業方法	単位数	標準履修年次	実施学期	曜時限	教室	担当教員	授業概要	備考
01RC001	医学概論		1	1.0	1	春A	金5,6	檜澤 伸之, 山崎 正志, 榎本 剛史, 丸島 愛樹, 正田 純一, 関根 郁夫, 小田 竜也, 鄭 允文, 森島 祐子, 家田 真樹	Malignant neoplasm, cardiovascular disease, and cerebrovascular disease have been major causes of death in Japan. Additionally, orthopedic disorder and trauma by athletics are common. This course will provide students with an overview of current states on pathological conditions, treatments, outcomes, and clinical problems about the diseases. In addition, the progress of research associated with the diseases will be reviewed.	英語で授業。 主専攻必修科目。
01RC002	創薬概論		4	1.0	1	春BC	金1,2	宮前 友策, 保富 康宏, 池浦 義典	Student will study what kind of processes each pharmaceutical company goes through to place new drugs on the market and their original drug discovery strategy. Students will also study development and practical application of vaccines against infectious disease.	英語で授業。 主専攻必修科目。
01RC003	食品科学概論		1	1.0	1	秋A	金1,2	中嶋 光敏, 磯田 博子, 坂本 和一, ダス ネヴェス マルコス アントニオ, 市川 創作	In this course, students will learn about food science, based on physical, chemical, biochemical, biological, and engineering approach from fundamental level to cutting-edge applied science technology. After an overview of current status, the first section is food functionality. "Functional food" is a food given an additional function, related to health-promotion or disease prevention. Food functionality is so important in order to produce value added products. Next is food chemistry. Food chemistry explores chemical processes and interactions of all components of foods. The main components of carbohydrates, lipids, and protein, but also includes water, vitamins, minerals, food additives, flavors, colors and so on. Then, food nutrition physiology will be lectured, which is the study of nutrients and their roles in growth, health, and disease. The study includes food uptake, absorption, and metabolism. Food physics deals with the physical properties of food and ingredients. The lecture describes the principles of food physics with basic principles, understanding their structures.  (1) Guidance and overview of the lecture. (2) Food functionality for valorization of food products. (3) Food chemistry. (4) Food nutrition and physiology. (5) Food Physics	英語で授業。 主専攻必修科目。
01RC004	バイオリソース概論		1	1.0	1	秋B	金1,2	小林 正智, 中村 幸夫, 大熊 盛也, 吉木 淳, 阿部 訓也	Students are expected to deeply understand the importance of bioresources and roles of resource centers in promoting life science innovation. In order to achieve the aim, professors who are responsible for experimental animal, experimental plant, cell bank and microorganisms in RIKEN BRC will give lectures on their resources including technologies and related information.	英語で授業。 主専攻必修科目。
01RC005	自然史概論		5	1.0	1・2	秋A	集中	高橋 真哉, 倉持 利明, 樋口 正信	To introduce investigations on Natural History, several biological and geographical researches including studies by the researchers of the National Museum of Nature and Science will be reviewed. Through the lectures, practical experiments, and observation tour at the Tsukuba Botanical Garden, students are expected to understand aspects of Natural History and find out something useful for their research and life.	英語で授業。 主専攻必修科目。

