Course title (and course title in Engineering Ethics Engineering Ethics Content of Engineering Ethics Ethics Engineering Ethics Ethics Engineering Ethics Ethics Engineering Ethics Engineering Ethics Ethics Ethics Engineering Ethics Ethic	iraduate School of Engineering irofessor,ATOMI HARUYUKI iraduate School of Informatics irofessor,KANDA TAKAYUKI iraduate School of Engineering enjor Lectmer KANFKO KENTARQU				
Target year 4th year students or above Number of credits 2 Year/semesters 2020/First semesters	ster				
Days and periods Thu.3 Class style Lecture Language distinution Japanese					
[Overview and purpose of the course]					
Modern ethics based on engineering aspect are becoming essential to present engineers and scientists. Instructors from various faculties give lectures about ethics in their research fields.					
[Course objectives]					
The goal of this class is to understand engineering ethics, and to develop the ability to judge by yourself you encounter ethical issues.	when				
[Course schedule and contents]					
engineering area on daily disastrous accidents and fire event. The significances of engineering ethics to examples are discussed. (K. Harada: Architecture) Geotechnical engineering and engineering ethics. (4/18) 1 time. Geotechnical Engineering is indispensal discussing the underground public use, slope stability, geo-sequestration of byproduct for the energy generating. Introducing some examples are of natural disasters and construction accidents, geotechnical engineering ethics will be discussed. (K. Kishida: Global Engineering) Engineering ethics as an applied ethics. (4/25) 1 time. In this lecture, I will show the basic Idea of Engineering Ethics by comparing with the other fields of Applied Ethics. And show its unique character the age of information technology. (M. Mizutani: Graduate School of Letters) Ethical theories for engineering ethics. (5/2) 1 time. This lecture focus on various ideas in ethics (utilitarianism, deontology, virtue ethics, professional ethics etc.) which will be useful for thinking abou particular ethical problems in engineering ethics. (T. Iseda: Graduate School of Letters) Art-view concept for engineering. (5/9) 1 time. Concept of "quality of life" is required for human related engineering. Some practical examples in medical-care and welfare fields will be introduced, and probler the QOL-evaluation will be discussed from both function-optimizing view point and art view point. (N. Tomita: Engineering Science) Ethics of biotechnology and stem cell research. (5/16) 1 time. With the rapid development of genome ed technologis and think locut ethics locutoring technological development. (G. Eiraku: Industrial Chemistry) Research and engineering wetkis. (5/23) 1 time. It is said that the that will do no ill, must do nothing that belongs thereto. The sense of ethics necessary to whom conducts research and engineering work in soci	hose ble in in t t n of iting scome tical ety is of				
as reproductive medicine, genome editing, and clone-animal techniques, is causing revolutions in the fie	lds of				
Continue to 工学倫理(2)↓↓	-↓ - •				

工学倫理(3)

[Study outside of class (preparation and review)] The assignment of the report will be given for each lessor (Other information (office hours, etc.)) The class order is subject to change *Please visit KULASIS to find out about office hours. [Courses delivered by instructors with practical work experience] (1) Categor A course with practical content delivered by instructors with practical work experience (2) Details of instructors' practical work experience related to the course (3) Details of practical classes delivered based on instructors' practical work experience

工学倫理(2)

medicines and food productions. Associated with it, problems of their safety and ethics are arising, which should be addressed by our societies. In this class, the recent progress in biology-related techniques, and problems we have and will have in near future are described. (M. Shirakawa: Industrial Chemistry) Patents and ethics (Part 1). (6/6) Itime. This course will teach the students about 1) patent systems which protect inventions and research results and 2) ethical issues in patents. The first class, in preparation for the next subject of patent ethics, introduces Japan's patent system with comparisons to the patent systems in the world's major countries and international framework. (M. Nakagawa: Electrical and Electronics Engineering)

Patents and ethics (Part 2), (6/13) Itime. Students, equipped with the basic knowledge of patent systems by the previous lecture, will get familiar with actual case studies on ethical and legal issues in patents. (M. Nakagawa: Electrical and Electronics Engineering)

Ethics required for advanced science. (6/27) 1 time. Engineers and researchers are at the forefront of preventing harm caused by advanced chemistry. Think about social roles and ethics required by engineers and researchers through relationships between chemical substances and environmental problems, efforts to avoid

hazards of nanomaterials. (K. Miura: Industrial Chemistry) Ethics in press release. (7/4) 1 time. Press Release is an essential process for introducing the research to our society through various medias. In this lecture, issues related to Press Release in University are addressed and

discussed. (K. Umeno: Informatics and Mathematical Science) Failure accidents and inspection/maintenance (7/11) 1time. On the occasions of failure accidents of vehicles

Failure accidents and inspection/maintenance (7/11) 1time. On the occasions of failure accidents of vehicles and plants, the appropriateness of inspection/maintenance of their structures is often questioned. Some actual failure accidents are reviewed to discuss the importance of inspection/maintenance together with the relation to engineering ethics. (S. Biwa: Engineering Science) Ethics in nuclear engineering. (7/18) 1time. Discussion on engineering ethics in the TEPCO accident from view point of Tsunami evaluation by the Japanese government. (I. Takagi: Engineering Science) Ethica issues on sound design. (7/25) 1 time. Every working things consuming energy emits acoustic sound. Even a small sound energy affect human as noise and may create annoyance and health problems. Sound problems of various things are introduced in the lecture. Ethical issues, which shall be considered during design and operation environment, will be discussed. (Y. Takano: Architecture)

[Course requirements]	
None	
[Evaluation methods and policy]	
Class participation and reports.	
[Textbooks]	
Lecture materials will be distributed.	

[References, etc.]

(Reference books) [Omnibus Engineering Ethics] (Kyoritsu Shuppan Co., Ltd.) ISBN:978-4320071964 [Practical Engineering Ethics - A Short Course, New Edition.] (Kagaku-Dojin Publishing Company,INC) ISBN:9784759811551 [Engineering Ethics (Revised Edition)] (CORONA PUBLISHING CO., LTD.) ISBN:978-4-339-07798-

[World of Engineering Ethics (3rd Edition)] (Morikita Publishing Co., Ltd.) ISBN:978-4-627-97303-9

(and course title in English)	章導 onal Guida	nce		in na ar of	ame, job til ad departm affiliation	tle, nent	Part-time Le	cturer,INOUE MAK		
Farget yea	ar Bro	i year students o	or above	Number o	of credits	5 2	Year	/semesters	2020/Intensive, First semeste	
Days and per	i ods Int	ensive	Class	s style	Lecture			Language of instruction	Japanese	
[Overview and purpose of the course] 現代の日本は高学歴化が進み、学校教育において進学準備教育が重視される一方で、職業生活へ り移行にかかも教育・訓練の機体は弱体化している。中等教育の目的の一つは、生徒の職業選択 りための力量形成であり、さらに、専門高校では具体的な職業教育が行われてきた。本講義は、現 そ日本における職業教育の課題を理解するとともに、日本の専門高校における職業教育の実態を把 握することを通じて、青年が生き方・働き方を主体的に選択できる教育とは如何なるものか、議論 を深めることを目的とする。 [Course objectives] ・高校における職業教育の基本的な役割を理解する。 ・国際比較の観点や労働市場との関係性をとおして、日本の高校職業教育の特徴を理解することが できる。										
Course objectives] 高校における職業教育の基本的な役割を理解する。 国際比較の観点や労働市場との関係性をとおして、日本の高校職業教育の特徴を理解することができる。 Course schedule and contents] 国際比較の観点や労働市場との関係性をとおして、日本の高校職業教育の特徴を理解することができる。 Course schedule and contents] 国本の学校における進路(職業) 指導の起源と理論 第2回 学校と職業世界との接続(1) 日本的雇用システムと学校における進路指導の関係 第4回 学校と職業世界との接続(2) 日本の職業資格制度と学校教育 第5回 世界の職業教育一般米における中等職業教育制度の特徴 第6回 技術・職業教育に関する国際的合意と日本の中等職業教育の位置 第7回 戦後の高校制度の性格と総合制ー高校における職業教育の実際(2) 職業資格・検定と専門教科の内容との関係 第1回 専門高校における職業教育の実際(3) 職場体験 (インターンシップ)の実施と課題 第11回 目本の公的職業教育・訓練施設の租類と高校との接続関係 第12回 高等教育における職業教育の実際(3) 職場体験 (インターンシップ)の実施と課題 第11回 日本の公的職業教育・「専門職大学制度」の概要とこれから 第13回 日本におけるキャリア教育の提唱とその課題 第14回 日本の中等職業教育の意識 第15回 総括・レポート試験 										
#\$40回 +\$学世技戦専専■■ 第第10回 目12回 日12回 第第11回 日13回 第第11回 日 13回 14回 14回 15回 15回 15回 15回 15回 15回 15回 15	校PR術後門門門門3番3→3→23 転職職職高校校材2番3→3→2 ながれたい。 ながらしていたい。 ないたいでは、 ないたいででは、 ないたいでででするいでいです。 ないたいででです。 ないたいでででするいででででです。 ないたいででででででです。 ないたいででででででででででででででででででででででででででででででででででで	業業業校にににない がいたいで、 業業業校にににない ないで、 ない ない ない ないで、 ない ない ない ない ない ない ない ない ない ない	安米す格業業業・業アに統にると教教教書書教育	(2) 日本等 日本等 日本等 日本等 日本等 日本等 日本等 日本 日本等 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本	の 職業 業 本 の む 転 数 年 本 の に 路 数 に る 路 数 に し 、 進 職業 制 本 の に 職業 料 本 の に 職業 料 本 の に し に 、 路 数 に に 、 る い の 職業 計 本 の に の 、 の 職業 制 本 の に の に の 、 の い の い の 、 の の 、 の 、 の の 、 の 、 の の の 、 の 、	、各野田市 、各野町 、各野町 も 、 な た で 、 、 、 、 、 、 、 、 、 、 、 、 、	子学特業教り定く続き、「学学特業教育方とマスに、「「学校教育方とマスに、「学校教育方とマスに、「学校教育のと考えていた」	- おける進路 の 位置 の 位置 20 注進路状況 評門教科の内 系 とこれから	指導の関係 容との関係 の実施と課題	

[Course requirements]	
None	
[Evaluation methods and policy]	
レポート試験の成績(60%) 平常点評価(40%) 平常点評価には、授業への参加状況、授業内での積極的発言を含む。	
[Textbooks]	
Instructed during class	
[References, etc.]	
(Reference books) 掘内達夫・佐々木革―・伊藤一雄・佐藤中人編 『日本と世界の聯業教育』	(法律文化社) ISBN·
978-4-589-03511-0	(IAH-)CIGIL) INDIA
佐藤史人・伊藤一雄・佐々木英一・堀内達夫編 『新時代のキャリア教育と耶 対応して』(法律文化社)ISBN:978-4-589-03953-8	職業指導免許法改定に
[Study outside of class (preparation and review)]	
復習:授業で配布した資料等をよく読んで、講義内容の理解を深めておくこ	と。
(Other information (office hours, etc.))	
開講時期:令和2年8月26日(水)~8月31日(月)の土日を除く4日間の集中 各日ともⅠ時限~Ⅳ時限まで(8月28日(金)のみⅡ~Ⅳ時限)	講義
*Please visit KUI ASIS to find out about office hours	
Trase visit ROLLASIS to find out about office nours.	

工学序論(2)
[Textbooks]
Specify if necessary.
[References, etc.]
(References, etc.]
(Reference books)
Specify if necessary.
[Study outside of class (preparation and review)]
Specify if necessary.
(Other information (office hours, etc.))
Information about lecturers and contents of lectures are announced on electric bulletin boards.
Please confirm to your department office that the credit of this course is admitted to graduation requirements.
*Please visit KULASIS to find out about office hours.

Course number U-ENG20 22501 SJ77 Graduate School of Engineering Senior Lecturer,OHTA HIROTO Course tit 工学序論 name, job title, and department of affiliation Graduate School of Engineering Senior Lecturer, KANEKO KENTAROU Graduate School of Engineering Senior Lecturer, YOROZU KAZUAKI (and cours title in ntroduction to Engineering English) 1st year students or above Number of credits Year/semesters 2020/Intensive, First semest Target year Days and periods Intensive Class style inguage of instruct Japanese Lecture [Overview and purpose of the course] Engineering is to inquire after truth, to develop useful technologies, and to establish ways how to give back development results of technology to the society. First, we offer special lectures regarding the basic knowledge that students in faculty of engineering are xpected to have. Then, we offer a series of intensive lectures about how engineering can suggest solutions of current and future problems of our society, the value of technology, and the responsibilities that researchers and engineers are expected to fulfill. [Course objectives] Students learn basic matters such as attitudes and responsibilities they are expected to take as a member of ocial community. They find value in studying engineering and become to consider what they do in future by understanding technology can suggest solutions of problems our society is facing, especially problems about safety and security. [Course schedule and contents] Special lectures, ltime, About basic knowledge and attitude as students who start to learn engineering, and the role of engineering in society. Intensive lectures, 6times, A series of lectures offered by special lecturers playing on global stages of science and technology. Lectures are for understanding the role that technology is playing in modern society, for reconfirming importance to study engineering and to work as a researcher and engineer in society, and are to be opportunities to consider own future path. Essays are assigned in every lecture to summarize the lecture ontent and opinions of other students. chedule of the lectures are announced later [Course requirements] [Evaluation methods and policy] valuation will be based on participation and essays assigned in every intensive lecture.

Continue to 工学序論(2)↓↓↓

Course number U-ENG23 23181 LJ73 Course tit Graduate School of Engineerin GLセミナーI (企業調査研究) name, job title, and department of affiliation Senior Lecturer, YOROZU KAZUAK (and course title in Global Leadership Seminar I Graduate School of Engineering Senior Lecturer, KOMIYAMA YOSUKE English) 2nd year students or above Number of credits Year/semesters 2020/Intensive, year-round Target year Days and periods Intensive Class style anguage of instructi Japanese Semina [Overview and purpose of the course] The purpose of this course is to study about how worldwide leading company, institute, etc. make proposals and find solutions for expanding their own technologies to the international market. Throughout hands-on training on their laboratory, students investigate the methodology of team organization, proposal, market prediction and conception ability by group works. After the investigation, students are expected to improve their comprehension and explanation capability. As extended exersice subject of this course, the Global Leadership Seminar II is opened in the second semester. [Course objectives] The goal of this course is to improve student's comprehension and explanation capability for processes of proposal and expansion on the international market invesitgating worldwide leading companies by group work. [Course schedule and contents] Week 1, Guidance Week 2-13, Hands-on training Week 14, Pre-presentation Week 15, Final presentation [Course requirements] How to register will be announced later. Students who want to join this course is requested to attend the first lass [Evaluation methods and policy] tudents are prohibited to skip hands-on training. Evaluation will be based on presentation. [Textbooks] Not used _____ Continue to G L セミナー I (企業調査研究)(2) ↓↓↓

(Reference books) (Related URLs) tp://www.glc.t.kyoto-u.ac.jp/ugrad Study outside of class (preparation and review)] vestigating companies in advance. Analyzing the result from (Other information (office hours, etc.)) ow to register will be announced later. Students who want t ass. Students are prohibited to skip hands-on training. Evalt Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category n ommibus course delivered hy invited lecturers and evest st	m hands-on training. Preparing presentation. o join this course is requested to attend the first uation will be based on presentation.
(Related URLs) tp://www.glc.t.kyoto-u.ac.jp/ugrad Study outside of class (preparation and review)] vestigating companies in advance. Analyzing the result from (Other information (office hours, etc.)) ow to register will be announced later. Students who want t ass. Students are prohibited to skip hands-on training. Evalu Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category no mombus course delivered by invited lecturers and events is	m hands-on training. Preparing presentation. o join this course is requested to attend the first uation will be based on presentation.
(Related URLs) ttp://www.glc.t.kyoto-u.ac.jp/ugrad Study outside of class (preparation and review)] vestigating companies in advance. Analyzing the result from (Other information (office hours, etc.)) ow to register will be announced later. Students who want t ass. Students are prohibited to skip hands-on training. Evalt Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category no monthus course delivered by invited lecturers and events	m hands-on training. Preparing presentation. o join this course is requested to attend the first uation will be based on presentation.
(Related OKLS) tp://www.glc.t.kyoto-u.ac.jp/ugrad Study outside of class (preparation and review)] vestigating companies in advance. Analyzing the result from Other information (office hours, etc.)) ow to register will be announced later. Students who want to ass. Students are prohibited to skip hands-on training. Evalt Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category n ommibus course delivered by invited lecturers and enest st	m hands-on training. Preparing presentation. o join this course is requested to attend the first uation will be based on presentation.
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Study outside of class (preparation and review)] westigating companies in advance. Analyzing the result from (Other information (office hours, etc.)) ow to register will be announced later. Students who want to ass. Students are prohibited to skip hands-on training. Evalt Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category n ommibus course delivered by invited lecturers and events	m hands-on training. Preparing presentation. o join this course is requested to attend the first uation will be based on presentation.
(Other information (office hours, etc.)) ow to register will be announced later. Students who want to ass. Students are prohibited to skip hands-on training. Evalt Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category n omnibus course delivered by invited lecturers and events at	o join this course is requested to attend the firs auton will be based on presentation.
(Other information (office hours, etc.)) ow to register will be announced later. Students who want t ass. Students are prohibited to skip hands-on training. Evalt Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category no monthus course delivered by invited lecturers and events st	o join this course is requested to attend the firs aation will be based on presentation.
ow to register will be announced later. Students who want t ass. Students are prohibited to skip hands-on training. Evalt Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category no monthus course delivered by invited lecturers and events a	o join this course is requested to attend the firs aation will be based on presentation.
Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical wo) Category n omnibus course delivered by invited lecturers and quest si	rk experience]
Courses delivered by instructors with practical wo) Category n omnibus course delivered by invited lecturers and guest st	ork experience]
) Category n omnibus course delivered by invited lecturers and guest si	
	peakers from different companies, etc.
) Details of instructors' practical work experience related	to the course
) Details of practical classes delivered based on instructors'	' practical work experience

工学部国際インターンシップ1(2)

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

It is required for students to check if the internship program to participate in could be evaluated as part of mandatory credits or not and could earn how many credits before the participation to the undergraduate school or educational program the student in enrolled. If the credit could not be treated as mandatory ones, get in touch with the Global Leadership Engineering Education Center.

*Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

Category
 A course that includes off-campus training classes.

