

International Bioindustrial Sciences Course

COMMON CORE UNITS

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02AP001	Special Research in Bioindustrial Sciences I	3	6.0	1, 2	Annual	by request		Kazuo Watanabe, Takaaki Satake, Yoshiro Higano, Seigo Sato, Pi-Chao Wang, Zhen Ya Zhang, Michiyuki Ono, Yutaka Kitamura, Kouji Nakamura, Shigeki Yoshida, Hideyuki Shigemori, Toshia ki Nakajima-Kambe, Yingnan Yang, Kosumi Yamada, Motoo Utsumi, Nakao Nomura, Akira Kikuchi	生命産業科学の各専門領域に関する実験、調査、データ解析手法を具体的事例に即して習得させ、博士論文作成の指導を行う。	
02AP002	Special Research in Bioindustrial Sciences II	3	6.0	1 - 3	Annual	by request		Kazuo Watanabe, Takaaki Satake, Yoshiro Higano, Seigo Sato, Pi-Chao Wang, Zhen Ya Zhang, Michiyuki Ono, Yutaka Kitamura, Kouji Nakamura, Shigeki Yoshida, Hideyuki Shigemori, Toshia ki Nakajima-Kambe, Yingnan Yang, Kosumi Yamada, Motoo Utsumi, Nakao Nomura, Akira Kikuchi	生命産業科学の各専門領域に関する実験、調査、データ解析手法を具体的事例に即して習得させ、博士論文作成の指導を行う。	
02AP003	Advanced Bioindustrial Science	1	2.0	1	SprAB	Thu7, 8	2L502	Takaaki Satake, Kazuo Watanabe, MAKOTO KAWASE	Omnibus topics will be given but those are related on life science industry.	(教員追加予定)

ELECTIVE REQUIRED UNITS

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02AP011	Regulatory Aspects in Bioindustry	1	2.0	1, 2	Annual	by appointment	2L501	Kazuo Watanabe, Hideyuki Shigemori	バイオ産業を支援する法制及び行政面での解説を行う。生物系での研究開発を行う上での施設、薬品、作業者やバイオセーフティーなどについての法制と実務、医薬開発に関わる安全性及び効果についての検証及び承認プロセス、及び知的財産権の保護などについて網羅する。	奇数年度開講
02AP012	Transfer of Industrial Technique on Life Science	1	2.0	1, 2					多岐な生命産業分野での動植物・遺伝資源を有効に活用したバイオ科学技術を産業に移転する方法、施策、条約を紹介する。また実例を挙げて論じる。	Open in an even number year.
02AP013	COE Lectures in Bioindustry	1	2.0	1, 2	Annual	by appointment		Yoshiro Higano	生命産業にかかわる企業や民間研究機関の研究リーダーが最新の生命産業の動向や展望ならびに関連する研究開発から生産に至るまでの諸問題を講述する。	

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02AP014	Practices on Applied Bio-industrial Science	3	2.0	1, 2	Annual	by appointment		Toshiaki Nakajima-Kambe, Akira Kikuchi	Visit bio-related companies or research institutes carrying out an advanced study around Tsukuba and sense a frontier of the bioindustrial sciences through discussions with front-line researchers directly.	奇数年度開講 Biennially