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01RC006	バイオインフォマティクス		5	1.0	1	春AB	金4	櫻井 鉄也, Ranjith Kumar Bakku, 二村 保徳	In this course, students learn basic concepts and techniques in bioinformatics. Exersizes using a computer will be provided to help understanding basic theories and learning practical skills.	英語で授業。 主専攻必修科目。
01RC007	医薬品・食品マネジメント学		1	1.0	2	春A	金5, 6	磯田 博子, 寺崎直, 秋元 浩, 山本 信行	This course will provide students with an overview of current states on the intellectual property, management and investment on the business management on pharmaceutical, functional food and cosmetic industry concretely.	英語で授業。 主専攻必修科目。
01RC008	レギュラトリーサイエンス		1	1.0	2	春AB	集中	ブリリアル マイラ, 荒川 義弘, Rage Andrieu Virginie, フォンテス セシル ルギャル	The Regulatory Science is defined as “The science to perform precise prediction, evaluation and judgment, and adjust results of science and technology to the most desirable state on investigation of persons and society for the purpose of applying results of science and technology to persons and society”. In this lecture, we will describe about crucial roles that regulatory science plays for effectiveness, safety and guarantee of quality of pharmaceutical products and medical treatment devices in Japan and Europe.	英語で授業。 4/17, 4/22, 4/24, 6/3, 6/4 主専攻必修科目。
01RC011	CITI:責任ある研究行為:基盤編(e-learning)		0	1.0	1	通年	随時	平川 秀彦	Students will learn responsible conduct of research (basic research ethics) using e-learning system.	主専攻必修科目。 eラーニング科目
01RC012	博士前期インターンシップ 春		0	1.0	1・2	春学期	随時	平川 秀彦	Students will experience employment and lean practical skills as a member of society in national or industrial research institutes, companies, ministries and agencies, and laboratories in this academic program.	
01RC013	博士前期ライフイノベーションセミナー		1	1.0	1	春BC	集中	磯田 博子, ゴーディング コリン, オニール エリック, フィリパコボロス パナギス, ブリリアル マイラ	Visiting professors from top-ranked universities associated with this program provide the students with the opportunity to engage in discussion on topics that are in the forefront of research in life science. At the end of this course, the students develop skills in writing their abstracts and presenting their scientific papers and develop critical thinking when reviewing scientific articles.	英語で授業。 5/27-5/31, 7/22-7/26 主専攻必修科目。

専門科目 (病態機構)

科目番号	科目名	授業方法	単位数	標準履修年次	実施学期	曜時限	教室	担当教員	授業概要	備考
01RC101	疾患の分子細胞生物学I		1	1.0	1・2	春B	集中	磯田 博子, ゴーディング コリン, オニール エリック, フィリパコボロス パナギス, メラー ジェーン, ガードハンセン マッズ, ステイングリムソン エイリークル, ヒメネス カストディア ガルシア, ラリユー ライオネル, ブリリアル マイラ	This course provides an introduction to the principles of molecular and cellular biology and their connections to disease control. Lectures range transcription regulation to models of diseases (in vivo) and provide insights into biological processes and how biological mechanisms underlie human disease (e.g. cancer) and physiology.	英語で授業。 5/27-5/31

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01RC102	疾患の分子細胞生物学II	1	1.0	1・2	春C	集中		磯田 博子, ゴーディング コリン, オニール エリック, フィリパコボロス パナギス, メラー ジェーン, ガードハンセン マツズ, ステイン グリムツソン エイリークル, ヒメネス カストディア ガルシア, ラリユー ライオネル, プリリアル マイラ	This course complements Molecular and Cellular Biology of Disease I. Lectures range from cancer cell biology to relationship between deregulation of metabolism and cancer and provides current information in these fields of research.	英語で授業。 7/22-7/26
01RC103	細胞制御論	1	1.0	1・2	春A	月1,2		許 東洙, カウル レヌー ワダワ, 鄭 允文, 桑原 知子, 久野 敦, 伊藤 弓弦	The objective of this class is to learn basic knowledge and the latest research progress on regenerative medicine and stem cell biology fields by reading original articles. In addition, this class aims to improve individual ability to extract the point at issue of the article and discuss with other participants.	英語で授業。
01RC105	神経科学特論	1	1.0	1・2	春A	火・木7		柳沢 正史, 櫻井 武, 船戸 弘正, 長瀬 博, Liu Qinghua, 阿部 高志, 坂口 昌徳, 林 悠, Lazarus Michael, 本城 咲季子	神経科学分野において重要な論文を読み、内容を深く理解することで、基礎から応用までの幅広い知識を養う。	HBPとコードシェア 01EQ052, 02RA185, 02RE602と同一。 英語で授業。

専門科目(創薬開発)