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

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Course nu	umber	U-EN	G23 3	3184 PJ73							
Course title (and course title in English)	工学部 Faculty	3国際イン of Engineeri	ター: ng Inte	ンシップ 1 ernational Inte	ernship 1	Inst nam and of a	ructor's e, job ti departn filiation	tle, nent	Approved		
Target yea	r 3rd	year students o	or above	Number	of cred	its	1	Yea	r/semesters	2020/Inter	nsive, year-round
Days and peri	ods Inte	ensive	Clas	s style	Semina	ır			Language of instruction	Japanes	e and English
[Overview	and p	urpose o	f the	course]							
Acquisition hosted by th	of inter e Unive	national sk ersity, the I	ills w Facult	ith the train y of Engine	ning of for ering, o	oreig r the	n langu underg	age th radua	brough the int te school the	ernship j ipplicant	programs t belongs to.
[Course o	bjectiv	/es]									
The acquisit hosted by th	tion of i e Unive	nternationa ersity is the	ıl skil majo	ls with the t or expectation	training on to the	of fo	reign la lents.	anguaş	ge through the	to inter	nship progran
[Course s	chedu	le and co	nten	ts]							
Overseas In	ternship	,1time,The	e conte	ents to be a	cquired	shou	ld be d	escrib	ed in the broc	hure of e	each internship
program.											
Final Presen	tation, l	time,A pre	esenta	tion by the	student	is ree	quired f	ollow	ed by discuss	ion amoi	ng participants
ICourse r	equire	ments]									
Described in	the en	nlightion h	ooklat	t for each ir	tornchir	nero	aram 7	The rea	ristrant is rac	variad to	have enough
language ski	ills for t	he particip	ation.		nernsnip	, bio	gram. i	ine reg	gistiant is req	icsicu io	nave enough
[Evaluatio	on met	hods and	polie	cy]							
Marit rating responsible credit is not the Global L determined	is done to ident include .eadersl dependi	based on t ify if the cr d in the un nip Educati ing on the c	the pro redit e dergra ion Ce conter	esentation of earned by the aduate schoor enter as a op nts and the o	or report nis subje ool in wh ptional c duration	s aft ct to iich redit of th	er each be incl he part . The n he prog	intern uded a icipan umber ram th	ship program as mandatory it belongs to, r of credits, ei at the particip	Each E ones or 1 he credi ther 1 or ant has j	epartment not. If the t is granted by 2, will be participated in
[Textbook	(s]										
								(Continue to 工学部	国際インター	ーンジップ1(2)↓↓

Course nu	umber	U-ENG23 33	3182 LJ73									
Course title (and course title in English)	urse title nd course le in glish) G L セミナー I I (課題解決演習) Instructor's Global Leadership Seminar II of affiliation of affiliat											
Target yea	arget year 2nd year students or above Number of credits 1 Year/semesters 2020 Intensive, Second emester											
Days and perio	Days and periods Intensive Class style Seminar Language distudior Japanese											
[Overview	i and pι	urpose of the	course]									
This course by themselv trained throu enhanced th preliminary	is a smal es aimin ugh grou rough or draft to i	l-group worksho g at creating nev p works in reside al presentations its completion.	op program v social va ential train regarding o	n where s lues. In c ing and s contents	students are concrete, ab skills of pre of the prop	e suppo oilities esentat osal at	osed to extrac of planning a ion and comm t each step of	t or set up challenges nd problem-solving are nunication are the process from a				
ICourse o	hiectiv	96]										
Ability of pl social values	lanning, i s, is train	from extraction of the ded through grou	or setting u p works.	ıp challe	nges to pro	posal	of solutions a	iming at creating new				
[Course s	chedule	e and contents	s]									
organized. Lectures,2tii Group work are done. Residential problems is Preliminary Report meet	Orientation, Itime, A brief overview and a schedule of the course are explained and working groups are organized. Lectures, 2times, Lectures by experts are given. Group works, 3times, Setting up challenges, extraction of problems, collecting information, and group works are done. Residential training, 7times, Through intensive group works based on discussion, a proposal for solving problems is planned, a draft report is made, and a few presentations are made. Preliminary review meeting, 1time, A preliminary review meeting is held and discussions are made. Report meeting, 1time, Final presentations are made and reports are submitted.											
[Course re	equiren	ients]										
None												
[Evaluatio	on meth	ods and polic	у]									
It is required concerning a a goal is ma	l to join abilities i de throuş	the residential tr n group discuss gh presentation o	aining. A r ion to extra of the prop	report ma act or set osal as v	eeting is he up challen vell as a sub	ld and ges an omitteo	comprehensi d to propose : d report.	ve evaluation solutions for achieving				
						_c	Continue to G L セミ	テーⅠⅠ(課題解決演習)(2)↓↓↓				

G L セミナー I I (課題解決演習)(2)	工学部国際インターンシップ2(2)
[Textbooks]	[References, etc.]
Will be indicated as necessary.	(Reference books)
[References, etc.]	
(Reference books) Will be indicated as necessary.	[Study outside of class (prepara
[Study outside of class (preparation and review)]	Other information (office hour
Will be indicated as necessary.	It is required for students to check if the
(Other information (office hours, etc.))	school or educational program the stud
Course open period: October to January	get in touch with the Global Leadershi
How to register the course will be instructed. *It depends on divisions which students belong to whether the earned credits are admitted as credits required for archdvision. Places credits to the sulback of your division.	*Please visit KULASIS to find out abo
for graduation. I lease felet to the synabus of your division.	[Courses delivered by instructo
*Please visit KULASIS to find out about office hours.	 Category A course that includes off-campus trai
[Courses delivered by instructors with practical work experience]	
(1) Category	(2) Details of instructors practical w
(2) Details of instructors' practical work experience related to the course	(3) Details of practical classes delivered
(3) Details of practical classes delivered based on instructors' practical work experience	

 (Reference books)

 [Study outside of class (preparation and review)]

 (Other information (office hours, etc.))

 It is required for students to check if the internship program to participate in could be evaluated as part of mandatory credits or not and could earn how many credits before the participation to the undergraduate school or educational program the student in enrolled. If the credit could not be treated as mandatory ones, get in touch with the Global Leadership Engineering Education Center.

 *Please visit KULASIS to find out about office hours.

 [Courses delivered by instructors with practical work experience]

 (1) Category

 A course that includes off-campus training classes.

 (2) Details of instructors' practical work experience related to the course

 (3) Details of practical classes delivered based on instructors' practical work experience

Course n	umb	er	U-EN	G27 3	7137 LE48	U-ENO	327	37137	LE61			
Course title (and course title in English)	Zourse title (and course title in English) ス学部国際インターンシップ2 Faculty of Engineering International Internship 2 (Approved) Approved											
Target year Brd year students or above Number of credits 2 Year/semesters 2020/Intensive, year-round											2020/Intensive, year-round	
Days and periods Intensive Class style Seminar Language distudior Japanese and English												
[Overview	/ and	d pu	rpose o	of the	course]							
Acqusition of international	of int l inte	ternat ernshi	ional sk ip progra	ills wi ums he	th wth the t ld by the F	raining o aculty of	f fo Enį	reign la gineerir	inguag ig or it	e through s subsidia	the try t	participation to the bodies.
[Course o	bjed	ctive	s]									
The acquisit programs is	ion o expe	of intected.	ernation Detaile	al and d obje	foreign lan ctives of th	guage ski e particip	ills atic	through on shou	1 the pa ld be ic	rticipatio lentified b	on to by e	o international each program.
[Course s	che	dule	and co	ntent	s]							
Overseas In program. Final Preser	terns	ship,1	time,Th me,A pr	e conte	tion by the	cquired si student is	hou rec	ld be de	escribe followe	d in the b d by disc	ussi	hure of each internship ion among participants.
[Course r	equi	irem	ents]									
Described in language sk	n the ills f	appli or the	ication b e particij	ooklet oation.	for each in	ternship	pro	gram. T	The reg	istrant is i	requ	uested to have enough
[Evaluatio	on m	netho	ods and	l polio	;y]							
Marit rating responsible credit is not the Global I determined	is de to id inclu leade depe	one b entify uded ership nding	ased on y if the c in the un Educat g on the	the pro redit e idergra ion Ce conten	esentation of arned by th aduate scho enter as a op its and the o	or reports is subjec ol in whi otional cru luration o	afte t to ch t edit of th	er each be incl the part The n ne progr	interns uded as icipant umber ram tha	hip progr s mandato belongs t of credits at the part	ram. ory to, t s, ei icip	Each Department ones or not. If the the credit is granted by ther 1 or 2, will be pant has participated in.
[Textbook	(s]											
'									c	ontinue to I		国際インターンジッデ2(2)↓↓↓

										未更新
Course nu	umbe	r U-EN	G27 3	7030 LJ61						
Course title (and course title in English)	有機 Indus	工業化学 strial Organi	nistry		Instructor's Grad name, job title, Profi and department Grad of affiliation Profi Grad Profi Grad Profi			Graduate School of Engineering Professor, MAE KAZUHIRO Graduate School of Engineering Professor, TANAKA TSUNEHIRO Graduate School of Engineering Professor, OOE KOUICHI Graduate School of Engineering Professor, AXWASE MOTOAKI Graduate School of Engineering Professor, KAWASE MOTOAKI Graduate School of Engineering Professor, KAWASE MOTOAKI Graduate School of Engineering Professor, KONDOU TERUYUKI		
Farget yea	r 3	rd year students	or above	Number	of cred	its	2	Yea	r/semesters	2020/Second semester
Days and peri	ods W	ed.1	Class	s style	Lecture	e			Language of instruction	Japanese
[Overview	/ and	purpose o	of the	course]						
10										
[Course o	bject	lives								
[Course s	ched	ule and co	ontent	sl		_		_		
2 times, 2 times, 2 times, 3 times, 2 times, 1 time, 2 times, 1 time,										
[Course re	equir	ements]								
None										
[Evaluatio	on me	ethods and	l polic	¢y]						
								,	Continue to 7	有機工業化学(2)↓↓↓

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有機工業化字(2)
[Textbooks]
[Poferences etc.]
[References, etc.]
(Reference books)
[Study outside of class (preparation and review)]
[
(Other information (office hours, etc.))
*Please visit KIII ASIS to find out about office hours
Prease visit KOLASIS to find out about office nours.
[Courses delivered by instructors with practical work experience]
(1) Category
A course with practical content delivered by instructors with practical work experience
recourse with practical content derivered by insulacions with practical work experience
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience

生物化学工学(2) [References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) Please visit KULASIS to find out about office hours. [Courses delivered by instructors with practical work experience] (1) Category A course with practical content delivered by instructors with practical work experience (2) Details of instructors' practical work experience related to the course (3) Details of practical classes delivered based on instructors' practical work experience

未更新

Course nu	mber	U-EN	G27 3	7042 LJ61							
Course title (and course d title in] English)	nurse title hd course 生物化学工学 e in Biochemical Engineering glish)							ile, nent	Graduate Sch Professor,AT Graduate Sch Professor,HA Graduate Sch Senior Lectu Graduate Sch Associate Pre Graduate Sch Pregram-Specific Asso Graduate Sch Senior Lecture	1001 of Engineering 70MI HARUYUKI 1001 of Engineering AMACHI ITARU hool of Engineering rer,KANAI TAMOTSU hool of Engineering ofessor,HARA YUUJI hool of Engineering r,TAMURA TOMONORI	
Target year	· Brd y	ear students	or above	Number	of cred	lits	2	Yea	r/semesters	2020/Second semester	
Days and perio	ds Fri.2		Class	s style	Lectur	e			Language of instruction	Japanese	
[Overview	and pu	urpose o	of the	course]							
[Course ob	ojectiv	es]									
[Course so	hedul	e and co	ntent	ts]							
,4times, ,3times, ,3times, ,4times, ,1time,											
[Course re	quiren	nents]									
None											
[Evaluation	n meth	ods and	polic	cy]							
[Textbooks	s]										
								,	Continue to :	生物化学工学(2)↓↓↓	

Course nu	ımbe	r	U-EN0	G27 3'	7043 LJ61						
Course title (and course title in English) 常常在全概論 Introduction to Environment Preservation						rvation	Instructor's name, job title, and department of affiliation Associate Professor, NASAII SHINICHI Graduate School of Engineerin Associate Professor, NAKAGAWA HIR			alth, Safety and Environment ASHIMOTO SATOSHI alth, Safety and Environment acKAI SHINICHI hool of Engineering sor,NAKAGAWA HIROYUKI	
Target year Brd year students or above Number of credits 2 Year/semesters 2020/								2020/First semester			
Days and periods Mon.1 Class style Lecture								Language of instruction	Japanese		
[Overview	and	l pu	rpose o	f the	course]						
This course Students wil of preservati sound mater for their futu	This course is designed for students specializing in chemistry. Students will study basic examples of environmental issues and their effects on society from the perspective of preservation of the environment at the university, the air environment, the aquatic environment, and a sound material-cycle society. We will help develop students' understanding of environmental preservation for their future research and social activities.										
[Course o	[Course objectives]										
The major course objectives: 1) To learn the background and basic mechanisms of environmental problems, specifically as they relate to ir and water, as well as how to establish a sound material-cycle society. (2) To understand relationships between various activities and their environmental impacts on campus.											

[Course schedule and contents]

 Environmental Issues of Our Time, 3 times
 With a particular focus on chemicals, we will study the background and current status of environmental issues and discuss possible future problems. We will also examine how environmental issues are related to human activities and resource/energy consumption.

2. Environment Preservation at Kyoto University, 2 times

Students will learn about environmental protection systems at Kyoto University. We will explain systems for water quality control, liquid waste treatment, and specially controlled waste management. We will also detail systems and regulations for proper use and management of chemical substances.

3. Air Environment, 5 times

We will discuss the current status of global air pollution. We will learn about a variety of regulations and the relevant background of rules created based on the Air Pollution Control Law. We will discuss in detail air pollutants emitted by factories and automobiles in urban areas and look closely at their chemical reactions in the air, with a particular focus on radical reactions.

4. Aquatic Environment, 2 times

4. Aquate Environment, 2 times Students will study the conservation of water quality, specifically (1) water contamination by organic substances and related purification methods, (2) water contamination by heavy metals and related treatment methods, and (3) management of environmentally persistent substances. They will also learn about environmental criteria, effluent standards, and environmental protection technologies for water quality <u>Continue to 電信項金属</u>

Continue to 環境保全概論(2)↓↓↓

環境保全概論(2)

L_____Control. 5. Waste Management and a Sound Material-Cycle Society, 2 times Students will develop a better understanding of waste treatment/management and a sound material-cycle society by studying (1) mass balance and indexes on the macro level, (2) definitions of waste and the current status of waste treatment, (3) waste and dioxin problems, and (4) approaches toward establishing a sound naterial-cycle society. Confirmation of students' levels of understanding, 1 time Students' level of understanding of course topics will be checked.

[Course requirements] None

[Evaluation methods and policy]

Evaluation: test scores + attendance rates.

[Textbooks]

Not specified. Materials and references will be distributed in class when needed.

[References, etc.]

(Reference books) To be announced in class.

[Study outside of class (preparation and review)]

Review on the materials and references distributed. Specified points willbe announced in class.

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

環境安全化学(2)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

丰面新

											11,2,11
Course n	ımb	er	U-EN	G27 3	7046 LJ61	U-EN	G2′	7 37046	LJ76		
Course title (and course title in English)	環均 Che	竟安 emist	全化学 Iry and Environmental Safety					tructor's me, job tit d departm affiliation	tle, nent	Agency for Hea Professor,HA Graduate Scl Associate Profes Graduate Scl Professor,AE	alth, Safety and Environment ASHIMOTO SATOSHI nool of Engineering sor,NAKAGAWA HIROYUKI nool of Engineering BE RYUU
Target yea	r	3rd y	ear students	or above	Number	of cred	its	2	Yea	r/semesters	2020/Second semester
Days and peri	ods 1	Γhu.1	1	Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	an a	d pı	irpose o	of the	course]						
[Course o	bje	ctive	es]								
[Course s	che	dule	e and co	nten	ts]						
,2-3times,											
,2-3times,											
,2-3times,											
,2-3times,											
.2-3times.											
,1time,											
							_				
[Course r	equ	irem	nents]								
None											
[Evaluatio	n n	neth	ods and	poli	cy]						
[Textbook	s]										
[Referenc	es,	etc.]								
(Refere	nce	boc	oks)								
		-							,	Continue to	環境安全化学(2)↓↓↓

											小文州	
Course nu	ımbe	er U	J-ENC	327 31	7048 LJ61	U-EN	G27	37048	LJ76			
Course title (and course title in English)	移動現象 Transport Phenomena						Instructor's name, job title, and department of affiliation			Graduate School of Engineering Professor,YAMAMOTO RYOICHI		
Target yea	r	Brd year students or above Number of cr					its	2	Year	/semesters	2020/First semester	
Days and perio	ods T	ue.2	c c	Class	s style	Lecture	e			Language of instruction	Japanese	
[Overview	anc	l purpo	ose of	the	course]							
[Course o	bjec	tives]										
[Course s	cheo	dule an	nd cor	ntent	s]							
,5times,		-										
,5times,												
,4times, 1time												
,1time,												
[Course re	equi	rement	ts]									
None												
[Evaluatio	n m	ethods	s and	polic	;y]							
[Textbook	s]											
[Referenc	es, e	etc.]										
(Referen	nce	books))									
[Study ou	tside	e of cla	ass (p	repa	ration and	d revie	w)]					
(Other in	form	nation ((office	e hou	ırs, etc.))							
*Please visit	t KU	LASIS	to find	out a	bout office	hours.						

丰面新

									木史和
Course nu	mber	U-ENO	G27 3	7052 LJ61					
Course title (and course title in English)	プロ・ Proce	セス制御工: ss Control	学			Instructor's name, job tit and departm of affiliation	tle, nent	Graduate Sch Professor,OC Graduate Sch Professor,SO Graduate Sch Assistant Prof	ool of Engineering DSHIMA MASAHIRO Iool of Engineering TOWA KENICHIRO Iool of Engineering Sessor,KIM SANGHONG
Target yea	r 31	d year students o	or above	Number	of cred	lits 2	Yea	r/semesters	2020/First semester
Days and perio	ods W	ed.2	Class	s style	Lectur	e		Language of instruction	Japanese
[Overview	and	purpose o	f the	course]					
computers). the second st The class tea models, white controller is Simulink are	computers). Understanding the process dynamics is the first step to develop a good control system. Then, as the second step, the optimal selection and manipulation of the process input variables has to be determined. The class teaches to derive the physico-chemical dynamic models of chemical processes and transfer function models, which are obtained by taylor expansion of the physico-chemical models. Then, the design scheme of controller is described. To make the understanding easier, computer simulation exercises using Matlab and Simulink are offered. 1.								ttrol system. Then, as tas to be determined. es and transfer function , the design scheme of es using Matlab and
The seal of	bject	ives]			- 1 1-	1. 6			
process cont	roller	and to analy	ze the	control pe	rformar	ice so as to c	lesign	the optimal p	rocess control systems.
[Course se	ched	ule and co	ntent	s]					
Introduction of Process Control, Itme,Showing several examples, the necessity, objectives and importance of process control are described. Then, the concepts of feedback and feed-forward controls and technical terms on process control are explained. Some issues on process control design are explained. The basic design procedure of the control system for solving the issues is explained. Development of Dynamic Models, Itime,The first step for developing better process control systems is to understand the dynamic behaviors of the process to be controlled. The modeling method using the material and heat balance equations is lectured to construct the model showing the dynamic behavior of the process appropriately. Then, how to derive the linear transfer model using Taylor expansion of the first principle model is explained. Laplace transform and Transfer function, Itime,The Laplace transform is revisited first. Then, how to derive the transfer function from the linearized dynamic model among the input and the output variables is lectured. How to obtain the linear model from the step response is also taught. Exercise with Matlab for learning dynamic behavior, Itime,[Exercise] After learning the basics of Matlab and Simulink, the dynamic behaviors of some typical dynamic systems such as the first-order lag system and the									
executing the PID Control	e simu ,1time	ilation is exe ,The most p	ecuted	r controller	in proc	ess industrie	es is Pl	ID (Proportion	nal, Integral, and

Derivative) controller. The basic features of three elements (P, I, D) are explained. Then, after explain ng the basic feature of PID controller, how to adjust the control parameters is taught. Dynamics of controlled system, Itime, The relationship between the pole of the transfer function and the stability is lectured. Then, the basic feature, the steady-state characteristics, and the stability of the feedback

stability is recurred. Inc., a.c. ----control system are explained. Continue to プロセス制御工学(2)↓↓↓

プロセス制御工学(3)

[Courses delivered by instructors with practical work experience]

(1) Category

Course number

U-ENG27 47056 LJ61

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

未更新

プロセス制御工学(2)

Mid-term exam, Itime, To know the level of understanding, the mid-term examination is conducted. Frequency response, Itime, The relationship between the sine wave input and the output (the frequency response), and how to detect the stability from the frequency response are lectured. The features of various filters are also explained.