ELECTIVE MAJOR UNITS

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02AP101	Plant Biotechnology Seminar A	2	2.0	1 - 3	Annual	by appointment		Michiyuki Ono	1年次を対象に植物の発生・分化を司る遺伝的制御ネットワークについて、その基本構造と植物界における多様性を概観し、遺伝資源としての産業利用について論議する。	
02AP102	Plant Biotechnology Seminar B	2	2.0	1 - 3	Annual	by appointment		Michiyuki Ono	This course is designed to help students gain a better understanding of the technique transfer from basic life science to applicable industry. Specialists on the rules on technique transfer are invited to give detailed information between domestic foreign regulation and successful technique transfer will be exemplified	Lecture time will be disclosed in advance.
02AP103	Plant Biotechnology Seminar C	2	2.0	1 - 3	Annual	by appointment		Michiyuki Ono	3年次を対象に、植物の発生・分化を司る遺伝的ネットワークについて、特定の生理現象を対象とした学説を構築するための、遺伝資源としての産業利用をするための、高度な思考能力を養う。	
02AP104	Gene Literacy Education	4	2.0	1 - 3	Annual	by appointment		Michiyuki Ono	遺伝子に関する応用技術が発展するなかで、初等・中等教育、及び大学の教養教育として、正しい知識の修得と関連する応用に対する判断力を滋養することが必要になった。遺伝子教育について「教育目的遺伝子組換え実験」を中心として教材開発から教授法に至るまで具体的に論じる。	
02AP105	Literacy Education to Biotechnology	2	2.0	1 - 3	Annual	by appointment		Michiyuki Ono, Kazuo Watanabe	生命科学領域の先端応用技術分野において市民との対話は社会受容の上で必須の要件である。一般市民・学生に対する科学リテラシーの教育について、状況の調査と把握および具体的な方法を論じる。	
02AP106	Bioprocess Engineering Seminar A	2	2.0	1 - 3	Annual	by appointment		Nakao Nomura	微生物や動物細胞を用いた生体活性物質の生産プロセスおよび生物学的、物理化学的手法を用いた湖沼、養殖場の水質保全・修復プロセスについて最近の研究論文を講読・解説すると共に、討論を通じてプロセス開発の進め方を教授する。	
02AP107	Bioprocess Engineering Seminar B	2	2.0	1 - 3	Annual	by appointment		Nakao Nomura	微生物や動物細胞を用いた生体活性物質の生産プロセスおよび生物学的、物理化学的手法を用いた湖沼、養殖場の水質保全・修復プロセスについて最近の研究論文を講読・解説すると共に、討論を通じてプロセス開発の進め方を教授する。	
02AP108	Bioprocess Engineering Seminar C	2	2.0	1 - 3	Annual	by appointment		Nakao Nomura	微生物や動物細胞を用いた生体活性物質の生産プロセスおよび生物学的、物理化学的手法を用いた湖沼、養殖場の水質保全・修復プロセスについて最近の研究論文を講読・解説すると共に、討論を通じてプロセス開発の進め方を教授する。	
02AP109	Genome Biology Seminar A	2	2.0	1 - 3	Annual	by appointment		Kouji Nakamura	ゲノム構造の全体像と転写・翻訳・翻訳後修飾など、ゲノム機能の発現と繊細な制御の仕組みについて最近の研究論文を講読・解説すると共に、討論を通じて、当該分野で生み出された遺伝子資源の開発研究の進め方を議論する。	
02AP110	Genome Biology Seminar B	2	2.0	1 - 3	Annual	by appointment		Kouji Nakamura	ゲノム構造の全体像と転写・翻訳・翻訳後修飾など、ゲノム機能の発現と繊細な制御の仕組みについて最近の研究論文を講読・解説すると共に、討論を通じて、当該分野で生み出された遺伝子資源の開発研究の進め方を議論する。	
02AP111	Genome Biology Seminar C	2	2.0	1 - 3	Annual	by appointment		Kouji Nakamura	ゲノム構造の全体像と転写・翻訳・翻訳後修飾など、ゲノム機能の発現と繊細な制御の仕組みについて最近の研究論文を講読・解説すると共に、討論を通じて、当該分野で生み出された遺伝子資源の開発研究の進め方を議論する。	
02AP201	Molecular Informatics of Bioindustrial Technology	2	2.0	1 - 3	Annual	by appointment		Hideyuki Shigemori	地球上に存在する多様な生物種がもつ未開拓な生体機能分子に関する分子生物学的および生物有機化学的な研究を行い、DNAやタンパク質、生体組織や生体活性物質に関するデータ構築の実現に向けた教育研究を行う。	
02AP202	Plant Physiology Seminar A	2	2.0	1 - 3	Annual	by appointment		Kosumi Yamada	Topics in phytohormones and bioactive substances will be discussed with laboratory members and supervisor.	