科目番号	科目名	授業方法	単位数	標準履修年次	実施学期	曜時限	教室	担当教員	授業概要	備考
01RC201	有機化学/ケミカルバイオロジー	1	1.0	1・2	秋A	月1,2		沓村 憲樹, 宮前 友策, 山本 直司, 齊藤 毅, 大好 孝幸, 南雲 陽子	This course provides the basic organic chemistry required for learning about medicinal chemistry and chemical biology. Mini-exam and report (homework) will promote greater understanding of organic synthetic chemistry. Topics in chemical biology such as target identification and protein-protein interaction will be also discussed.	02RA171と同一。 英語で授業。
01RC202	創薬化学/薬理学	1	1.0	1・2	秋B	月1 月2		長瀬 博, 遠藤 摂, 南雲 康行, 長瀬 博, 南雲 康行, 遠藤 摂	This course provides the opportunities for students to learn characteristics of a living body, nature of water, the nature and role of the membrane, pharmacophore binding theory for drug design from the selection of drug targets, enzymes, the basis of receptor binding, how to discover new drugs, structure-activity relationship theory as well as application to drug development based on these. This course also provides the pharmacology required for drug discovery. Students will learn mode of action and mechanism of action of the drug, and the basis of the pharmacology from in vitro to in vivo. Furthermore, students will learn the effect of the physiologically active substance on the biological function in central nervous system, cardiovascular, immune/inflammatory system as well as chemotherapy.	英語で授業。

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01RC203	創薬トランスレーショナルサイエンス		5	1.0	1・2	春A	水1,2	宮前 友策, 三好 庄介, 野田 昭宏, 宮田 桂司, 須藤 勝美, 村上 佳裕	Translational Science has been of more importance to bridge basic research in the preclinical stage and patient care in the clinical stage. From drug discovery research point of view, it can enhance our understanding and confidence in targets, bringing potential compounds and biologics up to Proof of Concept earlier. Bio-imaging is a translatable tool from preclinical study to clinical study with same methodology such as PET MRI CT, to investigate pharmacokinetics, pharmacodynamics and efficacy especially in target organs with more minimally invasive.	英語で授業。
01RC204	創薬研究・プロジェクトマネジメント		1	1.0	1・2				Promote an understanding of key elements/process of drug discovery research (selection of drug target, assay development, disease-model, lead compound finding, translational research, drug delivery, clinical development etc.) and project management, and provide the examples of specific drug discovery projects in Alzheimer's disease and cancer.	英語で授業。 2019年度開講せず。
01RC205	薬剤設計工学		1	1.0	1・2	秋A	火1,2	市川 創作, 陳 国平, 杉浦 慎治, 金森 敏幸	In this course, students will learn about physical chemistry and material science for the basis of pharmaceutical design and engineering. In addition, pharmacokinetics and pharmaceutical assay required for pharmaceutical design will be lectured. We will also provide advanced research topics and cutting-edge technologies in the related fields.	英語で授業。

専門科目(食料革新)

科目番号	科目名	授業方法	単位数	標準履修年次	実施学期	曜時限	教室	担当教員	授業概要	備考
01RC301	食品プロセス工学		1	1.0	1・2	秋B	集中	中嶋 光敏, ブーンレムコ, ダス ネヴェス マルコス アントニオ	Environmentally-friendly and efficient production of high-quality products from natural resources will be one of the key challenges for the coming decades. It is surprising however that in the conversion from harvested crops to the food that the consumer eats or product that he or she applies, the majority of the materials is lost, while large amounts of energy and water are consumed. At the same time, large volumes of waste water and solid wastes are generated. That would change if we could process with more efficiency and more effectiveness. This course will provide instruments for evaluation and design of sustainable process systems, that allow the evaluation of food and bio-production systems on efficient use of raw materials, energy, water and other utilities from large-scale supply chain and factory level, down to product and unit operation level. This is a well-defined thermodynamic concept that allows us to objectively judge the efficiency in a system. It allows to identify the efficiency of sub-processes on very small scale, but also for a complete unit operation, a processing plant, and even total supply chains. It is well suited for analysis of large and complex systems, as it can deal with streams that cross system boundaries - but only if you use it in a consistent way. Combined with the ability to connect different inputs and outputs (energy, water, raw material, waste), it is an important instrument to bring process efficiency a step further.	英語で授業。
01RC302	食品機能学		1	1.0	1・2	秋B	火1,2	磯田 博子, 山本 万里, ラロク ミシェル, プリリアル マイラ	Functional Foods are foods that have, in addition to their nutritive value, beneficial effect on health. This course discusses functional foods and their bioactive components, specifically their effect on cancer, allergy, neuronal regulation, regulation of metabolism including the mechanism of their effects.	英語で授業。