PID control system design ,1time,The adjusting method of PID parameters based on the IMC control procedure is explained. Then, several revised controllers of the basic PID controller for improving the performance are lectured.

Exercise of control system design , Itime, [Exercise] For a given process, the exercise of tuning the control parameters and verifying the performance under the developed system using Matlab/Simulink is executed. Cascade control and Multi-loop control, ltime, The concept of cascade control is explained. Then, as a control system dealing with the two-input and two-output process, the multi-loop control system is introduced, and how to remove the interaction among the control loops is explained. Exercise of multi-loop control, ltime, [Exercise] For a given process, the exercise of developing a controller

for a two-input and two-output process is executed.

For a two-input atwo-output process is executed. Equipment for control, titme, The equipment used for the real process control system are explained. The concept of proportional band and the reason why non-dimensional system is used are explained. Overall exercise of process control design, time, [Exercise] Starting with the construction of the first principle model of a chemical/bio process, a two-input and two-output control system (multi-loop controller) is designed and the parameters are tuned by using Matlab and Simulink

Feed-back time, 1 times. The question and answer to the final exercise, and the whole of the lectures are

onducted.

[Course requirements]

Basic understanding of linear algebra, ordinal differential equations and Laplace transform

[Evaluation methods and policy]

The score is determined by considering the quality of homeworks, midterm exam, term-end exam and final project.

[Textbooks]

Process Control Engineering, Hashimoto, Hasebe, Kano, Asakura book store, isbn{}{4254250312}

[References. etc.]

(Reference books) rocess Control System, Ohshima, CORONA Publishing isbn{}{4339033146}

[Study outside of class (preparation and review)] The final term project will be given

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

Course title (and course title in English)	e title ourse 由) Introduction to Quantum Chemistry					Inst nan and of a	tructor's ne, job tit I departm offiliation	tle, nent	Graduate School of Engineering Professor,SATO HIROFUMI		
Target yea	get year Brd year students or above Number of credits 2 Year/su						/semesters	2020/Second semester			
Days and perio	ods 1	Mon.2	Class	s style	Lecture	e			Language of instruction	Japanese	
[Overview	ı an	d purpose o	of the	course]							
[Course o	bje	ctives]									
-	-										
[Course s	che	dule and co	ontent	s]							
,1time,											
.2times.											
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,3times,											
,2times,											
,2times,											
,1time,											
,4times,											
,1time,											
[Course re	equ	irements]									
None											
[Evaluatio	on n	nethods and	d polic	>y]							
Textbook	sl					_					
								_c	Continue to	量子化学概論(2)↓↓↓	
1											

量子化学概論(2)
References, etc.]
(Reference books)
Study outside of class (preparation and review)]
(Other information (office hours, etc.))
Please visit KULASIS to find out about office hours.

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Course nu	umbe	er	U-EN	G27 4	7061 LJ61						
Course title (and course title in English)	有榜 Spe	幾分) ctros	光学 copy for	Orgai	nic Compou	inds	Inst nan and of a	tructor's ne, job ti I departn Iffiliation	tle, nent	Graduate Sch Associate Profess Institute for C Associate Prof Graduate Sch Professor,TA Institute for C Associate Prof	ool of Engineering sor,KURAHASHI TAKUYA Chemical Research essor,TAKAYA HIKARU ool of Engineering ,NAKA KAZUO Chemical Research essor,HIROSE TAKASHI
Target yea	r	4th ye	ear students o	or above	Number	of cred	its	2	Yea	r/semesters	2020/First semester
Days and perio	r sbc	lue.2	!	Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	and	d pu	irpose o	f the	course]						
[Course o	bjed	ctive	es]								
[Course s	che	dule	and co	nten	ts]						
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,2times,											
,2times,											
, Itime,											
,oumes,											
, runic,											
[Course re	equi	irem	ents]								
None	-										
TT											
Evaluatio	n m	ieth	oas ana	poli	cy]						
[Textbook	s]										
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		_								Continue to	有機分光学(2)↓↓↓↓
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									未更新
Course numb	er U-EN	G27 47059	9 LJ61						
Course title (and course title in English)				Instructor's name, job title, and department of affiliation			Graduate School of Global Environmental Studies Professor,ABE TAKESHI Graduate School of Global Environmental Studies Associate Professor,MIYAZAKI KOUHEI Graduate School of Engineering Assistant Professor 道師 能力		
Target year	4th year students of	or above Nu	mber	of cred	lits	2	Yea	r/semesters	2020/First semester
Days and periods	l'hu.2	Class st	yle	Lectur	e			Language of instruction	Japanese
[Overview and	d purpose o	f the cou	urse]						
[Course object	ctives]								
[Course sche	dule and co	ntents]							
Fundamental of	electrochemic	al reaction	n,4time	es,					
Kinetics of elect	rochemical re	action,4tir	nes,						
Battery and fuel	cell,4times,								
Electrolysis, Itin	ie,								
Corrosion, Itime	,								
Evaluation, runn	-,								
[Course requi	irements]								
None									
[Evaluation m	ethods and	policy]							
-									
[Textbooks]									
[References,	etc.]								
(Reference	books)								
[Study outsid	e of class (p	oreparati	on an	d revie	w)]				
(Other inform	nation (offic	e hours,	etc.))		_		_		
*Please visit KU	LASIS to find	l out abou	t office	e hours.					

有機分光学(2) [References, etc.]

(Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

*Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

(1) Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

						未更新
Course number	U-ENG27 3706	54 LJ61				
Course title (and course 触媒化2 title in English)	学 Chemistry		Instructor's name, job tit and departm of affiliation	Grac Prof Grac Prof le, Grac Grac Prof Center fr Program	duate Sch essor,EG duate Sch essor,TA duate Sch ciate Profes duate Sch essor,AB or the Promotion n-Specific Ser	ool of Engineering UCHI KOUICHI ool of Engineering NAKA TSUNEHIRO ool of Engineering sor, TERAMURA KENTARO ool of Engineering E RYUU of Intelsicplang Education and Research ior Lecture, ASAKURA HIROYUKI
Target year 4th y	ear students or above Nu	umber of cred	its 2	Year/sem	nesters	2020/First semester
Days and periods Wed.	.1 Class s	tyle Lecture	•	Langua	age of instruction	Japanese
[Overview and pu	urpose of the co	ourse]				
[Course objective	es]					
[Course schedule	and contents]					
,2times,						
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[Course requirem	nents]					
None						
[Evaluation meth	ods and policy]					
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Course num	nber	U-ENG27 37	7070 LJ61	U-EN	G27 37070	LJ76		
Course title (and course title in English)	主化学II Basic Bio	ochemistry II			Instructor's name, job ti and departn of affiliation	tle, nent	Graduate Scl Professor,AT Graduate Scl Professor,MG Graduate Scl Senior Lectu Graduate Scl Associate Pr Graduate Scl Professor,HA	tool of Engineering OMI HARUYUKI iool of Engineering DRI YASUO iool of Engineering rer,KANAI TAMOTSU iool of Engineering ofessor,HARA YUUJI iool of Engineering MACHI ITARU
Target year	3rd ye	ar students or above	Number	of cred	its 2	Yea	r/semesters	2020/Second semester
Days and period	ls Mon.	Class	style	Lectur	5		Language of instruction	Japanese
[Overview a	and pu	rpose of the	course]					
[Course ob	jective	s]						
		-						
[Course scl	hedule	and content	s]					
,3times,								
,3times,								
,2times,								
,2times,								
,2times,								
,2times,								
,1time,								
,4times,								
[Course red	quirem	ents]						
inolle								
[Evaluation	metho	ods and polic	;y]					
Textbooks	1							
[Reference:	s, etc.]							
Reference	ce boo	ks)						
	·						Continue to	 生化学II(2)↓↓↓

触媒化学(2)	
[Textbooks]	-
IReferences etc.1	
(References, etc.)	
[Study outside of class (preparation and review)]	
(Other information (office hours, etc.))	
*Please visit KULASIS to find out about office hours.	
[Courses delivered by instructors with practical work experience]	
 Category A course with practical content delivered by instructors with practical work experience 	
(2) Details of instructors' practical work experience related to the course	
(3) Details of practical classes delivered based on instructors' practical work experience	

生化学II(2)	
[Study outside of class (preparation and review)]	
(Other information (office hours, etc.))	
*Please visit KULASIS to find out about office hours.	
Courses delivered by instructors with practical work experience	1
1) Category	•
A course with practical content delivered by instructors with practical work end	xperience
(2) Details of instructors practical work experience related to the course	
(3) Details of practical classes delivered based on instructors' practical work	c experience

Course title and course itle in English)	urse title 微粒子工学 e in glish)							ile, ient	Graduate Scl Professor,M/ Graduate Scl Associate Profe	nool of Engineering ATSUSAKA SHIYUUJ 1000 of Engineering ssor,WATANABE SATOSH
arget year	Brd year s	students or a	tudents or above Number of credits 2 Year/semesters 20				2020/Second semester			
ays and period	ds Tue.3	C	lass s	style	Lecture	,			Language of instruction	Japanese
cocesses. In owders, prop d the gener Course ob udents will adyzing the	this course perties of c ation, sepa ojectives] acquire ar dynamic 1	e, student dispersed aration, a	and ing	learn abc cles in a g llection of g of the ch e particles	put the fi as (vapo particle naracteri s. Studen	stic	s of part	prope phase	nd powders,	and of methods of s in applications and
evelopments ollection.	; involving	g the man	nipulat	ion of fin	e particl	es,	includin	g thei	generation,	separation, and
ourse sc	hedule a	nd cont	tents]							
verview of f planation is presses and	fine-partic s made of l natural pl	le engine the role o henomen	eering of fine na.	(1 class) engineer	ing in cl	hem	iical pro	cesses	, with examp	les from classical
rticle prope these lecture e distributi elastic defo pillary conc ationship b rticles, and ethods for t	erties and r res, explan on and rela- ormation a densation, between lig the charace hese will a	measuren nation is 1 ated stati nd plastic etc., elec ght wavel cteristics also be di	ment (4 made n istical ic defo ctrostat length of par iscusse	4 classes) regarding processin rmation, j tic proper and parti- ticle inter ed.	the foll g metho physicoo ties rela cle diam actions	owi ds, cher ted ieter and	ng: part dynami nical pr to electi r, etc., a particle	icle di c prop opertio rical cl s well aggre	ameter expres erties, especia es including d harge, optical as the proper gates (assemi	ssion method, particle ally the basic properties roplet formation and properties from the ties of individual blies). Measurement
s (vapor)-p ctures focu gas-phase o face depos	bhase parties on the bad dispersed p sition, fine tions, inclu	cle syster asics of n particles. particle a uding dis	ems (5 microp . Expla aggreg spersic	classes) particle ge mation is gation, etc on, classif	neration made of . Using ication,	ı via f ana this soli	a pulveri alysis m as a foi d-gas se	zation ethod: indation parati	and nucleations for basic photon, discussion on, materials	on, as well as motion enomena such as wall- n is then made of processing, etc.
	narticle sy	vstems (4	4 class	es) liquid-ph	ase disp	ersi	on parti	cles, a	nd this base i	s used to discuss unit
quid-phase planation is rations inc rticle group derstood th	s made of cluding dis interactione contents	interaction spersion, ons are ex- of this c	ons of aggre xplaine course.	gation, fil ed next. F	tration, inally, c	etc. onf	Examp irmatior	les of a	ordered struct	ture formation based on ent that students have

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Course title (and course プ title in Pro	ロセスシス	テム工学 s Engineering	lr n a	nstructor's ame, job ti nd departr	itle, nent	Graduate Scl Professor,SC Graduate Scl	nool of Engir
English)	cess system	is Engineering	0	f affiliation	1	Assistant Profe	ssor,TONOMU
Target year	3rd year studen	ts or above Numbe	or of credit	s 2	Year	/semesters	2020/Secon
Days and periods	Thu.2	Class style	Lecture			Language of instruction	Japanese
[Overview ar	nd purpose	of the course]				
optimal synthes	is,optimal de e also explai	esign and product	tion manage	ment are	describ	ed. The math	ematical me
[Course obje	ctives]						
This course aim	is to understa	and the systemati	c modelling	procedur	es of th	ne design and	operational p
problems which	ocesses. In a 1 are formula	ted as the linear,	non-linear o	erstand th r combin	atorial	programming	g problem.
Course och		ententel					-
Utert in DSE2 1	equie and (contents			1 .		
Modelling of th	time, the col	physical model 1	systems engi Itime The fe	neering is ature of p	s expia	inea. I models used	in the proce
and operation p	roblems is e	plained.		ature or p	ii j sieu	i modelo doed	in the proce
Modelling of th	e processes	statistical mode	l,1time,The	least squa	re met	hod used in c	onstructing t
statistical mode	l is explaine	1.					
Procedure of pr	ocess design	,Itime,The proce	dure of proc	ess desig	n and t	he solution m	ethod using
Process design	using simula	tion 1 time The se	equential mo	dular anr	roach	which is com	monly used
process simulat	ors is explain	ned.	equentiai me	uunu upp	nouen	which is com	monny useu
Process synthes	sis,1time,The	combinatorial pr	rogramming	method a	and mu	lti-step heuris	stic method v
used in the cond	ceptual desig	n are explained.		a .			
the heat exchanger	network syr	unesis,2times,A s	systematic s	ynthesis n	nethod	using T-Q di	agram is exp
Production man	agement of	synthesis probler	es.1time.The	e concept	of pro	duction mana	gement inch
supply chain pr	oblem is exp	lained.	, 1 11110, 1 110	- concept	p. 0		
Solution proced	lure using LI	,2times,The form	nulation of t	he produc	ction pl	anning proble	em as a linea
programming p	roblem, and	its solution method	od using the	simplex i	method	l are explaine	a
programming p						cohoduling p	u.
Scheduling pro	blem and Ba	mpB method, 2 ti	imes, The for	mulation	of the	scheduning pi	oblem of ba
Scheduling prol processes as a trevelained	blem and Ba raveling sale	mpB method, 2 ti sman problem an	imes, The for id its solutio	mulation n procedu	of the tre usin	ig the branch	u. oblem of ba and bound n
Scheduling prol processes as a tr explained. Various schedu	blem and Ba raveling sale ling problem	mpB method, 2 ti sman problem an as of batch proces	imes,The for id its solutio isses,1time.V	mulation n procedu arious sch	of the ire usin nedulin	ig the branch	oblem of ba and bound n which arise in
Scheduling prol processes as a tr explained. Various schedu processes and th	blem and Ba raveling sale ling problem heir solution	mpB method, 2 ti sman problem an s of batch proces methods are expl	imes,The for ad its solution sses,1time,V lained.	mulation n procedu arious sch	of the ire usin nedulin	ig the branch	oblem of ba and bound n which arise in
Scheduling prol processes as a trexplained. Various schedu processes and the Evaluation of let	blem and Ba raveling sale ling problem heir solution earning achie	mpB method, 2 ti sman problem an as of batch proces methods are exp wement, 1 times,	imes,The for ad its solution sees,1time,V lained. The comprel	mulation n procedu arious sch hensive re	of the tre usin nedulin eview i	ig the branch ig problems w s executed, an	roblem of ba and bound n rhich arise in nd the

未更新

General summary of course (1 class) A summary, chiefly focused on dry powder operations.
[Course requirements]
None
[Evaluation methods and policy]
Evaluation is made on the basis of scores (results) in periodically given tests. Consideration will also be given to reports that may be assigned at any time during the course.
[Textbooks]
K. Okuyama, H. Masuda and S. Morooka ^[] Biryuushi Kougaku ndash Fine particle technology.] (Ohmsha) ISBN:4-274-12900-4
[References, etc.]
(Reference books) K. Hashimoto, F. Ogino 『Gendai Kagaku Kogaku』 (Sangyo Tosho) ISBN:4-7828-2609-5
[Study outside of class (preparation and review)]
Students must prepare for classes, and review after classes.
(Other information (office hours, etc.))
Please visit KULASIS to find out about office hours.
*Please visit KULASIS to find out about office hours.