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02AP203	Plant Physiology Seminar B	2	2.0	1 - 3	Annual	by appointment		Kosumi Yamada	Topics in phytohormones and bioactive substances will be discussed with laboratory members and supervisor.	
02AP204	Plant Physiology Seminar C	2	2.0	1 - 3	Annual	by appointment		Kosumi Yamada	Topics in phytohormones and bioactive substances will be discussed with laboratory members and supervisor.	
02AP205	Animal Cell Biotechnology Seminar A	2	2.0	1 - 3	Annual	by appointment		Pi-Chao Wang	This course is designed to help students learn the methodology of animal cell biotechnology and enhance the capability of discussion. Training is also provided to enable students to establish independent thinking way on research	
02AP206	Animal Cell Biotechnology Seminar B	2	2.0	1 - 3	Annual	by appointment		Pi-Chao Wang	This course is designed to enable students to design experiments on animal cell biotechnology and enhance the capability of discussion. Training of practical technique is also provided to enable students to make a logic approach on research	
02AP207	Animal Cell Biotechnology Seminar C	2	2.0	1 - 3	Annual	by appointment		Pi-Chao Wang	This course is designed to enable students to solve the problems of the practical technique, training is also provided to develop an overview capability to handle the difficult technical problems on research.	
02AP208	Bioindustrial Resources	1	2.0	1 - 3	Fall/AB	Fri3, 4	2L501	Kazuo Watanabe, Akira Kikuchi, Taichi Oguchi, Naozumi Mimida	バイオ産業の基幹資源となる生物・遺伝資源について、生命科学的な観点から基礎的事項及び産業利用について論じる。また、遺伝資源の保全や産業利用について政策、社会、経済、法律及び国際関係の観点を含め、学際的に事例研究を行う。知的所有権などの無体産物についての資源的理解も議論する。バイオ産業の研究開発において、情報、研究経費、時間、人材やインフラストラクチャーなどのクリティカルマスの資源についても論議する。	
02AP209	Bioindustrial Resources Seminar A	2	2.0	1 - 3	Annual	by appointment		Kazuo Watanabe, Akira Kikuchi, Taichi Oguchi, Naozumi Mimida	後期1年次を対象に、バイオ産業を支援する最新のバイオ科学技術の諸分野の論文を読解することによって、知見を幅広く得ることによって、自己の研究の基盤を作る。	
02AP210	Bioindustrial Resources Seminar B	2	2.0	1 - 3	Annual	by appointment		Kazuo Watanabe, Akira Kikuchi, Taichi Oguchi, Naozumi Mimida	後期2年次を対象に、バイオ産業を支援する最新のバイオ科学技術の特定分野の論文を焦点をしぼり読解することによって、知見を深めることによって、自己の研究の内容を充実させる。	
02AP211	Bioindustrial Resources Seminar C	2	2.0	1 - 3	Annual	by appointment		Kazuo Watanabe, Akira Kikuchi, Taichi Oguchi, Naozumi Mimida	後期3年次を対象に、自己の研究課題と関連の深いバイオ産業を支援する最新のバイオ科学技術の論文や情報を詳細に吟味し、研究の達成のための充実を図る。	
02AP212	Bioactive Natural Products Chemistry Seminar A	2	2.0	1 - 3	Annual	by appointment		Hideyuki Shigemori	1年次を対象に、天然生理活性物質が関与する医薬品や農業および機能性剤の開発や創製に関する内外の先端的な研究論文を購読し、討論を行う。	
02AP213	Bioactive Natural Products Chemistry Seminar B	2	2.0	1 - 3	Annual	by appointment		Hideyuki Shigemori	2年次を対象に、天然生理活性物質が関与する内外の先端的な研究論文を調査、購読、発表させ、論文読解能力とともにプレゼンテーション能力を高める。	
02AP214	Bioactive Natural Products Chemistry Seminar C	2	2.0	1 - 3	Annual	by appointment		Hideyuki Shigemori	3年次を対象に、天然生理活性物質が関与する内外の先端的な研究論文を購読し、この分野の研究動向を幅広く理解させ、セミナー形式でプレゼンテーションを行う。これを通して、自己の研究の位置付けを明確にし、研究成果のまとめ方および学術論文を作成するための高度な思考能力を養う。	
02AP215	Industrial Microbiology and Bioresource Science Seminar A	2	2.0	1 - 3	Annual	by appointment		Toshiaki Nakajima-Kambe	Topics about industrial microbiology or microbial resources are shown every time. Students must find out some original papers about it by oneself and perform a summary, presentation.	
02AP216	Industrial Microbiology and Bioresource Science Seminar B	2	2.0	1 - 3	Annual	by appointment		Toshiaki Nakajima-Kambe	Topics about industrial microbiology or microbial resources are shown every time. Students must find out some original papers about it by oneself and perform a summary, presentation.	