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01RC303	食品安全学	1	1.0	1・2	春A	木1,2		中嶋 光敏, 山本和貴, 長嶋 等	The lecture provides an overview of food safety: historical aspects, biological, chemical, and physical hazards, their risks, toxicological endpoints, safety factors, determination of standards, negligible risks, risk analysis, and so forth. Biological hazards include bacteria, parasites, and viruses. As for bacterial hazards, detection methods such as conventional plating and multiplex PCR as well as injured bacteria will be introduced. The chemical hazards include unintended contaminants such as mycotoxins, marine toxins, and cooked food toxins and intendedly-used chemicals such as food additives and pesticides. Physical hazards will be radio active substances, glass, and metals. In terms of safety measures for biological hazards, pasteurization/sterilization processes (e.g. heat treatment, high pressure treatment, and other novel technologies) will be explained as well as daily practices at home. For promoting fair food trade in the framework of World Trade Organization, Codex Alimentarius Commission plays an important role via establishment of international food safety standards.	英語で授業。
01RC304	食品ビジネス学	1	1.0	1・2	春A	火1,2		柏木 健一, 中嶋光敏	This lecture explores the extension of food business from the point of technology, economic and social view, and discuss the development and innovation of food industry. (i) After an review of current status of technology among food industries, the strategic approach toward the smooth implementation of newly developed technology for establishing the innovative food industry. (ii) Reviewing producer's and consumer's behaviour and market mechanism in agro-food value chain and discuss the way to develop a new market of agro-food sector. (iii) As case studies, we explore issues and challenges of research and development projects collaborating with business sector in Middle East and North Africa and West African countries. Reviewing strategies and cases of Japanese government and JICA, we discuss significance of collaboration of private sector, university and JICA for the promotion of regional development and in agro-food sector in particular.	英語で授業。

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01RC305	遺伝子栄養学	1	1.0	1・2	春B	木1,2		坂本 和一, 萩原啓実, 渡邊 直子	Phytochemicals are critically involved in the regulation of a variety of signaling cascades and their essential gene expression, resulting in the protection of metabolic syndromes and anti-aging. In this class, students will learn about the physiological roles and their related-signaling cascade caused by phytochemicals in lipid metabolism, bone metabolism, melanogenesis, and inflammation, etc.	英語で授業。

専門科目(環境制御)

科目番号	科目名	授業方法	単位数	標準履修年次	実施学期	曜時限	教室	担当教員	授業概要	備考
01RC401	生育環境と機能性成分	1	1.0	1・2	秋A	水1,2		平川 秀彦, 川原信夫, 瀧野 裕之, 吉松 嘉代, 田村憲司, 青野 光子(宮地), アプデリー シェドリール	Finding useful plants which contain functional compounds and culturing them are the important issues in drug discovery and industrial production from natural products. In addition, environmental parameters such as soil condition, global environmental changes define the content of functional compound.  This lecture will cover the topics related to follows: a) Natural product chemistry of useful plants, b) Screening of bioactive component from medicinal plants, c) Quality control of crude drugs, d) Drug discovery for tropical diseases from medicinal plants, e) Micropropagation of medicinal plants through tissue culture, f) Transformation of medicinal plants, g) Relation between soil condition and functional compound, h) Effect of environmental stress factors on plants in global environmental changes, i) Relation between soil condition and functional compound, j) Ecology of plants in arid and/or saline biotopes	西暦奇数年開講。 英語で授業。
01RC402	バイオマス科学	1	1.0	1・2	秋B	集中		渡邊 信, メイフィールド ステファン	Focused on algae biomass, useful functions and compounds are introduced from the viewpoints of energy, food, health and life securities, then current status and future prospect of their business are shown and discussed.	英語で授業。
01RC403	水環境と生命科学	1	1.0	1・2	春B	火1,2		辻村 真貴, 内海真生, 原 啓文	Water is one of the most important medium that determines the conditions of life and Water is cycling on earth, so that the dynamics of water environment is one of the key issues for controlling bioresource. On the other hand, biological method to quantify the hazardous contaminants such as endocrine disrupters that define the availability of water resource have been developed recent decades. Lecture will cover the topics related to dynamics of natural water environment: water cycle, climate change, diffusion of substances, hydraulics in stratified water body, material transportation and environmental risk assessment of endocrine disrupter, theoretically and practically.	英語で授業。
01RC404	環境藻類学	1	1.0	1・2	春AB	火3	研究室	中山 剛, 吉田 昌樹, 河地 正伸, 石田 健一郎	藻類の進化, 系統, 生態について, 基礎生物学および環境科学の視点から解説する。	02AF311と同一。
01RC405	環境医学	1	1.0	1・2	春AB	水5		熊谷 嘉人	大気, 水, 土壌および食品中に存在する様々な環境物質の実態を理解し, かつそれらの生体影響を把握する。また, どのようなメカニズムでその有害反応が生じるかを考察できるようになる。	02RA124と同一。 英語で授業。