微粒子工学(2)

Leeareerede	
The basic know differential and	ledge of chemical engineering such as the unit operation and reaction engineering, and that of integral calculus are requested.
[Evaluation r	nethods and policy]
Homework assi the total score.	gned in the lectures is treated as 30 points, and the final examination is treated as 70 points of
[Textbooks]	
Lecture materia	Is are distributed in the class.
[References, (Reference	etc.] books)
[References, (Reference	etc.] books)
[References, (Reference	etc.] books) de of class (preparation and review)]
[References, (Reference	etc.] books) de of class (preparation and review)]
[References, (Reference) [Study outside] (Other inform	etc.] books) de of class (preparation and review)] mation (office hours, etc.))
[References, (Reference [Study outsid (Other infor *Please visit Kt	etc.] books) de of class (preparation and review)] mation (office hours, etc.)) JLASIS to find out about office hours.
[References, (Reference [Study outsid (Other infor *Please visit KU [Courses del	etc.] books) de of class (preparation and review)] mation (office hours, etc.)) JLASIS to find out about office hours. ivered by instructors with practical work experience]

(3) Details of practical classes delivered based on instructors' practical work experience

										未更新	
Course nu	ımber	U-EN	G27 3'	7082 LJ76	U-EN	G27	37082	LJ61			
Course title (and course title in English)	プロ・ Proce	セス設計 ss Design			Inst nan and of a	ructor's ne, job tit departm ffiliation	tle, nent	Graduate Scl Professor,SC Faculty of E	Graduate School of Engineering Professor,SOTOWA KENICHIRO Faculty of Engineering		
Target yea	r 4t	h year students o	Number	of cred	its	2	Year	r/semesters	2020/First semester		
Days and perio	ods Fri	i.3	s style	Lecture	•			Language of instruction	Japanese		
The fundam Then, a conc engineering	ental s ceptua and pr	skills of desi l design exe rocess simul	gning rcise o ation s	chemical p of a chemics system.	rocesses al proce	s wh ss is	ich con execute	sist of ed usir	various unit on the knowle	operations are learned. dge of chemical	
[Course o It is requeste processes by	bject d to u apply	ives] inderstand the	ie way wledg	of concept e of chemic	tual desi cal engir	gn, neeri	and to h ing and	ave th related	e skill of desi d field.	gning chemical	
[Course s	ched	ule and co	ntent	s]							
explained. Evaluation r single-year c How to use simulators is Reality of pr available me explained. (1) Practice of a consisting of Oral present the faculty a	nethoc evalua process expla cocess ethods intensi chem f 2 or 1 ation,4 ttend.	ds, 1 time, Aft tion method is simulators nined. Then, design, 6 tim on market r ive course) ical process 3 students. 4 times, The f	er exp and a ,1time how t es,Acc esearc desig	laining the multi-year of the seque o use proce cording to t h, acquisiti n, 17times, 7 esign of eac	fundame evaluation ential modess simulation the process on of da on of da The exer ch group	enta ion 1 odul lator edur tta, j cise	l terms method ar appro- r is expl e of pro- process on proc- presente	on eco are ex bach th ained bcess d synthe cess de cess de	onomical effic plained. nat is commor using the den lesign, some i esis and equip esign is perfor ne workshop v	iency evaluation, a ily used in the process nonstration. mportant points and ment design are med by group where all members of	
[Course re	equire	ements]									
The basic kr	owled	lge on chem	ical ei	igineering s	such as u	unit	operatio	on is re	equested.		
[Evaluatio The results a	n me are eva	thods and aluated by th	polic ne cont	ents of the	final rep	port	and the	oral p	resentation.		
								(Continue to	- ブロセス設計(2)↓↓↓	

プロセス設計(2)
[Textbooks]
The reference materials are prepared by teachers.
[References, etc.]
(Reference books)
(Related URLs)
(http://www.cheme.kyoto-u.ac.jp/processdesign/)
[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
Since the exercise is supervised by faculty members in each laboratory, the registration is restricted to senior
students belonging to Chemical Process Engineering Course.
*Please visit KULASIS to find out about office hours.
[Courses delivered by instructors with practical work experience]
 Category An omnibus course delivered by invited lecturers and guest speakers from different companies, etc.
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience

Course title (and course title in English)	計算化学コ Computers	亡学 in Chemica	al Engineerii	lr n ng a o	nstructor's ame, job ti nd departn f affiliation	tle, nent	Graduate School of Engineering Professor,OOSHIMA MASAHI Graduate School of Engineering Associate Professor,NAGAMINE SHIN Graduate School of Engineering Assistant Professor,HIKIMA YU		
Target year	Brd year s	students or abov	Number	of credit	s 2	Year	/semesters	2020/First seme	
Days and perio	ds Tue.3	Clas	s style	Lecture			Language of instruction	Japanese	
[Overview	and purp	ose of the	e course]				<u> </u>		
Solving seve students earn the linear and square metho	ral Chemic the basic c 1 nonlinear od for parar	al Engineer computation algebraic e neter fitting	ing problem al skills for quations, dit s	s with cor engineeri ferential o	nputer lar ng calcula equations,	nguage, itions. ' integra	, Visual Basic They will be al and linear	c (VBA) in Exce learing how to so and nonlinear lea	
[Course of	ojectives]								
The goals of simple Cherr	this course nical Engine	is to write eering Prob	computer pr lems.	ogrammir	ig codes b	y stude	ents themselv	es for solving the	
[Course so	hedule a	nd conten	its]						
 Argeoratic The simple c solve with V 3-4. Iterative After leaning solutions of a 5-6. Differen After learnin calculation o 7-8. Numeric After learnin 	hemical en hemical en BA. calculatior the succes ilgebraic ec tial equation g the Euler f chemical cal integrati g computer	gineering p n methods ssive iteratic quations that and RKG r reactor. ion r algorithm	roblems that on and Newt it are not and nethods for like trapezoi	on iteration on iteration lytically s solving the dal methor	ormulated on, the stu- solvable. e differen od and Sin	by alge dents v tial equ npson 1	ebraic equation write the prog uations, the st method, the s	ons are assigned t rams to obtain th tudents work on t tudents write pro	
to integrate n 9. Partial diff After learnin students num distribution. 10-11. Matri First the prog Gaussian elin linear regress 12-14. Paran	umerical da erential equiparties of the schemic perically solution of the schemic scale of the schemic of the s	ata. uation ne of approv lve the heat on codes for pe solve the si from the da	ximating the conduction rforming ba imultaneous ata.	partial di equation a sic matrix linear equ	fferential and obtain calculation and	equation the time the time time the time time time time time time time time	on with differ me evolution aught. Then, op a compute	rence equations, t of temperature the students learn r program to deri	
The students extremum of	learn the st	teepest desc	ent method,	Newton 1	nethod an	d Mare	uardt metho	d to cool: loool	

計算化学工学(2)

data by non-linear least square method. 15. Term-end examination 16. Feedback

Course number U-ENG27 47096 LJ61

[Course requirements]

Excel is to be used. The basic operation of computer and excel is prerequisite.

[Evaluation methods and policy]

The submission of all homework assignments will be worth 40% of the final grade. The term end exam will be evaluated for the rest of the 60 % of the final grade.

[Textbooks]

Text will be prepared by the tutors

[References, etc.]

(Reference books) Introduced during class

[Study outside of class (preparation and review)]

Writing program for the chemical engineering problem is assigned as homework every week.

(Other information (office hours, etc.))

The first 30 minutes of the class will be devoted for explaining theory and basic computational scheme needed to solve the assignment of the day. Then, solve the assignment by using the computer.

*Please visit KULASIS to find out about office hours.

										木史新	
Course nu	umber	U-EN	G27 37	7101 LJ61	U-EN	G27	7 37101	LJ76			
Course title (and course title in English)	Course title (and course title in English)						tructor's ne, job tit d departm affiliation	le, hent	Graduate School of Engineering Associate Professor, AskAGAW A HIRON Graduate School of Engineering Professor, ABE RYUU Graduate School of Engineering Associate Professor, SUGASE KE Institute for Chemical Research Associate Professor, TOSAKA MASATI Graduate School of Engineering Senior Lecturer, ISHIDA NAOKI		
Target yea	r 4	th year students	or above	Number	of cred	lits	1	Year	semesters	2020/Intensive, First semester	
Days and perio	ods In	itensive	Class	style	Lectur	e			Language of instruction	Japanese	
[Overview	and	purpose c	of the	course]							
						_					
[Course o	bject	ives]									
[Course s	ched	ule and co	ontent	s]							
,1time,											
,1time,											
,1time,											
,1time,											
,1time,											
,1time,											
[Course re	equir	ements]									
None											
[Evaluatio	on me	thods and	l polic	:y]							
			_								
[Textbook	(s]										
[Referenc	es, el	ic.]									
(Refere	nce b	ooks)									
								c	ontinue to 化	学実験の安全指針(2)↓↓↓	

												~	
Course nu	Imb	er	U-EN	G27 2	7102 LJ60								
Course title (and course title in English)	化当 Sim	之工 ⁴ ulati	学シミュ ions in Ch	レー: nemic	ション al Engineeri	Ins nar and of a	tructor's ne, job tit d departm affiliation	tle, nent	Graduate School of Engineering Professor, YAMAMOTO RYOICHI Graduate School of Engineering Associate Professor, WATANABE SATOSHI				
Target yea	r	3rd ye	ear students or above Number of credits 2 Year/semesters 2020/Second se										
Days and peri	ods T	lue.2	2	Class style Lectu			e			Language of instruction	Japanese		
[Overview	and	d pu	irpose o	f the	course]								
[Course o	bjeo	ctive	es]										
[Course s	che	dule	and co	nten	ts]								
,3times,													
,1time,													
,2times,													
,1time, 2times													
.1time.													
,4times,													
,1time,													
[Course re	equi	irem	nents]										
None													
[Evaluatio	n m	neth	ods and	poli	cv]								
-				•									
[Textbook	s]												
L		_											
									(Continue to 化学	E字シミュレー	・ション(2)↓↓↓	

化学実験の安全指針(2)
[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
*Please visit KULASIS to find out about office hours.
[Courses delivered by instructors with practical work experience]
(1) Category
A course with practical content delivered by instructors with practical work experience
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience

化学工学シミュレーション**(2)**

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

*Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience] (1) Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

											未更新
Course n	umb	er	U-EN	IG27 2	7103 LJ60						
Course title (and course title in English)	物王 Phy	里化4 sical (学基礎及 Chemistry	び演 : Funda	習 [工化1] mentals and F	Exercises	Inst nan and of a	tructor's ne, job ti I departn Iffiliation	tle, nent	Graduate Sc Professor,K0	hool of Engineering DGA TSUYOSHI
Target yea	r	2nd y	ear students	or above	Number	of cred	lits	2	Yea	r/semesters	2020/First semester
Days and peri	ods	Гue.2	2	Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	/ an	d pu	irpose	of the	course]						
[Course o	bje	ctive	es]								
[Course s	che	dule	and c	onten	ts]						
,3times,											
,3times,											
,4times,											
,2times,											
,1time,											
[Course r	equ	irem	nents]								
None											
[Evaluation	n n	neth	ods an	d poli	cy]						
[Textbook	s]										
[Referenc	es,	etc.]	1								
(Refere	nce	boo	.ks)								
									(Continue to 物理化	;字基礎及び演習 工化1](2)↓

Course nu	umber	U-EN	327 2	7103 LJ60						
Course title (and course title in English)	物理化 Physical (学基礎及 Chemistry:	び演 Funda	習 [工化2] mentals and] Exercises	Inst nan and of a	tructor's ne, job ti I departn Iffiliation	tle, nent	Graduate Scl Professor,TA Graduate Scl Associate Profe	hool of Engineering ANAKA TSUNEHIRO hool of Engineering ssor,TERAMURA KENTA
Target yea	r 2nd y	ear students o	r above	Number	of cred	its	2	Year	semesters	2020/First semester
Days and perio	ds Tue.2	:	Clas	s style	Lecture	•			Language of instruction	Japanese
[Overview	and pu	irpose o	f the	course]						
[Course o	bjective	es]								
1										
[Course se	chedule	and co	nten	ts]						
,3times,										
,3times,										
,4times,										
,2times,										
,∠uilles, ltime										
,111110,										
[Course re	auirem	ents]				-				
None	quirei	lentoj								
rione										
[Evaluatio	n meth	ods and	poli	cy]						
•			•			-				
[Textbook	:s]									
[Reference	es, etc.									
Referer	nce boo	ks)								
[Study out	tside of	class (p	repa	ration an	d revie	w)]				
(Other inf	formation	on (offic	e hoi	urs, etc.))						
*Please visit	KULAS	SIS to find	louta	about office	e hours.					

物理化学基礎及び演習 [1111](2)
[Study outside of class (preparation and review)]
(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours
Tease visit KOLASIS to find out about office nouts.
[Courses delivered by instructors with practical work experience]
(1) Category A course with practical content delivered by instructors with practical work experience
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience
(3) Details of practical classes derivered based on historetors practical work experience

Course n	umb	er	U-ENO	G272	7103 LJ60								
Course title (and course title in English)	 httle httle 物理化学基礎及び演習[工化3] Physical Chemistry: Fundamentals and Exercises nd department of affiliation Graduate School of Engineering Associate Professor, TANABE KATSUAKI 												
Target yea	r	2nd y	ear students o	or above	Number	of cred	lits	2	Year	/semesters	2020/Firs	t semes	ster
Days and peri	ods	Гue.2	2	Clas	s style	Lecture	е			Language of instruction	Japanese		
[Overview	ı an	d pı	urpose o	f the	course]								
[Course o	bje	ctive	es]										
[Course s	che	dule	and co	nten	ts]								
,3times, ,3times, ,4times, ,2times, ,2times, ,1time,													
[Course r	equ	irem	nents]										
None													
[Evaluatio	n n	neth	ods and	polie	cy]								
[Textbook	(s]												
[Referenc	es,	etc.]										
(Refere	nce	boo) (ks)						,			F (5)	

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未更新

未更新

Continue to 物理化学基礎及び演習 [工化3] (2) ↓ ↓ ↓

(Other information (office hours, etc.)) Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical work experience] (Category Category Course with practical content delivered by instructors with practical work experience Details of instructors' practical work experience related to the course Details of practical classes delivered based on instructors' practical work experience Details of practical classes delivered based on instructors' practical work experience					
Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical work experience Category course with practical content delivered by instructors with practical work experience Details of instructors' practical work experience related to the course Details of practical classes delivered based on instructors' practical work experience Details of practical classes delivered based on instructors' practical work experience	Other information (ffice hours, etc.)			
Courses delivered by instructors with practical work experience] () Category () course with practical content delivered by instructors with practical work experience (2) Details of instructors' practical work experience related to the course (3) Details of practical classes delivered based on instructors' practical work experience	Please visit KULASIS to	find out about office hou	rs.		
Courses delivered by instructors with practical work experience] 1) Category course with practical content delivered by instructors with practical work experience 2) Details of instructors' practical work experience related to the course 3) Details of practical classes delivered based on instructors' practical work experience					
 Category course with practical content delivered by instructors with practical work experience Details of instructors' practical work experience related to the course Details of practical classes delivered based on instructors' practical work experience 	Courses delivered by	instructors with prac	ctical work e	xperience]	
 2) Details of instructors' practical work experience related to the course 3) Details of practical classes delivered based on instructors' practical work experience 	 Category course with practical co 	ntent delivered by instruc	tors with prac	tical work experienc	e
3) Details of practical classes delivered based on instructors' practical work experience	2) Details of instructors'	practical work experience	ce related to th	ie course	
5) Details of practical classes delivered based on instructors practical work experience			, , ,		
	3) Details of practical cla	sses delivered based on in	istructors pi	actical work experie	ence

物理化学基礎及び演習 [工化4] (2)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

Please visit KULASIS to find out about office nours.

[Courses delivered by instructors with practical work experience]

Category
 A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

Course n	umber	U-EN	G27 27103 LJ60						
Course title (and course title in English)	物理化: Physical	学基礎及 Chemistry:	び演習[工化4] Fundamentals and F	Exercises	Inst nam and of a	ructor's le, job tit departm ffiliation	tle, nent	Graduate Sch Associate Profess Graduate Sch Associate Pro	nool of Engineering sor,UMEYAMA TOMOKAZU nool of Engineering ofessor,SUGASE KENJI
Target yea	r 2nd y	ear students (or above Number (of cred	its	2	Yea	r/semesters	2020/First semester
Days and peri	ods Tue.	2	Class style	Lecture	,			Language of instruction	Japanese
[Overview	/ and pu	urpose o	f the course]						
[Course o	bjectiv	es]							
[Course s	chedul	e and co	ntentsl						
,3times,									
,3times,									
,4times,									
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10	· · · · · · · · · · · · · · · · · · ·				_				
[Course r	equiren	nentsj							
INORE									
[Evaluatio	on meth	ods and	policy]						
[Textbook	(s]								
[Referenc	es, etc.]							
Refere	nce boo	oks)							
							(Continue to 物理化的	学基礎及び演習「工化4」(2)↓↓↓

Course nu	Imber	U-EN	G27 2	7104 LJ60											
Course title (and course title in English)	有機化学基礎及び演習 [工化1] Exercises in Basic Organic Chemistry Instructor's and department of affiliation Graduate School of Engineering Senior Lecturer, ISHIDA NAOKI														
Target yea	r 2r	id year students (or above	Number	of cred	lits	2	Year/	ar/semesters 2020/First semester						
Days and perio	Days and periods Mon.1 Class style Lecture Language d'instruction Japanese														
[Overview	[Overview and purpose of the course]														
This course exercises. Pa important fu compounds	This course systematically studies the basic concepts and principles of organic chemistry through lectures and exercises. Particular attentions are focused on the chemistry of carbonyl group, which is one of the most mportant functional group in organic chemistry. The organic chemistry of amines and heterocyclic compounds are also studied.														
[Course o	[Course objectives]														
Acquire the of carbonyl	Acquire the basic concept and knowledge, especially physical properties and reactions, of organic chemistry of carbonyl compounds, amines, and heterocycles.														
[Course schedule and contents]															
1. Aldehyde Study on the	1. Aldehydes and ketones (2) Study on the structures, properties, syntheses, and reactions of aldehydes and ketone.														
Study on the ketones.	react	ions and rea	ction 1	mechanism	s of the	nucl	eophilio	c additi	on reactions	to aldehydes and					
 Carboxyli Study on the 	c acid struc	s and nitrile ture, propert	s (1) ies, sy	ntheses, an	d reacti	ons	of carbo	oxylic a	cids and nit	riles					
 Carboxyli Study on the acid halides. 	c acid	derivatives ture, propert	(2) ies, sy	ntheses, an	d reacti	ions	of carbo	oxylic a	cid derivativ	ves, such as esters and					
 Nucleoph Study on the acid derivati 	ilic ac react ves.	yl substitutio ions and rea	on rea	ctions (2) mechanism	s of the	nucl	eophilio	c acyl s	ubstitution r	eactions of carboxylic					
6. alpha-Sub Study on the alkylations a	6. alpha-Substitution and condensation reactions of carbonyl group (2) Study on the reactions and reaction mechanisms involving enolate anions of ketons and esters, such as alkylations and aldol reactions.														
7. Amines and Study on the	nd het	erocycles (2 ture, propert) ies, sy	ntheses, an	d reacti	ions	of amin	es and	heterocycles	i.					
8. Feedback	Audy on the structure, properties, syntheses, and reactions of annines and neterocycles. 3. Feedback (1) Continue to 有機化学基礎及び演習 [工化1] (2)↓↓↓														

irable to take Basic Organic Chemistry A and B. aluation methods and policy] uate based on a final written examination and exercises and tests during the lecture. xtbooks] rマリー 『有機化学 生体反応へのアプローチ』(東京化学同人)ISBN:978480790691 ferences, etc.] Reference books) udy outside of class (preparation and review)] aration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	
aluation methods and policy] tuate based on a final written examination and exercises and tests during the lecture. xtbooks] rマリー『有機化学 生体反応へのアプローチ』(東京化学同人)ISBN:978480790691 ferences, etc.] Reference books) udy outside of class (preparation and review)] aration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	Basic Organic Chemistry A and B.
uate based on a final written examination and exercises and tests during the lecture. xtbooks] rマリー『有機化学 生体反応へのアプローチ』(東京化学同人)ISBN:978480790691 ferences, etc.] Reference books) udy outside of class (preparation and review)] aration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	thods and policy]
xtbooks] ママリー 『有機化学 生体反応へのアプローチ』(東京化学同人)ISBN:978480790691 ferences, etc.] Reference books) udy outside of class (preparation and review)] paration and reviewing the textbook are needed. ther information (office hours, etc.)) asse visit KULASIS to find out about office hours.	a final written examination and exercises and tests during the lecture.
rマリー 『有機化学 生体反応へのアプローチ』(東京化学同人)ISBN:978480790691 ferences, etc.] Reference books) udy outside of class (preparation and review)] paration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	
Interferences, etc.] Reference books) udy outside of class (preparation and review)] paration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	機化学 生体反応へのアプローチ』(東京化学同人)ISBN:9784807906918
offerences, etc.] Reference books) udy outside of class (preparation and review)] waration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	
Reference books) udy outside of class (preparation and review)] aration and reviewing the textbook are needed. ther information (office hours, etc.)) as visit KULASIS to find out about office hours.	tc.]
udy outside of class (preparation and review)] aration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	ooks)
udy outside of class (preparation and review)] arration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	
aration and reviewing the textbook are needed. ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	of class (preparation and review)]
ther information (office hours, etc.)) ase visit KULASIS to find out about office hours.	viewing the textbook are needed.
ase visit KULASIS to find out about office hours.	ation (office hours, etc.))
	ASIS to find out about office hours.