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02AP217	Industrial Microbiology and Bioresource Science Seminar C	2	2.0	1 - 3	Annual	by appointment		Toshiaki Nakajima-Kambe	Topics about industrial microbiology or microbial resources are shown every time. Students must find out some original papers about it by oneself and perform a summary, presentation.	
02AP218	Plant Biotechnology Seminar on Abiotic Stresses A	2	2.0	1 - 3	Annual	by appointment		Akira Kikuchi	Presentation about the abiotic tolerance in higher plants is performed, and then corresponding discussion is carried out among participants.	研究室にて。
02AP219	Plant Biotechnology Seminar on Abiotic Stresses B	2	2.0	1 - 3	Annual	by appointment		Akira Kikuchi	Presentation about the abiotic tolerance in higher plants is performed, and then corresponding discussion is carried out among participants.	At the office
02AP220	Plant Biotechnology Seminar on Abiotic Stresses C	2	2.0	1 - 3	Annual	by appointment		Akira Kikuchi	Presentation about the abiotic tolerance in higher plants is performed, and then corresponding discussion is carried out among participants.	At the Office.
02AP301	Bio-Environmental Control Engineering Seminar A	2	2.0	1 - 3	Annual	by appointment		Motoo Utsumi	1年次生を対象に、生物圏環境制御工学分野における基本的課題に関する著書、学術論文などを講読し、論理的思考力を養い、専門知識の深化を図る。	
02AP302	Bio-Environmental Control Engineering Seminar B	2	2.0	1 - 3	Annual	by appointment		Motoo Utsumi	2年次生を対象に、生物圏環境制御工学関連分野における応用的著書、学術論文などを講読し、それらと自己の研究課題を関連づけ、評価し得る総合的思考力を養う。	
02AP303	Bio-Environmental Control Engineering Seminar C	2	2.0	1 - 3	Annual	by appointment		Motoo Utsumi	3年次生を対象に、生物圏環境制御工学分野における各自の研究内容を俯瞰的な視点から客観的に評価しうる能力の向上を図り、より高度な専門知識の修得を目指す。	
02AP304	Eco-System Engineering Seminar A	2	2.0	1 - 3	Annual	by appointment		Zhen Ya Zhang	Intended for first year students and focuses on reading scientific papers. To nurture the students capable of thinking scientifically and logically, this course intends to guide the first-year students how to read scientific papers typically related with the field of ecological and environmental engineering systems. Followed-up discussion with respect to advanced technologies in practice are also included.	
02AP305	Eco-System Engineering Seminar B	2	2.0	1 - 3	Annual	by appointment		Zhen Ya Zhang	Intended for second year students to develop the ability to learn and expand the research issues pertaining to eco-system engineering. Also involves application of research ideas into practical sense Followed-up discussion with respect to advanced technologies in practice are also included.	
02AP306	Eco-System Engineering Seminar C	2	2.0	1 - 3	Annual	by appointment		Zhen Ya Zhang	Intended for third year students. It focuses on developing research skills and advanced thinking, with special training pertaining to summarization of results obtained. Followed-up discussion with respect to advanced technologies in practice are also included.	
02AP401	Food Process Engineering Seminar A	2	2.0	1 - 3	Annual	by appointment		Takaaki Satake	各自の研究課題に関する著書、学術論文などを収集・講読し、総説の作成および内容紹介・討論などを通じて論理的な思考能力を養う共に、専門知識の一層の深化を目指す。	
02AP402	Food Process Engineering Seminar B	2	2.0	1 - 3	Annual	by appointment		Takaaki Satake	隣接する関連領域を含む広範な著書、学術論文を収集、講読し、それらを各自の研究課題と関連づける総説の作成および内容紹介・討論を通じて、学際性に富む専門知識の修得を目指す。	
02AP403	Food Process Engineering Seminar C	2	2.0	1 - 3	Annual	by appointment		Takaaki Satake	各自の研究内容を俯瞰的な視点から客観的に評価しうる能力の向上に重きを置き、さらに広範な著書、学術論文などを収集・講読し、基礎から応用にわたる体系的な専門知識の修得を目指す。	
02AP404	Food System Seminar A	2	2.0	1 - 3	Annual	by appointment		Yutaka Kitamura	With a focus on original papers, variety of research areas related to food Systems Science (agricultural engineering, food engineering, agriculture facility studies, etc.) to understand and learn the basic research methods are studied to clarify the significance and the direction of the research.	