共通専門科目

科目番号	科目名	授業方法	単位数	標準履修年次	実施学期	曜時限	教室	担当教員	授業概要	備考
01RC501	ライフィノベーション博士前期演習I秋	2	1.0	1	秋学期	随時		ライフィノベーション学位プログラム博士前期課程研究指導教員	Students will participate journal club in their laboratories, perform scientific presentation and discussion about the journal topics. Student will also take the obtained results into their own research.	主専攻必修科目。

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01RC502	ライフイノベーション 博士前期演習I春	2	1.0	1	春学期	随時		ライフイノベーション学位プログラム博士前期課程 研究指導教員	Students will participate journal club in their laboratories, perform scientific presentation and discussion about the journal topics. Student will also take the obtained results into their own research.	主専攻必修科目。
01RC503	ライフイノベーション 博士前期研究I秋	8	2.0	1	秋学期	随時		ライフイノベーション学位プログラム博士前期課程 研究指導教員	Students will propose research projects and conduct research activities. Students will perform presentation about their research progress, deepen the discussion and correct the course of the research. Students will perform presentation at academic meetings and publish the result of their research and finally complete a master thesis or a report on specific subject research.	主専攻必修科目。
01RC504	ライフイノベーション 博士前期研究I春	8	2.0	1	春学期	随時		ライフイノベーション学位プログラム博士前期課程 研究指導教員	Students will propose research projects and conduct research activities. Students will perform presentation about their research progress, deepen the discussion and correct the course of the research. Students will perform presentation at academic meetings and publish the result of their research and finally complete a master thesis or a report on specific subject research.	主専攻必修科目。
01RC505	博士前期海外インター ンシップ 春	0	1.0	1・2	春学期	随時		平川 秀彦	Faculty from abroad associated with this program provide students with research topics in life sciences from basic to forefront. Students will acquire qualities of a researcher and the skills of presentation, discussion and communication by interacting with the lecturers.	英語で授業。
01RC506	ライフイノベーション 博士前期演習II秋	2	1.0	2	秋学期	随時		ライフイノベーション学位プログラム博士前期課程 研究指導教員	Students will participate journal club in their laboratories, perform scientific presentation and discussion about the journal topics. Student will also take the obtained results into their own research.	主専攻必修科目。
01RC507	ライフイノベーション 博士前期演習II春	2	1.0	2	春学期	随時		ライフイノベーション学位プログラム博士前期課程 研究指導教員	Students will participate journal club in their laboratories, perform scientific presentation and discussion about the journal topics. Student will also take the obtained results into their own research.	主専攻必修科目。
01RC508	ライフイノベーション 博士前期研究II秋	8	2.0	2	秋学期	随時		ライフイノベーション学位プログラム博士前期課程 研究指導教員	Students will propose research projects and conduct research activities. Students will perform presentation about their research progress, deepen the discussion and correct the course of the research. Students will perform presentation at academic meetings and publish the result of their research and finally complete a master thesis or a report on specific subject research.	主専攻必修科目。
01RC509	ライフイノベーション 博士前期研究II春	8	2.0	2	春学期	随時		ライフイノベーション学位プログラム博士前期課程 研究指導教員	Students will propose research projects and conduct research activities. Students will perform presentation about their research progress, deepen the discussion and correct the course of the research. Students will perform presentation at academic meetings and publish the result of their research and finally complete a master thesis or a report on specific subject research.	主専攻必修科目。