有機化学基礎及び演習 [工化2] (2) [Course requirements] Desirable to take Basic Organic Chemistry A and B. [Evaluation methods and policy] Evaluate based on a final written examination and exercises and tests during the lecture. [Textbooks] マクマリー 『有機化学 生体反応へのアプローチ』(東京化学同人)ISBN:9784807906918 [References, etc.] (Reference books) [Study outside of class (preparation and review)] Preparation and reviewing the textbook are needed. (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

Course nu	umber	U-EN	G27 2	7104 LJ60								
Course title (and course title in English)	urse title d course b in glish) 有機化学基礎及び演習 [工化2] Exercises in Basic Organic Chemistry glish) Land department of affiliation											
Target yea	arget year Dad year students or above Number of credits 2 Year/semesters 2020/First semester											
Days and periods Mon.1 Class style Lecture Lagrage distuice Japanese												
This course systematically studies the basic concepts and principles of organic chemistry through lectures and exercises. Particular attentions are focused on the chemistry of carbonyl group, which is one of the most important functional group in organic chemistry. The organic chemistry of amines and heterocyclic compounds are also studied. [Course objectives] Acquire the basic concept and knowledge, especially physical properties and reactions, of organic chemistry												
of carbonyl compounds, amines, and heterocycles. [Course schedule and contents] . Aldehvdes and ketones (2)												
Study on the structures, properties, syntheses, and reactions of aldehydes and ketone. 2. Nucleophilic addition reactions (3) Study on the reactions and reaction mechanisms of the nucleophilic addition reactions to aldehydes and ketones.												
 Carboxyli Study on the 	ic acids a structu	and nitrile re, proper	s (1) ties, sy	ntheses, an	d reacti	ons	of carbo	oxylic	acids and nitr	iles		
4. Carboxylic acid derivatives (2) Study on the structure, properties, syntheses, and reactions of carboxylic acid derivatives, such as esters and acid halides.												
 Nucleophilic acyl substitution reactions (2) Study on the reactions and reaction mechanisms of the nucleophilic acyl substitution reactions of carboxylic acid derivatives. 												
6. alpha-Sub Study on the alkylations a	6. alpha-Substitution and condensation reactions of carbonyl group (2) Study on the reactions and reaction mechanisms involving enolate anions of ketons and esters, such as alkylations and aldol reactions.											
 Amines a Study on the 	nd heter structu	ocycles (2 re, proper	e) ties, sy	ntheses, an	d reacti	ons	of amin	es and	l heterocycles			
8. Feedback	(1)											

Continue to 有機化学基礎及び演習 [工化2] (2)↓↓↓

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Course nu	umbe	er	U-EN	G27 2	7104 LJ60								
Course title (and course title in English)	ie se 有機化学基礎及び演習 [工化3] Exercises in Basic Organic Chemistry and department of affiliation Graduate School of Engineering Professor,HAMACHI ITARU												
Target yea	r	2nd yea	d year students or above Number of credits 2 Year/semesters 2020/First semester										
Days and perio	Days and periods Mon.1 Class style Lecture Language distutution Japanese												
[Overview	/ and	d pur	pose o	f the	course]								
This course exercises. Pa important fu compounds	This course systematically studies the basic concepts and principles of organic chemistry through lectures and exercises. Particular attentions are focused on the chemistry of carbonyl group, which is one of the most important functional group in organic chemistry. The organic chemistry of amines and heterocyclic compounds are also studied.												
[Course o	bjec	tives	5]										
Acquire the basic concept and knowledge, especially physical properties and reactions, of organic chemistry of carbonyl compounds, amines, and heterocycles.													
[Course schedule and contents]													
 Aldehydes and ketones (2) Study on the structures, properties, syntheses, and reactions of aldehydes and ketone. 													
 Nucleoph Study on the ketones. 	ilic a e reac	dditions	on reacti and rea	ons (3 ction 1	3) mechanism	s of the	nuc	leophilio	c addit	ion reactions	to aldehydes and		
 Carboxyli Study on the 	ic aci e stru	ds an cture	d nitrile , propert	s (1) ies, sy	ntheses, an	ıd reacti	ons	of carbo	oxylic	acids and nitr	iles		
 Carboxyli Study on the acid halides. 	ic aci e stru	d der cture	ivatives , propert	(2) ies, sy	ntheses, an	ıd reacti	ons	of carbo	oxylic	acid derivativ	es, such as esters and		
 Nucleoph Study on the acid derivati 	5. Nucleophilic acyl substitution reactions (2) Study on the reactions and reaction mechanisms of the nucleophilic acyl substitution reactions of carboxylic acid derivatives.												
6. alpha-Sub Study on the alkylations a	6. alpha-Substitution and condensation reactions of carbonyl group (2) Study on the reactions and reaction mechanisms involving enolate anions of ketons and esters, such as alkylations and aldol reactions.												
 Amines a Study on the 	nd he e stru	eteroc cture	ycles (2 , propert) ies, sy	ntheses, an	ıd reacti	ons	of amin	es and	heterocycles.			
8. Feedback	(1)												
		_							(Continue to 有機化	学基礎及び演習 [工化3] (2)↓↓↓		

有機化学基礎及び演習[工化3](2)	
[Course requirements]	
Desimble to take Basic Operation Chamisters A and B	
Desirable to take Basic Organic Chemistry A and B.	
[Evaluation methods and policy]	
Evaluate based on a final written examination and exercises and tests during the lecture.	
[Textbooks]	
マクマリー 『有機化学 生体反応へのアプローチ』(東京化学同人)ISBN:9784807906918	
[References, etc.]	
(Reference books)	
[Study outside of class (preparation and review)]	
Preparation and reviewing the textbook are needed	_
replaced on and reviewing the textbook are needed.	
(Other information (office hours, etc.))	
*Please visit KULASIS to find out about office hours.	
[Courses delivered by instructors with practical work experience]	
 Category A course with practical content delivered by instructors with practical work experience 	
(2) Details of instructors' practical work experience related to the course	
(3) Details of practical classes delivered based on instructors' practical work experience	
	I

[Course requirements]
Desirable to take Basic Or	ganic Chemistry A and B.
[Evaluation methods	and policy]
Evaluate based on a final	written examination and exercises and tests during the lecture.
[Textbooks]	
マクマリー『有機化学	生体反応へのアプローチ』(東京化学同人)ISBN:9784807906918
[References, etc.]	
(Reference books)	
[Study outside of clas	s (preparation and review)]
Preparation and reviewing	the textbook are needed.
Other information (c	ffice hours etc.)
*Please visit KIII ASIS to	find out about office hours
Thease visit ROL/1515 to	This out about office hours.

Course nu	umbe	ər	U-EN	G27 2	7104 LJ60								
Course title (and course title in English)	course title and course itle in nanglish) たwere title bin nanglish) たwere title bin nanglish)												
Target yea	arget year 2nd year students or above Number of credits 2 Year/semesters 2020/First semester												
Days and periods Mon.1 Class style Lecture Language distudin Japanese													
This course systematically studies the basic concepts and principles of organic chemistry through lectures and exercises. Particular attentions are focused on the chemistry of carbonyl group, which is one of the most important functional group in organic chemistry. The organic chemistry of amines and heterocyclic compounds are also studied. [Course objectives] Acquire the basic concept and knowledge, especially physical properties and reactions, of organic chemistry													
2. Nucleoph Study on the ketones.	ilic a e read	additions	on reacti s and rea	ons (2	3) mechanism	s of the	nuc	leophili	e addit	ion reactions	to aldehydes and		
3. Carboxyli Study on the	ic aci e stru	ids ar icture	nd nitrile , propert	s (1) ies, s <u>y</u>	yntheses, an	id reacti	ons	of carbo	oxylic	acids and nitr	iles		
 Carboxylic acid derivatives (2) Study on the structure, properties, syntheses, and reactions of carboxylic acid derivatives, such as esters and acid halides. 													
 Nucleophilic acyl substitution reactions (2) Study on the reactions and reaction mechanisms of the nucleophilic acyl substitution reactions of carboxylic acid derivatives. 													
6. alpha-Substitution and condensation reactions of carbonyl group (2) Study on the reactions and reaction mechanisms involving enolate anions of ketons and esters, such as alkylations and aldol reactions.													
 Amines a Study on the 	nd he stru	eteroc icture	cycles (2 , propert) ies, s	yntheses, an	ıd reacti	ons	of amin	es and	heterocycles			
8. Feedback	(1)								,	antinua ta 古博化			

Course n	umber	U-EN0	327 2	7105 LJ60	U-EN	G27	27105	LJ76			
Course title (and course title in English) 基礎無機化学 [T17, T18] Instructor's name, job title, and department of affiliation of affiliation											ool of Engineering E RYUU ool of Energy Science ssor,TAKAI SHIGEOMI
Target yea	r 2nd y	ear students o	or above	Number	of cred	lits	2	Yea	r/semesters	5 2	2020/First semester
Days and peri	ods Fri.2		Class	s style	Lectur	e			Language of instructi	ior J	apanese
[Overview	/ and pι	irpose o	f the	course]							
[Course o	bjective	es]									
[Course s	chedule	e and co	ntent	s]						_	
,4times,											
,5times, .5times.											
,1time,											
[Course r	equiren	nents]									
None											
[Evaluatio	on meth	ods and	polic	¢y]							
[Textbool	(s]									_	
Referenc	es etc	1									
(Refere	nce boo	s ks)									
										_]
								(Continue to 基础	と無機	贵化学 [T17, T18] (2)↓↓↓

基礎無機化学 [T17, T18] (2)
[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
*Please visit KULASIS to find out about office hours.
Courses delivered by instructors with practical week surgeits all
[Courses delivered by instructors with practical work experience]
A course with practical content delivered by instructors with practical work experience
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience
(*) =

										未更新
Course n	umber	U-EN0	327 2	7105 LJ60	U-EN	G27	27105	LJ76		
Course tile (and course title in English) 基礎無機化学 [T21, T22] Instructor's name, job title, and department of affiliation Graduate School of Engine Professor, FUITA KOUII Institute for Liberal Arts and Professor, TANAKA KATS								nool of Engineering JJITA KOUJI Liberal Arts and Sciences NAKA KATSUHISA		
Target yea	r 2nd	year students o	or above	Number	of cred	lits	2	Year	/semesters	2020/First semester
Days and peri	ods Fri.2	2	Class	s style	Lectur	e			Language of instruction	Japanese
[Overview	and p	urpose o	f the	course]						
[Course o	bjectiv	ves]								
[Course s	chedu	le and co	ntent	s]						
,4times,										
,5times, 5times										
.1time.										
[Course r	equire	ments]								
None										
[Evaluatio	on metl	hods and	polic	⊳y]						
-						_				
Textbook	(s]									
	-									
[Referenc	es, etc	.]		_						
Refere	nce bo	oks)								
[Study ou	tside c	of class (p	orepa	ration and	d revie	w)]				
(Other in	format	ion (offic	e hou	urs, etc.))		_				
*Please visi	t KULA	SIS to find	l out a	bout office	e hours.					
1										

											未更新
Course nu	umbe	ər	U-EN	327 2	7105 LJ60	U-EN	G27	27105	LJ76		
Course title (and course title in English) 基礎無機化学 [T19, T20] Basic Inorganic Chemistry							Instructor's name, job title, and department of affiliation				oool of Engineering URA KIYOTAKA oool of Engineering essor,MATSUI TOSHIAKI
Target yea	r	2nd y	ear students of	r above	Number o	of cred	its	2	Year	/semesters	2020/First semester
Days and perio	ods F	ri.2		Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	and	d pu	irpose o	f the	course]						
[Course o	bjec	tive	es]								
[Course s	che	dule	and co	nten	ts]						
,4times,											
,5times,											
,5times,											
,1time,											
[Course re	equi	rem	ients]								
None											
[Evaluatio	n m	eth	ods and	poli	cy]						
[Textbook	s]										
[Referenc	es, (etc.]	j								
(Refere	nce	boo	ks)								
[Study ou	tsid	e of	class (p	orepa	ration and	d revie	w)]				
(Other in	forn	natio	on (offic	e hoi	urs, etc.))						
*Please visi	KU	LAS	SIS to find	l out a	about office	hours.					

										未更新
Course n	umb	er U-E	ENG27 2'	7111 LJ60						
Course title (and course title in English)	化 Fur	学プロセス idamental C	工学基础 hemical F	学基礎 [T17, T18] mical Process Engineering of affiliation and department of affiliation and department of affiliation and department of affiliation and department as chool of Engineerin Professor, YAMAMOTO RV Graduate School of Engineerin Associate Professor, MAKI TA					nool of Engineering AE KAZUHIRO nool of Engineering MAMOTO RYOICHI nool of Engineering ofessor,MAKI TAISUKE	
Target yea	r	2nd year stude	nts or above	Number	of cred	of credits 2 Year/semesters 2020/First semes				
Days and peri	ods	Thu.2	Class	s style	Lecture	•			Language of instruction	Japanese
[Overview	ı an	d purpose	e of the	course]						
[Course o	bje	ctives]								
[Course s	che	dule and	content	s]						
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.2times.										
,2times,										
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,1time,										
,0.5times,										
,1time,										
,1.5times,										
,1time,										
,2times,										
,1time,										
,1time,										
[Course r	equ	irements]								
None										
[Evaluatio	on n	nethods a	nd polic	;y]						
[Textbook	(s]									
[Referenc	es,	etc.]								
(Refere	nce	books)								
								c	ontinue to 化学プロ	セス工学基礎[T17, T18](2)↓↓↓

化学プロセス工学基礎 [T17, T18] (2)

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[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

*Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

(1) Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

化学プロセス工学基礎 [T19, T20](2)

reaction are lectured.

Weeks 10 and 11: Fundamental equations of designing and operating reactors--- Stoichiometry during reaction and kinetic balance equations of batch reactor, continuous tank reactor, and tubular reactor are explained.

Week 12: Kinetic analysis of simple reaction--- Measuring data in experiments using batch reactor, tubular reactor, or continuous tank reactor, analyzing those data, and formulating reaction rate as a function of concentrations and temperature are explained.

Weeks 13 and 14: Design and operation of reactors--- Design and operation of reactors are taught and exercised

Week 15: Comprehensive lecture on chemical reaction engineering which were lectured in previous weeks is given.

[Course requirements] None

[Evaluation methods and policy]

Absolute evaluation of intermediate and final examinations. Take-home assignments and in-class quizzes are imposed and evaluated if necessary.

[Textbooks]

K. Hashimoto and F. Ogino ed. 『Gendai Kagakukogaku (2001)』(Sangyo Tosho)ISBN:4782826095

[References, etc.] (Reference books)

R. Bird, W. Stewart and E. Lightfoot 『Transport Phenomena (2nd Ed.)』 (Wiley) ISBN:9780470115398 K. Hashimoto 『Han'no Kogaku (revised and augmented)』 (Baifukan) ISBN:9784563046347

[Study outside of class (preparation and review)]

Read through a corresponding part of the textbooks before the lecture. Assignments are usually taken from the textbooks.

(Other information (office hours, etc.))

All registered students are divide into 3 classes. The 3 classes run separately though the contents are shared. Fundamental knowledge on ordinary differential equations is needed. Be sure to take two examinations on the former part (transport phenomena) and the latter part (chemical reaction engineering).

_____Continue to 化学プロセス工学温暖[[119, 170] [6)↓↓↓

Course number	U-ENG27 27111 LJ60									
Course title (and course title in English) 化学プロセス工学基礎 [T19, T20] Fundamental Chemical Process Engineering Graduate School of Engineering of affiliation of affiliation of affiliation										
Target year 2nd year students or above Number of credits 2 Year/semesters 2020/First semester										
Days and periods Thu.	.2 Class style	Lecture		Language of instruction	Japanese					
[Overview and p	urpose of the course]									
also in environmental problems and energy problems which include diffusion of pollutants and efficient utilization of heat. In this course, beginning with material and energy balances, momentum transport, energy transport, and material transport are explained. As well, fundamentals of chemical reaction engineering which aims to analyze and design chemical reactors are lectured. Categorization of reactor operation and shapes of reactors is explained from engineering viewpoint and methods for formulating reaction rate equations from experimental data and for designing reactors are then explained.										
[Course objectiv	ves]									
To learn fundamenta reaction engineering	als of chemical process engi 3.	ineering p	particularly	transport phenome	ena and chemical					
[Course schedul	e and contents]									
Weeks 1 and 2: Flui	d dynamics (momentum tra	nsport)	- Basic cor	cepts of transport p	ohenomena, momentum					
transport in fluids as friction factor, and r	s well as Newton's law of vi nacroscopic flow and applic	scosity, l cation of	aminar flo balance eq	w of Newtonian flu uation to actual pro	id, turbulent flow and cesses are lectured.					
Weeks 3 and 4: Hea heat transfer at fluid heat exchanger are 1	t transfer (energy transport) lsolid interface and heat tra ectured.	Types ansfer co	s of heat tra efficient, c	unsfer, heat conduct onvective heat trans	tion and Fourier's law, sfer, and principles of					
Weeks 5 and 6: Diff transport, energy tra and application to d	usion (material transport) insport, and material transpo iffusion problems are lectur	- Diffusio ort, equin ed.	on and Fick nolar count	's laws, analogy be er diffusion and on	tween momentum e-directional diffusion,					
Week 7: Review of diffusion which wer	transport phenomena Cor re taught previous weeks is §	mprehens given.	sive lecture	of fluid dynamics,	heat transfer, and					
Week 8: Confirmati phenomena as pract	on of understanding of trans ice.	sport phe	nomena	Intermediate exam	ination on transport					
Week 9: Classificati engineering is lectur	ion of chemical reactions an red and categorization of rea	d chemic actions ar	cal reactors nd reactors	Basic concept of from engineering v	f chemical reaction riewpoint is explained.					
Weeks 9 and 10: Re explained. Steady-s	action rate equation Definition and part	nition of tial equili	reaction ra brium app	te and its dependen oximation fro form	cy on temperature are ulation of overall					
				Continue to 化学プロ	セス工学基礎 [T19, T20] (2)↓↓↓					

化学プロセス工学基礎 [T19, T20](3) *Please visit KULASIS to find out about office hours.