Course Number	Course Name	Course Type	Credits	Standard Academic Year	Course Offering Term	Weekday and Period	Classroom	Instructor	Course Overview	Remarks
02AP405	Food System Seminar B	2	2.0	1 - 3	Annual	by appointment		Yutaka Kitamura	Understand and master the research methods and reveal direction of significance and research by using English materials, mainly on the variety of research areas related to food Systems Science (Post harvest technology, Food engineering, Agricultural structure, etc.)	
02AP406	Food System Seminar C	2	2.0	1 - 3	Annual	by appointment		Yutaka Kitamura	Commentary of the latest paper on mainly studies of a variety of research areas related to food systems science (such as agricultural engineering, food engineering, agriculture structure science) and the proposal of future challenges by evaluation of important information with understanding the background.	
02AP407	Biological and Material Cycles Engineering A	2	2.0	1 - 3	Annual	by appointment		Yingnan Yang	Intended for first year students and focuses on reading scientific papers pertaining to the field of Biological and materials cycle. It also includes discussion of advanced technologies in order to cultivate the ability to apply them in practical sense.	Involves active participation of students
02AP408	Biological and Material Cycles Engineering B	2	2.0	1 - 3	Annual	by appointment		Yingnan Yang	Intended for second year students to develop the ability to learn and expand the research issues pertaining to Biological materials cycle. Also involves application of research ideas into practical sense.	Involves active participation of students
02AP409	Biological and Material Cycles Engineering C	2	2.0	1 - 3	Annual	by appointment		Yingnan Yang	Intended for third year students. It focuses on developing research skills and advanced thinking, with special training pertaining to summarization of results obtained.	Involves active participation of students
02AP501	Simulation Method for Comprehensive Evaluation of Environmental System Seminar A	2	2.0	1 - 3	Annual	by appointment		Yoshiro Higano	1年次生を対象として、環境技術・政策の評価に関する既往研究・文献をサーベイし、環境技術・政策の現状と今後の方向性について討論を行う。	
02AP502	Simulation Method for Comprehensive Evaluation of Environmental System Seminar B	2	2.0	1 - 3	Annual	by appointment		Yoshiro Higano	2年次生を対象として、技術・政策の評価手法に関する理論的な研究・文献のサーベイを行い、討論を通して新しい評価手法の検討を行う。	
02AP503	Simulation Method for Comprehensive Evaluation of Environmental System Seminar C	2	2.0	1 - 3	Annual	by appointment		Yoshiro Higano	3年次生を対象として、個々の研究課題について発表と相互討論を行い、研究の進歩を促す。	
02AP504	Principle of Human Environmental Symbiosis Seminar	2	2.0	1 - 3	Annual	by appointment		Yoshiro Higano	1年次生を対象に、バイオマス・エネルギー技術およびこれを前提とする分散型新エネルギーシステムと循環型廃棄物処理システムの実例について調査し、環境と社会経済活動の双方向性および生命産業技術の位置づけについて考察する。	
02AP601	Enzymatic Processes Seminar A	2	2.0	1 - 3	Annual	by appointment		Seigo Sato, Shigeki Yoshida	バイオ産業の基盤となる酵素反応の解析と酵素利用技術、工業用酵素とその性質、反応機構等に関する論文の紹介と解説・討論を通じて、学際的な専門知識の修得を目指す。	
02AP602	Enzymatic Processes Seminar B	2	2.0	1 - 3	Annual	by appointment		Seigo Sato, Shigeki Yoshida	バイオ産業の基盤となる酵素反応の解析と酵素利用技術、工業用酵素とその性質、反応機構等に関する論文の紹介と解説・討論を通じて、学際的な専門知識の修得を目指す。	
02AP603	Enzymatic Processes Seminar C	2	2.0	1 - 3	Annual	by appointment		Seigo Sato, Shigeki Yoshida	バイオ産業の基盤となる酵素反応の解析と酵素利用技術、工業用酵素とその性質、反応機構等に関する論文の紹介と解説・討論を通じて、学際的な専門知識の修得を目指す。	