Course number	U-ENG2	27 27111 LJ60								
Course title (and course title in English)	ourse title nd course le in nglish) 化学プロセス工学基礎 [T21, T22] Fundamental Chemical Process Engineering nglish)									
Target year 2nd y	arget year 2nd year students or above Number of credits 2 Year/semesters 2020/First semester									
Days and periods Thu. 1 Class style Lecture Language distudior Japanese										
[Overview and pu	urpose of t	the course]								
butalso in environmental problems and energy problems which include diffusion of pollutants and efficient utilization of heat. In this course, beginning with material and energy balances, momentum transport, energy transport, and material transport are explained. As well, fundamentals of chemical reaction engineering which aims to analyze and design chemical reactors are lectured. Categorization of reactor operation and shapes of reactors is explained from engineering viewpoint and methods for formulating reaction rate equations from experimental data and for designing reactors are then explained.										
[Course objective	esj									
To learn fundamenta reaction engineering	ils of chemic	cal process engi	neering p	articularly	y transp	oort phenome	na and chemical			
[Course schedule	e and cont	tents]								
weeks 1 and 2. Find transport in fluids as friction factor, and n Weeks 3 and 4: Heat heat transfer at fluid- heat exchanger are l Weeks 5 and 6: Diff transport, energy trat and application to di Week 7: Review of t diffusion which were Week 8: Confirmatic phenomena as practi Week 9: Classificati engineering is lectur Weeks 9 and 10: Rei explained. Steady-sti reaction are lectured Weeks 10 and 11: Fit reaction and kinetic l explained.	la dynamics (well as New acroscopic : t transfer (en solid interf ectured. usion (mater ansport, and r fiftusion prob transport phene e taught prev on of undersr ice. on of chemic ed and categ action rate et action rate et action rate et action rate et balance equi	viton's law of vi flow and applic nergy transport) face and heat tra- face and heat tra- material transport) material transport) material transpo- lems are lecture enomena Cor vious weeks is g standing of trans cal reactions an gorization of ree quation Defin mation and parti equations of de ations of batch	associty, la secosity, la secosity, la scosity, la superstantiation of the second second second second signing are reactor, cc	minar flo alance eq of heat tra- fficient, c a and Ficlo blar count we lecture omena l reactors action ra- ium appr d operati antinuous	w of N uation ansfer, convect k's laws ter diffe e of flui Interm s Bas from e te and coximat ng reac tank fr	on tansport p vertonian fluit to actual prorotation of the actual product of the actual pro- heat conduct ive heat trans- s, analogy be usion and one id dynamics, actual actual actual actual is concept of engineering v its dependen- ion fro format tors Stoicle actor and the	A urbulent flow and cesses are lectured. ion and Fourier's law, fer, and principles of tween momentum e-directional diffusion, heat transfer, and nation on transport chemical reaction iewpoint is explained. cy on temperature are lation of overall hiometry during			

(and course title in English)	有機化 Organic	学 I (創 Chemist	成化学 ry I (Fr	٤) ontier Ch	emistry)	Instructor's name, job t and depart of affiliatio	s title, ment n	Graduate Scl Professor,NA	nool of Engineering AKAO YOSHIAKI
Target yea	r 2nd y	ear students	or above	Number	of credi	ts 2	Year	/semesters	2020/Second sem
Days and peri	ods Mon.	1	Class	style	Lecture			Language of instruction	Japanese
[Overview	and pu	irpose o	of the o	course]					
[Course o	hiective	ve1							
[Course o	Djective	55]							
[Course s	chedule	e and co	ontents	s]					
,4times, ,3times,									
,3times,									
,2times,									
,2times,									
,1time,									
IC autor a									
Lourse r	equirem	ientsj							
None									
[Evaluation	on meth	ods and	l polic	v1					
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Tauthaal	(a)								
	sj								
LIEXTDOOR									
LIEXTDOOR									
[Referenc	es, etc.]]							
[Reference (Reference)	es, etc.] nce boo] oks)							
[Referenc (Referenc	es, etc.] nce boo] iks)							
[Referenc (Referenc	es, etc.] nce boo] Joks)	prepar	ration ar	nd review	v)]			
[Referenc (Referenc [Study ou	es, etc.] nce boo tside of] iks) class (j	prepar	ration ar	nd reviev	v)]			
[Referenc (Referenc [Study ou	es, etc.] nce boo tside of] ks) class (j	prepar	ration ar	nd reviev	v)]			
[Reference (Reference [Study out (Other in	es, etc.] nce boo tside of formatio] ks) class (j on (offic	prepar ce hou	ration ar rs, etc.))	nd review	v)]			
[Referenc (Referenc [Study ou (Other in *Please visi	tside of	class (class (on (offic	prepar ce hou d out al	ration ar rs, etc.)	nd review	v)]			
[Referenc (Referenc [Study ou (Other in *Please visi	tside of formatic	 ks) class (j on (offic SIS to fin	prepar ce hou d out al	ration ar rs, etc.); pout offic	nd review) e hours.	v)]			
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[Referenc (Referenc [Study ou (Other in *Please visi	tside of formatic] iks) i class (j on (offic SIS to fin	prepar ce hou d out al	ration ar rs, etc.); bout offic	nd review) e hours.	v)]			

未更新

未更新

concentrations and temperature are explained
Weeks 13 and 14: Design and operation of reactors Design and operation of reactors are taught and
exercised.
Week 15: Comprehensive lecture on chemical reaction engineering which were lectured in previous weeks is
given.
[Course requirements]
None
[Evaluation methods and policy]
Absolute evaluation of intermediate and final examinations. Take-home assignments and in-class quizzes are
imposed and evaluated if necessary.
[Textbooks]
K. Hashimoto and F. Ogino ed. [Gendai Kagakukogaku (2001)] (Sangyo Tosho) ISBN:4782826095
[References, etc.]
(Reference books)
F. Ogino "Ido Gensho." (Sangyo Tosho) ISBN:478282520X
R. Bird, W. Stewart and E. Lightfoot Transport Phenomena (2nd Ed.) (Wiley) ISBN:9780470115398
K. Hashinoto #Han to Kogaku (revisedand augmented)] (Ban ukan/ ISBN:4305043187
[Study outside of class (preparation and review)]
Read through a corresponding part of the textbooks before the lecture. Assignments are usually taken from
the textbooks.
(Other information (office hours, etc.))
All registered students are divide into 3 classes. The 3 classes run separately though the contents are shared.
Fundamental knowledge on ordinary differential equations is needed. Be sure to take two examinations on the
former part (transport phenomena) and the latter part (chemical reaction engineering).
*Please visit KIII ASIS to find out about office hours
These visit ROLLIONS to find out about office hours.
[Courses delivered by instructors with practical work experience]
(1) Category
A course with practical content delivered by instructors with practical work experience
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors practical work experience

Course nu	umber	U-EN	G27 2	7113 LJ60						
Course title (and course title in English) 物理化学 I(創成化学) Physical Chemistry I (Frontier Chemistry) and department of Right and School of Engineering and department of Right and School of Engineering Graduate School of Engineering Professor,NISHIDA KOUJ Graduate School of Engineering Professor,NISHIDA KOUJ										tool of Engineering ofessor,NISHIDA KOUJI tool of Engineering DGA TSUYOSHI
Target yea	r 2nd	year students (or above	Number	of cred	its	2	Year	/semesters	2020/Second semester
Days and periods Wed.2 Class style Lecture Language dristingtor Japanese										
[Overview	/ and p	urpose o	f the	course]						
[Course o	bjectiv	es]								
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,2times, ,3times, ,3times, ,3times, ,3times, ,1time,										
[Course re	equirer	nents]								
None										
[Evaluatio	on meth	nods and	poli	cy]						
[Textbook	(s]									
	-									
[Referenc	es, etc	.]								
(Refere	nce bo	oks)								
								(Continue to 物理	化字Ⅰ(創成化字)(2)↓↓↓

itudy outside of class (proparation and roviou)]	
Other information (office hours, etc.))	
Please visit KULASIS to find out about office hours.	
Courses delivered by instructors with practical work experience]	
 Category A course with practical content delivered by instructors with practical work experie 	nce
2) Details of instructors' practical work experience related to the course	
) Details of an ation before delivered based on instructory' and start such as	
b) Details of practical classes derivered based on instructors practical work expe	nence

 [Study outside of class (preparation and review)]

 (Other information (office hours, etc.))

 *Please visit KULASIS to find out about office hours.

 [Courses delivered by instructors with practical work experience]

 (1) Category

 A course with practical content delivered by instructors with practical work experience

 (2) Details of instructors' practical work experience related to the course

 (3) Details of practical classes delivered based on instructors' practical work experience

無機化学(創成化学)(2)

Course nu	umbe	r U-EN	G27 2	7114 LJ60						
Course title (and course title in English) 研究anic Chemistry (Frontier Chemistry) Inorganic Chemistry (Frontier Chemistry) Graduate School of Engineering and department of affiliation							hool of Engineering IURA KIYOTAKA hool of Engineering or,SHIMOTSUMA YASUHIKO			
Target yea	arget year 2nd year students or above Number of credits 2 Year/semesters 2020/Second semest							2020/Second semester		
Days and perio	Days and periods Mon.2 Class style Lecture Laguage distution Japanese									Japanese
[Overview	/ and	purpose c	of the	course]						
[Course o	bjec	tives]								
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IC auros a	aha-	lulo ond se	ntort			_				
[Course s	cned	iule and co	ntent	sj						
,3times,										
.4times.										
,4times,										
, 1 times,										
[Course re	equir	rements]								
None										
[Evaluatio	on me	ethods and	polic	sy]						
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Taythook	6 1									
LIEXTDOOM	s									
[Referenc	es, e	tc.]								
Refere	nce k	oooks)								
L										
								С	ontinue to 無根	戬化字(創成化学)(2)↓↓↓

											未更新
Course nu	umbe	r	U-EN	G27 2	7115 LJ61	U-EN	G27	27115	LJ62		
Course title (and course title in English)	分析化学(創成化学) Analytical Chemistry (Frontier Chemistry)									1001 of Engineering NTSUKA KOUJI 1001 of Engineering 1001 of Engineering 1001 of Engineering 1055507,KUBO TAKUYA	
Target yea	r	2nd yea	ar students	or above	Number	of cred	its	2	Year	r/semesters	2020/Second semester
Days and perio	ods Fi	ri.2		Class	s style	Lecture	e			Language of instruction	Japanese
[Overview	and	l pur	pose o	of the	course]						
[Course o	bjec	tives	s]								
[Course s	chec	dule	and co	ontent	ts]						
Acid-Base E Complex-Fo Oxidation-R ,1time,	Equili ormat edcu	briur ion E tion l	n,4time Equilibri Equilibr	s, um,4ti ium,4t	imes, times,						
[Course re	equi	reme	ents]								
None											
[Evaluatio	n m	etho	ds and	l polic	cy]						
				-							
[Textbook	s]										
Daniel C. Ha	arris:	Qua	ntitative	Chen	nical Analy	sis (W.F	I. Fr	eeman,	9th E	d., 2016) isbn	{}{9781464135385}
[Reference	es, e	etc.]									
(Referer	nce I	book	(s)								
[Study out	tside	e of (class (prepa	ration an	d revie	w)]				
(Other in	form	atio	n (offic	e hou	urs, etc.))						
*Please visit	t KUI	LASI	S to fin	d out a	about office	e hours.					

												未頭	更新
Course nu	umb	ber	U-EN	G27 3'	7117 LJ60								
Course title (and course title in English)	高: Elei	分子(ments o	化学基礎 I (創成化学) of Polymer Chemistry I (Frontier Chemistry) I (Frontier Chemistry)									ing KOUJI ing HIDEKI	
Target yea	r	2nd y	ear students	or above	Number	of cred	its	2	Year	/semesters	2020/5	econd se	emester
Days and peri	ods	Thu.2	2	Class	s style	Lecture	e			Language of instruction	Japane	se	
[Overview	ı ar	ոd pւ	urpose o	of the	course]								
[Course o	bje	ective	es]										
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[Course re	equ	iiren	nents]										
None													
[Evaluatio	on r	neth	ods and	polic	¢y]								
[Textbook	(s]												
									,	ontinue to 喜公子	(小学其礎)	(創成化学)	(<u>)</u>
										ventilitie to [6]/J Ţ	10-7-92-WE 1		(* /***

Course number U-ENG27 37118 LJ61 Course title (and course title in English) Instructor's name, job title, organic Chemistry II (Frontier Chemistry) Instructor's name, job title, of affiliation Graduate School of Engineering Professor,MATSUBARA SEDIRC Target year End year students or above Wed.2 Number of credits 2 Year/semesters 2020/First semester Days and periods Wed.2 Class style Lecture upuged instruct Japanese [Overview and purpose of the course] Instructor's affines, 3times, 3times, 3times, 2times, 1time, Instructor's affines, 3times, 3times, 2times, 1time, Instructor's affines, 3times, 3times, 3times, 3times, 2times, 1time, Instructor's affines, 3times, 3ti								うんぞう
Course title (and course English) 有機化学们(創成化学) Organic Chemistry II (Frontier Chemistry) instructor's name, job title, and department of affiliations Graduate School of Engineering Professor,MATSUBARA SEIJIRC Target year ad year students or above Wed.2 Number of credits 2 Year/Semesters 2020/First semester Days and periods Wed.2 Class style Lecture zapagedistude Japanese [Overview and purpose of the course] Instructor's astimes, 3times, 3times, 3times, 2times, 1time, Japanese Japanese [Course echedule and contents] Jatimes, 3times, 3times, 1time, Japanese Japanese [Course requirements] Jimes, 3times, 1time, Jimes Japanese Japanese [References, etc.] (Reference books) [Reference books) Japanese Japanese [Study outside of class (preparation and review)] Japanese Japanese Japanese [Other information (office hours, etc.)) "Please visit KULASIS to find out about office hours. Japanese Japanese	Course numb	er U-ENO	327 37118 LJ61					
Target year Ind year students or above Wed.2 Number of credits 2 Year/Semesters 2020/First semester Days and periods Wed.2 Class style Lecture Image distuict Japanese [Overview and purpose of the course] Image distuict Japanese Japanese Japanese [Course objectives] Image distuict Japanese Japanese Japanese Jaimes, Jaime	Course title (and course 有核 title in Org English)	幾化学II(創成 anic Chemistr	戊化学) y II (Frontier Cho	emistry)	Instructor's name, job ti and departn of affiliation	tle, nent	Graduate Sch Professor,MA	nool of Engineering ATSUBARA SEIJIRO
Days and periods Wed.2 Class style Lecture angage distuite Japanese [Overview and purpose of the course]	Farget year	3rd year students o	r above Number	of cred	its 2	Year	/semesters	2020/First semester
[Overview and purpose of the course] [Course objectives] [Course schedule and contents] 3times, 3times, 3times, 3times, 2times, 1time, [Course requirements] None [Evaluation methods and policy] [Textbooks] [References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	Days and periods	Wed.2	Class style	Lecture	,		Language of instruction	Japanese
[Course objectives] [Course schedule and contents] 3times, 3titotooks [Re	[Overview an	d purpose o	f the course]					
Sumes, [Course requirements] None [Evaluation methods and policy] [Textbooks] [References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[Course object [Course sche 3times, 3times, 3times, 2times,	ctives] dule and cor	ntents]					
[Evaluation methods and policy] [Textbooks] [References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	,2times, ,1time, [Course requ None	irements]						
[Textbooks] [References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[Evaluation m	nethods and	policy]					
[References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[Textbooks]							
[Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[References, (Reference	etc.] books)						
(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[Study outsid	le of class (p	reparation an	d reviev	w)]			
	(Other inform *Please visit KI	nation (office	e hours, etc.))	e hours				

高分子化学基礎 I (創成化学)(2)
References etc.]
(Reference books)
[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
*Please visit KULASIS to find out about office hours.

Course nu	umbe	er	U-EN	G27 3	7119 LJ60								
Course title (and course title in English)	生体 Bio	k関ì relate	車物質化 ed Materi	学(創 ial Cho	削成化学) emistry		Inst nan and of a	tructor's ne, job tit I departm iffiliation	le, ient	Institute for Frontier Life and Medical Science Professor, TABATA YASUHIKO Graduate School of Engineering Senior Lecturer, OOMAE MASASH Institute for Frontier Life and Medical Science Assistant Professor, JO JUNICHIRO			
Target yea	r	3rd ye	ear students	or above	Number of	of cred	its	2	Year	/semesters	2020/F	irst seme	ster
Days and perio	ods T	ue.1		Class	s style	Lecture	e			Language of instruction	Japanes	ie	
[Overview	and	d pu	irpose o	f the	course]								
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[Course s	che	dule	and co	ntent	ts]								
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,4times,													
3times													
,ounico,													
[Course re	equi	irem	ents]										
None													
[Evaluatio	n m	eth	ods and	polic	cy]								
[Textbook	s]												
[Referenc	es, (etc.]											
Refere	nce	boo	ks)										
		-								Continue to 生体関	連物質化学	(創成化学)	(2)↓↓↓

未更新

[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
*Please visit KULASIS to find out about office hours.
70
[Lourses delivered by instructors with practical work experience]
A course with practical content delivered by instructors with practical work experience
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience

								不又利	
Course nu	umber	U-ENG	27 37121 LJ61						
Course title (and course title in English) 高分子化学基礎II (創成化学) Instructor's name, job title, and department of affiliation Graduate School of Engineer Associate Professor, HORINAKA II Graduate School of Engineer Associate Professor, TERASHIMA									
Target yea	r 3rd y	ear students or	above Number	of cred	lits 2	Year	/semesters	2020/First semester	
Days and perio	ods Tue.	2 C	Class style	Lectur	e		Language of instruction	Japanese	
[Overview	and pu	urpose of	the course]	-					
[Course o	bjectiv	es]							
10									
[Course s	chedul	e and con	itents]						
2times, 2times									
3times.									
,3times,									
4times,									
ltime,									
[Course re	equiren	nents]							
None									
Evoluatio	n moth	ode and i	nolicy]						
	mmeun	ious anu j	policy]						
[Textbook	s]								
(D. (
[Reference	es, etc.	(] ()							
Referen	nce boo	JKS)							
[Study ou	tside of	f class (pi	reparation an	nd revie	w)]				
		(þ.			71				
(Other in	formati	on (office	hours, etc.))					
*Please visit	KULA	SIS to find	out about offic	e hours.					

										未更新
Course nu	umbe	r U-E	NG27 3'	7120 LJ61	U-EN	G27	37120	LJ62		
Course title (and course title in English)	Course title (and course title in English) 物理化学II(創成化学) Physical Chemistry II (Frontier Chemistry) Instructor's name, job title, and department of affiliation Professor, ODNO KO Institute for Chemical Research Professor, TSUJII YOSHINOBL									
Target yea	r	Brd year studen	ts or above	Number	of cred	its	2	Year	/semesters	2020/First semester
Days and peri	ods W	/ed.1	Class	s style	Lecture	e			Language of instruction	Japanese
[Overview	/ and	purpose	of the	course]						
[Course o	bjec	tives]								
[Course s	ched	lule and o	content	s]						
,3times,										
,2times, .2times.										
,4times,										
,3times,										
,1time,										
[Course re	equir	rements]								
None										
[Evaluatio	on me	ethods ar	nd polic	.vl						
Landado		onnouo ui	ia poin	-71						
Textbook	sl					_				
1										
[Referenc	es, e	tc.]								
Refere	nce b	books)								
[Study ou	tside	of class	(prepa	ration and	d revie	w)]				
(Other in	form	ation (off	ice hou	urs. etc.))			_		_	
*Please visit	t KUI	ASIS to f	ind out a	bout office	e hours					
1 100.00 7131										

											未更新
Course nu	umbe	ər	U-EN	327 3	7122 LJ60						
Course title (and course title in English)	統計 Introd	ト熱 Juction	力学入門 to Statistical T	(創 f hermody	成化学) mamics (Frontier	Chemistry)	Inst nan and of a	tructor's ne, job til I departm iffiliation	tle, nent	Graduate Sch Associate Pro	ool of Engineering ofessor,IDA DAICHI
Target yea	r	Brd ye	ear students o	or above	Number	of cred	its	2	Year	/semesters	2020/First semester
Days and peri	ods N	lon.	2	Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	and	d pu	irpose o	f the	course]						
[Course o	bjec	tive	es]								
[Course s	che	dule	and co	ntent	ts]						
,2times, ,3times, ,3times, ,3times, ,3times, ,1time,											
[Course re	equi	rem	ents]								
None											
[Evaluatio	n m	ethe	ods and	polio	cy]						
[Textbook	s]										
[Referenc	es, e	etc.]	l								
(Referen	nce	boo	ks)								
[Study ou	tsid	e of	class (p	orepa	ration and	d revie	w)]				
(Other in	form	natio	on (offic	e hou	urs, etc.))						
*Please visit	t KU	LAS	SIS to find	l out a	about office	hours.					

										未史新				
Course nu	umber	U-ENG	27 37123	LJ60										
Course title (and course title in English)	機器分 Instrumer	析化学(創 ntal Analytical C	引成化学) Themistry (Fr	rontier C	Themistry)	Ins nar and of a	tructor's ne, job ti d departr affiliatior	tle, nent	Graduate School of Engineering Professor,OOTSUKA KOUJI 9. Graduate School of Engineering Associate Professor,OYAMA MUNETA Graduate School of Engineering Associate Professor,KUBO TAKU					
Target yea	r Brd y	year students or	above Nun	nber	of cred	lits	2	Yea	r/semesters	2020/First semester				
Days and perio	ods Fri.1	c	lass sty	le	Lectur	e			Language of instruction	Japanese				
[Overview	and p	urpose of	the cour	rse]										
[Course o	biectiv	resl		_				_						
[Course s	chedul	e and con	tents]											
Chromatogr	anhy 4ti	imes	tentoj											
Spectroscop	v.5time	s.												
Electrochen	nical An	alysis,5time	es,											
,1time,														
[Course re	eauirer	nents]												
None														
[Evaluatio	n moth	nde and r	olicyl											
	in meu	ious anu p	Joney											
Textbook	(s]					_								
Daniel C. H	arris: O	uantitative (Chemical .	Analy	sis (W.F	I. F	reeman	9th E	d., 2016) isbn	{}{9781464135385}				
										()())				
[Referenc	es, etc	.]	_		_									
Refere	nce bo	oks)												
Douglas A.	Skoog, l	F. James Ho	oller, Stan	ley R.	Crouch	:Pr	inciples	of Ins	strumental Ana	alysis(Cengage				
Learning, 7t	h Ed., 2	017) isbn{}	{9781305	55772	13}									
[Study ou	tside o	of class (pr	reparatio	on an	d revie	w)]								
(Other in	format	ion (office	hours, e	etc.))			_							
*Please visit	t KULA	SIS to find	out about	office	hours.									

Target year ird year students or above Number of credits 2 Year/semesters 2020/Second st Days and periods Tue.1 Class style Lecture Laguage/instudio Japanese [Overview and purpose of the course] In Physical Chemistry III (frontier chemistry), lectures will focus on quantum chemstry, which is one ocre subjects in physical chemistry as well as thermodynamics and statistical thermodynamics; and statistical thermodynamics is make slinks between microscopic and macroscopic properties. The lectures will also on how quantum theory serves as a basis for understanding electron configuration in atoms, chemical to molecular structure, and various spectroscopic properties. [Course objectives] Students will understand quantum theory systematically, which provides the fundamental laws of the molecular world. Students will also become able to explain, on the basis of quantum theory, electron configuration in atoms, chemical bonds, molecular structures, and various spectroscopic properties. [Course schedule and contents] (1) Quantum theory (5 classes) • Origins of quantum mechanics and microscopic system dynamics • Quantum-mechanical principles • Translational motion, vibrational motion • Structure and complex atomic spectra of multielectron atoms (3) Molecular structure (2 classes) • Structure and spectro • Valence bond method, molecular orbital method • Polyatomic m	Course title (and course 物近 title in Phy English)	里化学III(創 rsical Chemist	J成化学) ry III (Frontier Ch	emistry) ar o	structor's ame, job ti nd departn f affiliation	tle, nent	Graduate Scl Professor,OC	hool of Engineering OKITA HIDEO
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Students will understand quantum theory systematically, which provides the fundamental laws of the molecular world. Students will also become able to explain, on the basis of quantum theory, electron configuration in atoms, chemical bonds, molecular structures, and various spectroscopic properites. [Course schedule and contents] (1) Quantum theory (5 classes) • Origins of quantum mechanics and microscopic system dynamics • Quantum-mechanical principles • Translational motion, vibrational motion • Rotational motion, vibrational motion • Structure and spectra of the hydrogen atom • Structure and complex atomic spectra (2 classes) • Structure and complex atomic spectra of multielectron atoms (3) Molecular structure (2 classes) • Valence bond method, molecular orbital method • Polyatomic molecular system orbitals (4) Molecular spectroscopy 1 (2 classes) • Vibrational spectrum • Vibrational spectrum (5) Molecular spectroscopy 2 (1 class) • Electron transition (6) Molecular spectroscopy 3 (1 class)	Course obje	ctives]	1 1	1 1				
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Course title (and course title in English)	有機 Orga	數化学III(創 anic Chemist	成化╡ ry Ⅲ (I	学) Frontier Che	emistry)	Inst nan and of a	tructor's ne, job tit I departm affiliation	tle, nent	Graduate Scl Associate Profe Graduate Scl Associate Profe	nool of Engineer ssor,KURAHASHI nool of Engineer sssor,YOSHIHIRC	ring TAKUYA ring) SASAKI
Farget yea	r	3rd year students	or above	Number	of cred	its	2	Year	r/semesters	2020/Second s	emester
Days and perio	ods T	ue.2	Class	s style	Lecture	•			Language of instruction	Japanese	
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[Textbook	s]										
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[Study ou	tside	e of class (prepa	ration and	d revie	w)]					
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*Please visit	t KU	LASIS to fin	d out a	bout office	e hours.						

Magnetic resonance
 (7) Intermolecular interactions (1 class) Electrical properties Intermolecular interactions
Final examination/ Confirmation of extent of student learning
Feedback (1 class)
[Course requirements]
Prerequisites for this course are completion of the following courses: Fundamentals of Physical Chemistry and Practical Exercises, Physical Chemistry I (Frontier Chemistry), and Physical Chemistry II (Frontier Chemistry).
[Evaluation methods and policy]
 [Evaluation method] Evaluation will be based on an examination (80%) and class performance (20%). Evaluation for Participation in class includes attendance and evaluations of short reports. [Evaluation policy] Achievement of goals is evaluated according to the grade evaluation policy of the undergraduate.
[Textbooks]
Peter Atkins, Julio de Paula 著, 中野元裕・上田貴洋・奥村光隆・北河康隆 訳 『アトキンス「物理化 学」第10版(上)』(東京化学同人) ISBN:978-4-8079-0908-7 (アトキンス「物理化学」第8版 (上)でも構いません) Peter Atkins, Julio de Paula 著, 中野元裕・上田貴洋・奥村光隆・北河康隆 訳 『アトキンス「物理化 学」第10版(下)』(東京化学同人) ISBN:978-4-8079-0909-4 (アトキンス「物理化学」第8版 (下)でも構いません)
[References, etc.]
(Reference books) Introduced during class To be introduced during the course
[Study outside of class (preparation and review)]
Lectures will proceed on the assumption that students have read carefully and thoroughly assigned textbook pages before each class period. Therefore, students should be sure to perform such study before and after each class.

物理化学III(創成化学)**(2)**

J埋化字Ⅲ(剧成化字)(3)	Course number LI-ENG27 37129 LIG1										
Other information (office hours, etc.)) Please visit KULASIS to find out about office hours.	Course title (and course title in English) 化学のフロンティア(創成化学) Instructor's name, job title, and department of affiliation Graduate School of Engineerin Professor,OOUCHI MAKOTO Faculty of Engineering										
	Target year #th year students or above Number of credits 2 Year/semesters 2020/First seme										
	Days and periods Fri.4 Class style Lecture Languaged instruction Japanese										
	[Overview and purpose of the course]										
	Advanced research being performed in frontier chemistry research labs will be explained in an easy-to- understand way by researchers themselves. This is a concentrated course: Two classes will be held one after the other on Friday afternoons at 13:00-14:30 and 14:45-16:15, for a total of seven class days. Course dates are posted separately elsewhere.										
	[Course objectives]										
	Students will gain knowledge of frontier research as currently practiced in representative chemistry rese areas, as well as of likely future trends. Students will also understand the role that chemistry plays in sc										
	[Course schedule and contents]										
	As macromolecules form a variety of molecular assembly structures, they display superior properties. I these lectures, an overview explanation is provided on how block copolymers and graft copolymers for self-organization, regular micro-phase separated structures on nanometer orders. These nano-patterns a then used in the development of devices and new materials. Frontlines of polymer synthesis (2 classes) An overview explanation is provided of basic chain polymerization functions, methods of precise synth macromolecules via chain polymerization, and the characteristics of polymers thus precisely synthesize Frontlines of macromolecular design (2 classes) Chemistry for the rational design and synthesis of macromolecules is indispensable to activities that ain proactively grant new functions to polymers. Students will gain a deeper understanding of the fundame of living radical polymerization, which has undergone remarkable developments in recent times, and su graft polymerization; an overview of applications in surface graft polymerization. Frontlines of polymer characterization (2 classes) An overview explanation is provided of light scattering in polymer solutions and of methods for determ molecular parameters from intrinsic viscosity measurement. Also discussed are application examples for each type of macromolecule (polymer). Frontlines of organic chemistry and analytical chemistry (2 classes) Fine organic synthesis using organometallic compounds has become the most powerful tool of molecular architecture. An overview is made of the theories of fine organic synthesis, and concrete advanced rese cases are introduced. Micro- and nanoscale high-performance separation and analysis techniques are										

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Target yea	ır	3rd ye	ar students o	or above	Number	of cred	its	2	Yea	r/semesters	2020/Second semester
Days and peri	ods F	ri.1		Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	/ and	d pu	rpose o	f the	course]						
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Daniel C. H	arris	Qua	antitative	Chen	nical Analys	sis (W.F	I. Fi	reeman,	9th E	d., 2016) isbn	{}{9781464135385}
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*Please visi	t KU	LAS	IS to find	l out a	bout office	hours.					

化学のフロンティア(創成化学)(2)

introduced to showcase the frontlines of novel topics.

Frontlines of inorganic materials chemistry (2 classes) Discussion will be made of the synthesis and function of novel inorganic materials synthesis for applications involving spin electronics and photonics materials.

Frontlines of polymer materials chemistry (2 classes) Explanation will be made of recent issues associated with the characteristics and properties of such things as elastomers and polymer gels. Lectures discuss the flow of development from supramolecular assembly to supramolecular organization, trends in molecular architecture such as catenane and rotaxane, and the development of nanomaterials.

Feedback (1 class) Evaluation is made of the extent of learning achieved in the course overall, and in regards to the degree that students have achieved course goals.

[Course requirements]

Students are recommended to have finished fundamental courses in organic chemistry, physical chemistry, inorganic chemistry, analytical chemistry, and polymer chemistry.

[Evaluation methods and policy]

Grades will be determined based on an overall evaluation of attendance and scores (results) on reports.

[Textbooks]

No textbook will be used. Materials and PowerPoint presentations will be distributed and/or used during classes.

[References, etc.]

(Reference books)

[Study outside of class (preparation and review)]

Assignments and individual reports will be appropriately instructed during classes.

(Other information (office hours, etc.))

Course contents may be changed as necessary

Please visit KULASIS to find out about office hours.

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Language of instruction	Japanese	D	Days and periods Wed.1 Class style Lecture Language of instruction Japanese											
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Continue to	化学生物学(2)↓↓↓									· ·	c	ontinue to	高分子化学 Ⅰ(2)↓↓↓	

Instructor's

[Course requirements] one [Evaluation methods and policy] The credit is judged by the scheduled examination and the attendant rate. [Textbooks] [References, etc.] (Reference books) (Reference books) Fundamentals of Biochemistry: Life at the Molecular Level; Wiley isbn{}{9780470547847}、 Molecular biology of the Cell; Garland Science isbn{}{9780815344322}、 ますます重要になる細胞周辺環境(細胞ニッチ)の最新科学技術;株式会社メディカルドゥ isbn{} {9784944157846}、 |776744757697] |Immunology : Saunders isbn{}{9780323080583}、 生物薬剤学;株式会社南江堂 isbn{}{9784524403059}、 絵で見てわかるナノDDS;株式会社メディカルドウ isbn{}{9784944157884} [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

化学生物学(2)

Written Examination [Textbooks]

高分子化学 I (2)

[Evaluation methods and policy]

Course number U-ENG27 27200 LJ60

Course title

None in particular. PDF files of slides that are to be shown at the course lectures will be uploaded into the course website, and it is strongly recommended for students to download these materials for review and selflearning.

[References, etc.]

(Reference books) quotFundamentals in Polymer Sciencequot, Tokyo Kagaku Dojin: isbn{}{9784807906352}

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

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Course n	umber	U-EN	G29 4	9121 LJ10	U-EN	G29	49121	LJ24	U-ENG29 4	9121 LJ43		
Course title (and course title in English) 化学数学(創成化学) Mathematics of Chemistry(Frontier Chemistry							tructor's ne, job ti I departn offiliation	tle, nent	Graduate Scl Professor,TA Graduate Scl Professor,NA	aduate School of Engineering fessor,TAKIGAWA TOSHIKAZU aduate School of Engineering ofessor,NAKAMURA YOU		
Target yea	n r 2nd ;	year students (or above	Number	of cred	its	2	Year	/semesters	2020/Second semester		
Days and peri	ods Tue.	2	Class	s style	Lecture	e			Language of instruction	Japanese		
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Course n	umb	er	U-EN0	G24 4	4073 LJ74							
Course title (and course title in English)	錯句 Coo	本化当 ordina	ዾ(創成 tion Chen	化学) histry (Frontier Ch	emistry)	Inst nan and of a	tructor's ne, job tit I departm iffiliation	le, ient	Graduate School of Engineering Professor,FUJITA KOUJI Institute for Liberal Arts and Sciences Professor,TANAKA KATSUHISA		
Target yea	r	3rd ye	ar students o	or above	Number	of cred	its	2	Year	/semesters	2020/Second semester	
Days and peri	ods N	Mon.	l	Clas	s style	Lecture	e			Language of instruction	Japanese	
[Overview	<i>i</i> an	d pu	rpose o	f the	course]							
[Course o	bje	ctive	s]									
[Course s	che	dule	and co	ntent	s]							
,3times,												
,3times,												
,2times,												
,5times, ,1time,												
[Course r	equi	irem	ents]									
None												
[Evaluatio	on m	netho	ods and	polic	>y]							
[Textbook	(s]											
[Referenc	es,	etc.]										
(Refere	nce	boo	ks)									
[Study ou	tsid	e of	class (p	orepa	ration an	d revie	w)]					
(Other in	forn	natic	on (offic	e hou	urs, etc.))							
*Please visi	t KU	LAS	IS to find	l out a	bout office	hours.						

16字数字(剧队16字) (2)
1
[Textbooks]
[References, etc.]
(Reference books)
(Reference books)
[Study outside of class (preparation and review)]
(Other information (office hours at))
(Other information (office nours, etc.))
*Please visit KULASIS to find out about office hours.
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										未更新
Course nu	umbe	r U-EN	G29 4	9992 GJ11	U-EN	G29	9 49992	GJ12	U-ENG294	19992 GJ10
Course title (and course title in English)	高分 Poly	·子化学II mer Chemist	ry II			Inst nan and of a	tructor's ne, job tit I departm offiliation	tle, nent	Graduate Scl Professor,TA Institute for (Assistant Pro	nool of Engineering KENAKA MIKIHITO Chemical Research fessor,OGAWA HIROKI
Target yea	r	3rd year students o	or above	Number	of cred	its	2	Year	r/semesters	2020/Second semester
Days and perio	ods Fr	ri.2	Clas	s style	Lecture	e		Japanese		
[Overview	and	l purpose o	f the	course]						
[Course o	bjec	tives]								
Mastering at field	t least	t the minimu	m kno	wledge of j	polymer	phy	sics nec	essary	/ for starting r	esearch in polymer
[Course s	chec	lule and co	nten	ts]						
,4times, ,4times, ,3times, ,1time,	will t	k uiseusseu.								
[Course re	equir	rements]								
None										
[Evaluatio	n m	ethods and	poli	cy]						
Grading										
[Textbook	s]									
[Referenc	es, e	tc.]								
(Refere	nce l	books)								
[Study ou	tside	e of class (p	orepa	ration an	d revie	w)]				
(Other in	form	ation (offic	e ho	urs, etc.))	_					
*Please visit	KUI	LASIS to find	l out a	about office	hours.					

										未頭	更新
Course nu	ımbe	r U-EN	G27 4	7222 LJ60							
Course title (and course title in English)	創成 Front	化学実験 I ier Chemistry Li	(創」 iborator	戎化学) y I(Frontier C	hemistry)	nstructor's name, job ti and departr of affiliatior	tle, nent	Graduate Scl Professor,M. Faculty of E 創成化学実験	- Graduate School of Engineering Professor,MATSUBARA SEIJIRO Faculty of Engineering 削成化学実験関連教員		
Target yea	r	3rd year students	or above	Number	of credit	s 7	Year	/semesters	2020/1	First seme	ester
Days and perio	odsTue.	3,4,5,Wed.3,4,5,Thu.3,4,	Class style Experiment Language of instruction Japanese							se	
[Overview	and	l purpose o	of the	course]							
[Course o	bjec	tives]									
[Course s	chec	lule and co	nten	ts]							
,6times,				-							
,6times,											
,12times,											
,9times,											
,3times,											
,9times,											
,15times,											
,6times,											
[Course re	qui	rements]									
None											
[Evaluatio	n m	ethods and	poli	cy]							
[Textbook	s]										
L											
							(Continue to 創成(☆実験	(創成化学)	(2) ↓ ↓ ↓

Course nu	umber	U-ENG27 3	7223 EJ61						
Course title (and course title in English)	創成(Frontier	化学実験Ⅱ(創店 r Chemistry Laborator	成化学) y II(Frontier Cl	hemistry)	Instructor's name, job tit and departm of affiliation	tle, nent	Graduate Sch Professor,M/ Faculty of Er 創成化学実际	nool of H ATSUB ngineerin 倹関連孝	Engineering ARA SEIJIR(ng 女員
Farget yea	r Bro	d year students or above	Number o	of cred	its 7	Year	/semesters	2020/S	econd semes
Days and perio	odsTue.3,4	4,5,Wed.3,4,5,Thu.3,4,5 Clas :	s style	Experi	ment		Language of instruction	Japane	se
[Overview	and	purpose of the	course]						
[Course o	bjecti	ives]							
[Course s	chedu	ule and content	ts]						
,6times,									
,12times,									
9times,									
,3times,									
,9times,									
,15times,									
6times									
,oumes,									
,6times,									
,6times,	eauire	ementsl				_			
,6times, [Course re	equire	ements]							
,6times, [Course re None	equire	ements]							
,6times, [Course re None [Evaluatio	equire on met	ements] thods and polic	cy]						
Course re None	equire on met	ements] thods and polic	cy]						
,6times, [Course re None [Evaluatio	equire on met	ements] thods and polic	cy]						
[Course re None [Evaluatio	equire on met	ements] thods and polic	cy]	_					
[Course re None [Evaluatio	equire on met	ements] thods and polic	cy]						
(Gourse re None [Evaluatio] [Textbook	equire on met	ements] thods and polie	cy]						
(formes) (Course re None [Evaluatio [Textbook	equire on met	ements] thods and polie	cy]						
(formes, [Course ref None [Evaluatio [Textbook	equire on met ss]	ements] thods and polie	cy]						
(Course re None [Evaluatio	equire on met ss]	ements] thods and polie	cy]						
(Golines, Golines, ICourse re None IEvaluatio	equire on met	ements] thods and polie	cy]						
(climes, [Course re None [Evaluatio [Textbook	equire on met	ements]	cy]						
(dimes, [Course re None [Evaluatio	equire on met	ements] thods and polie	cy]						
(dimes, [Course re None [Evaluatio	equire	ements] thods and polie	cy]						
(Gimes, [Course re None [Evaluatio	equire	ements] thods and polie	cy]						
(dimes, [Course re None [Evaluatio	n mei	ements] thods and polie	[y]						(創成化学) (2)↓

割风化子美験Ⅰ (剧风化子)(2)
[References, etc.]
(Reference books)
[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
*Please visit KULASIS to find out about office hours.
[Courses delivered by instructors with practical work experience]
 Category Course with practical content delivered by instructors with practical work experience.
reduise with practical content derivered by instructors with practical work experience
(2) Details of instructors' practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience

創成化学実験 II (創成化学)(2)

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience] (1) Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

土面新

										未更新	
Course nu	umbe	r U-ENG	327 3	7315 LE48	U-EN	IG2	7 37315	LE61			
Course title (and course title in English)							tructor's ne, job ti I departn Iffiliation	tle, nent	Graduate School of Engineering Professor,MATSUBARA SEIJIROU Part-time Lecturer,John Pryce		
Target year Brd year students or above Number of credits 2 Year/semesters 2020/First sem										2020/First semester	
Days and perio	ods M	ion.3	Class	s style	Lectur	e			Language of instruction	English	
[Overview	and	purpose o	f the	course]							
10	hine	(i	_		_		_	_			
[Course o	Djec	livesj									
[Course s	ched	lule and co	ntent	sl		_					
.1time.	01100										
, 4 times,											
, 4 times,											
, 5 times,											
[Course re	equir	ements]									
None											
[Evaluatio	n me	ethods and	polic	;y]							
[Textbook	s]										
None											
[Referenc	es, e	tc.]									
(Referer	nce k	ooks)									
[Study ou	tside	of class (p	orepa	ration and	d revie	w)]					
(Other in	form	ation (offic	e hou	urs, etc.))	_		_				
*Please visit	KUI	ASIS to find	l out a	bout office	hours.						

submitte	d during the course may be counted in evaluation
[Textb	a during the course may be counted in evaluation.
[Textb	
	poks]
Inorgani	c Chemistry (6th edition) M.Weller, T.Overton, J.Rourke, F.Armstrong(2014) ISBN
9780199	641826 isbn{}{9780199641826}
[Refer	ences, etc.]
Ref	erence books)
Supplen	ental explanation will be delivered at the first class.
	*
[Study	outside of class (preparation and review)]
Lound	outside of class (preparation and review)]
Othe	r information (office hours, etc.))
Before t	ne class each topic should be prepared. At every class, quizes will be given and the answers for
should b	e submitted at the next class.
*Please	visit KULASIS to find out about office hours.
[Cours	es delivered by instructors with practical work experience]
(1) Cate	gory
A course	with practical content delivered by instructors with practical work experience
(2) Deta	ils of instructors' practical work experience related to the course
(2) Deta	is of instructors practical work experience related to the course
	ils of practical classes delivered based on instructors' practical work experience
(3) Deta	is of practical classes derivered based on instructors practical work experience
(3) Deta	is of practical classes derivered based on instructors practical work experience
(3) Deta	is of practical classes derivered based on instructors — practical work experience
(3) Deta	ns of practical classes derivered based on instructors – practical work experience
(3) Deta	ns of practical classes derivered based on institucions – practical work experience

無機化学 I (工業基礎化学) [工化1・工化3](2)

Course nu	ımber	U-ENG27 2	7202 LJ60						
Course title (and course title in English)	無機化学 Inorganie	「 (工業基礎化学 c Chemistry I (Fun	ź) [工化1・ ndamental Ch	工化3]Ir n. emistry)ai o	structor's ame, job ti ad departm affiliation	tle, nent	Graduate School of Engineering Professor, SAKKA TETSUO Institute of Advanced Energy Professor, NOHIRA TOSHIYUKI Graduate School of Global Environmental Studi Professor, ABE TAKESHI Graduate School of Engineering Associate Professor, MATSUI TOSHIMA Graduate School of Engineering Professor, ABE RYUU Graduate School of Global Environmental Studi Sascriate Professor, MYAZ AKI KOUHI		
Target yea	r 2nd g	year students or above	Number	of credit	5 2	Yea	r/semesters	2020/Second semester	
Days and perio	ds Mon	.2 Class	s style	Lecture			Language of instruction	Japanese	
[Overview	and p	urpose of the	course]						
In quotInorg compounds of molecular	anic Ch 2) Oxida structu	emistry Iquot, fo ation and reducti res 4) Fundamer	ollowing fo ion 3) Conc ntals of d-b	ur topics v cept of gro lock coord	vill be ex up theory ination c	plaine , whic ompou	d: 1) Acids an h is necessary nds	d bases of inorganic for the understanding	
[Course o	bjectiv	es]							
Acids and ba Inorganic ch	ises, oxi emistry	idation and redu II at 3rd grade a	ction, a gro and Electro	up theory, chemistry	and coor at 4th gra	dinati de.	on compounds	will be understood for	
[Course s	chedul	e and content	s]						
Asids and B Soft Acids a evaluate the Oxidation an In particular reactions wi Molecular S groups, varie Coordination Lewis bases Evaluation, 1	ases,4tir nd Base degree o nd Reduct, stand a ll be exp ymmetr jous phys n compo will be time,Ev	nes,Bronstead a s (HSAB) theor of intensities of cition,4times,Ox ard potentials w plained. y,4times,Based sical phenomena ounds,2times,Co described and the aluaion	cids and ba y by Peason acids and b idation and ill be expla on the mole of molecu ordination heir geomet	ses and th n will be e ases will b Reduction ined in det ecular shap les will be compound rical struc	e Lewis a xplained. e describ i will be a ail. By us bes, point describe s based o tures will	cids a Finall ed. explain sing th group d. n meta be ex	nd bases will l ly, solvent par ned mainly by e potentials, c s can be deter al ions of Lew plained.	be described. Hard and ameters which can using electrochemistry. xidation and reduction mined. By using point is acids and ligands of	
[Course re	equiren	nents]	- 1		<u> </u>				
	unders		•undamenta			uryquo	or, rectures wil	」 De done. 1東基礎[[字] 「I [[1 · Ī(3] [2]]↓↓	

										未更新	
Course nu	ımbe	r U-l	ENG27 2	27202 LJ60							
Course title (and course title in English)	無機 Inorg	化学 I (工 anic Chem	業基礎化 ² istry I (Fu	学) [工化2・ ndamental Ch	⊥{[24] emistry)	Inst nan and of a	ructor's ne, job tit departm ffiliation	tle, d P C C	Graduate Sch Professor, SA Institute of A Professor, NG Graduate School Professor, AE Graduate Sch Graduate Sch Graduate Sch Graduate Sch Graduate School Associate Professor, AE Graduate School Associate Professor, AE	nool of Engineering KKA TETSUO dvanced Energy HIRA TOSHIYUKI of Globa Environmental Studies BE TAKESHI nool of Engineering cate Professor H00KAWA SABUROU nool of Engineering BE RYUU of Global Environmental Studies essor,MIYAZAKI KOUHEI	
Target year	r	2nd year stud	ents or abov	Number	of cred	its	2	Year/	semesters	2020/Second semester	
Days and perio	ods M	fon.2	Clas	s style	Lecture	e			Language of instruction	Japanese	
[Overview	and	l purpos	e of the	course]							
n quotInorganic Chemistry Iquot, following four topics will be explained: 1) Acids and bases of inorganic compounds 2) Oxidation and reduction 3) Concept of group theory, which is necessary for the understanding of molecular structures 4) Fundamentals of d-block coordination compounds											
[Course ol	bjec	tives]									
Acids and ba Inorganic ch	ises, emis	oxidation try II at 3	and redu rd grade	action, a gro and Electroo	up theor chemistr	ry, a ry at	nd coor 4th gra	dination de.	n compound	s will be understood for	
[Course so	chec	dule and	conten	ts]							
Suidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion letection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature- based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious iraffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, Itime,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.											
[Course re	qui	rements]								
Based on the	und	erstandin	g of quot	Fundamenta	l Inorga	inic	Chemis	tryquot	, lectures wi ntinue to 無機化学	11 be done. [1集基表记字] [1记: 1(4] [2]] ↓	

無機化学I(工業基礎化学)[工化2・工化4](2)
[Evaluation methods and policy]
Grading is based on the examination held at the end of the semester. The attendance rate and the reports submitted during the course may be counted in evaluation.
[Textbooks]
Inorganic Chemistry (6th edition) M.Weller, T.Overton, J.Rourke, F.Armstrong(2014) ISBN 9780199641826 isbn{}{9780199641826}
[References, etc.]
(Reference books)
Supplemental explanation will be delivered at the first class.
[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
Before the class, each topic should be prepared. At every class, quizes will be given and the answers for them
should be submitted at the next class.
*Please visit KULASIS to find out about office hours.
[Courses delivered by instructors with practical work experience]
(1) Category
A course with practical content delivered by instructors with practical work experience
(2) Datails of instructors' prestical work experience related to the source
(2) Details of instructors practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience

[Textbooks] Daniel C. Harris, Quantitative Chemical Analysis, 9th ed., Freeman (2016) isbn{}{9781464135385} [References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

分析化学 I (工業基礎化学) [工化1・工化3](2)

Course nu	umbe	er U-ENG27 27203 LJ60											
Course title (and course title in English)	分析(Anal	化学 I (工業基 ytical Chemistr	ç礎化学 y I (Fu	^{を)} [工化1・ ndamental Ch	工化3] emistry)	tle, nent	Graduate School of Engineering Professor,SAKKA TETSUO Institute of Advanced Energy Professor,NOHIRA TOSHIYUKI Institute for Integratel Radiation and Nuclear Science Associate Professor,OKI YUUICHI Graduate School of Global Environmental Studies Professor,ABE TAKESHI Graduate School of Engineering Associate Professor,NISHI NAOYA Graduate School of Engineering						
Target yea	r	2nd year students (or above	Number	of cred	lits	2	Yea	r/semesters	2020/Second semester			
Days and perio	ods T	ue.2	Class	s style	Lectur	е			Language of instruction	Japanese			
[Overview	and	d purpose o	f the	course]		_							
The solution fundamental oxidation-re	ls of ducti	ilibria that are chemistry, in ion equilibriu	e impo gener m, are	ortant not or al, such as a the subject	nly for i acid-bas s of this	ntro se eq s cou	ductory juilibriu irse.	analy m, co	tical chemistry	y but also for the on, precipitation, and			
[Course o	bjec	tives]											
Not only the but the appr science, in g [Course s Intriduction Acid-base en Precipitation Complexatio Oxidation-rec	e unde eciati enera chec to ch quilit n equ on eq ecduc	erstanding of ion of the rela al, will be tar dule and co memical equili prium,5times, ilibrium,1tim uilibrium,2tin ction equilibri	the ba tionsh geted. ntent brium e, nes, ium,4t	usics of solution of the solut	ition equilation e	uilib equil	ria and libria wi	the ca	pability of sol	ving related problems, of chemistry and			
Evaluation, 1	time	,											
[Course re	equi	rements]											
None													
[Evaluation methods and policy] Grading is based on the examination held at the end of the semester. The attendance rate and the reports submitted during the course may be counted in evaluation.													
['								(Continue to 分析化学 I	「工業基礎化学) 「工化1・工化3」(2)↓↓↓			

								未更新		
Course n	umber	U-ENG27 27203 LJ60								
Course title (and course title in English)	Graduate State Set Article Profession Set Article Profession Set Article Profession Instructor's Instructor's							ool of Engineering KKA TETSUO dvanced Energy HIRA TOSHIYUKI del Radiaton and Nuclear Science foessor,OKI VUUICHI of Global Environmental Studies E TAKESHI oool of Engineering sosr,KOBAYASHI YOUJI		
farget yea	r 2nd	l year students or above Number	of cred	its	2	Year	r/semesters	2020/Second semester		
Days and peri	ods Tue	c.2 Class style	Lecture				Language of instruction	Japanese		
[Overview	and p	ourpose of the course]								
The solutior fundamenta oxidation-re	n equilit ls of che duction	bria that are important not or emistry, in general, such as a equilibrium, are the subject	nly for in acid-bas ts of this	ntro e eq cou	ductory uilibriu 1rse.	analyt m, cor	tical chemistry	but also for the on, precipitation, and		
[Course o	bjectiv	ves]								
Not only the out the appr science, in g	e unders eciation general,	standing of the basics of solu of the relationship of the so will be targeted.	ition equ olution e	uilib quil	ria and i ibria wi	the caj th oth	pability of sol [®] er disciplines	ving related problems, of chemistry and		
[Course s	chedu	le and contents]			11			11. A 41. A A		
Juidance,2times,Guidance on how this class is operated, and how to use computing facility for this class. Jasic knowledge on the role of IDS in network security and how machine learning can help the intrusion letection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature- ased IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms sweed from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious raffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, Itime,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.										
[Course r	equire	ments]								
None						_c	Continue to 分析化学 I (工業基礎代字)「工代2・工代4」(2)↓↓		

17116チェート本語語16年) 「1164」(4)	
Evolución methodo and policy]	4
Evaluation methods and poincy	
mading is based on the examination held at the end of the semester. The attendance rate and the reports ubmitted during the course may be counted in evaluation	
Johntee during the course may be counted in evaluation.	
Textbooks]	
Daniel C. Harris, Quantitative Chemical Analysis, 9th ed., Freeman (2016) isbn{}{9781464135385}	
References, etc.1	
(Reference books)	1.
Study outside of class (proparation and roviow)]	
	4
(Other Information (office nours, etc.))	
Please visit KULASIS to find out about office hours.	

						小文 柳	
Course numb	er U-EN	G27 27204 LJ61	U-ENG27 272	04 LJ55			
Course title (and course title in Org English)	靴学 I (工業基 anic Chemistry	基礎化学)[工化2・ · I (Fundamental Ch	工化4] name, jo emistry) of affilia	or's b title, artment tion	Graduate Scl Professor,OC Graduate Scl Associate Pro Institute for Professor,NA	hool of Engineering DE KOUICHI hool of Engineering fessor,MIURA TOMOYA Chemical Research KAMIIRA MASAHARII	
Farget year	2nd year students	or above Number	of credits 2	Year	r/semesters	2020/Second semester	
Days and periods I	Mon.1	Class style	Lecture		Language of instruction	Japanese	
Overview an	d nurnose o	of the coursel	1			-	
[Course sche Juidance,2time Basic knowledg	edule and co s,Guidance on e on the role o	ntents] how this class is of IDS in network	operated, and he security and ho	ow to use w machin	computing fa e learning car	cility for this class.\ help the intrusion	
ssued from IDS by str ssued from IDS intrusion Detect raffic by machi Presentation,1tin machine learnin	and commun ion by Machin ne learning ali me,Based on t ag, and discuss	s it with other stud	ased IDS and att ing signatures to es,Learn the met lic dataset for be ents presents thei lents and instruc	acks, such detect att hod of cla nchmarki r methods tors.	as correspor acks. acksifying norm ng intrusion c s of intrusion	nal and malicious letection performance. detection using	
[Course requ	irements]						
None							
[Evaluation n	nethods and	l policy]					
[Textbooks]							
[
				_c	Continue to 有機化学 I	「工業基礎化学)」「工化2・工化4」(2)↓	

										未更新		
Course n	umber	U-EN	G27 2	7204 LJ61	U-EN	G27	27204	LJ55				
Course title (and course title in English) Organic Chemistry 1 (Fundamental Chemistry) of affilia のす affilia							tructor's ne, job ti I departn affiliation	tle, nent	Graduate School of Engineering Professor,OOE KOUICHI Graduate School of Engineering Associate Professor,MIURA TOMOYA Institute for Chemical Research Decisions N/A AMIYB A MASA HAPU			
Target yea	Farget year 2nd year students or above Number of credits 2 Year/semesters 2020/Second semester											
Days and periods Mon. 1 Class style Lecture Language distuited Japanese												
[Overview	and p	urpose o	of the	course]								
19001980	2,000											
Nucleophili Delocalizati Acidity, Baa Using Organ Nucleophili Determining assessing a s [Course r None [Evaluatic	c Additi on and sicity, a nometal c Substi c Substi g Organ student# equire	ion to the C Conjugatic nd pKa (Cl lic Reagen itution at ft tution at Cl ic Structur f039s level ments]	Carbor on (Ch h 8),2t ts to M he Car =O w es Usi l of att	yl Group (7),2times, imes, Aake C-C I bonyl Grou ith Loss of ng Spectro ainment,1t	Ch 6),2t Bonds (C pp (Ch 1) Carbony scopies ime,	ime (h 9) (1 O (Chs	s,),1time, times, xygen (s 3 and	Ch 11 13),2ti),2times, imes,			
[Textbook	(S]											
[Referenc (Referenc	es, etc nce bo	.] oks)										
[Study ou	tside o	of class (j	orepa	ration an	d revie	w)]						
(Other in	format	ion (offic	e hou	urs, etc.))								
*Please visi	t KULA	SIS to fine	d out a	bout office	e hours.							

F摄化学 I (工業基礎化学) (工化2・工化4) (2) [References, etc.] (Reference books)

 [Study outside of class (preparation and review)]

 (Other information (office hours, etc.))

 *Please visit KULASIS to find out about office hours.

										木史新
Course n	umber	U-EN	G27 3	7207 LJ60						
Course title (and course title in English) Mathematical Method in Chemistry I (Fundamental Chemistry							tructor's ne, job ti I departn Iffiliation	tle, nent	Graduate Scl Associate Pro Center for the Promotion Program-Specific Ass	nool of Engineering Dfessor,ITOU AKIHIRO of Interdisciplinary Education and Research ociate Professor,FUKUDA RYOICH
Target yea	Farget year 2nd year students or above Number of credits 2 Year/semesters 2020/Second sem									
Days and peri	ods Thu	.1	Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	/ and p	urpose o	of the	course]						
[Course of	bjectiv	ves]								
[Course s	chedu	e and co	nten	ts]						
,6times,										
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"										
.3times.										
,1time,										
,7times,										
,1time,										
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"										
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"										
,, .1time.										
ICourse r		montol								
None	equirei	nentsj								
				_						
[Evaluatio	on meth	nods and	polie	cy]						
[Textbool	(s]									
								_c	Continue to 化学数	

Course number	U-ENG27	7 37208 LJ60					
Course title (and course title in English)	ʲⅢ(工業基礎们 Chemistry II (I	匕学) 〔工化1・ Fundamental Ch	工化3]Ir nemistry)a o	nstructor's iame, job tit ind departm if affiliation	tle, tent	Graduate Sch Professor,SA Graduate Sch Associate Pro Graduate Sch Associate Profe Institute for (Professor,MI	nool of Engineering TO HIROFUMI nool of Engineering ofessor,ITOU AKIHIRO hool of Engineering ssor,HIGASHI MASAHIRO Chemical Research IZUOCHI NORIKAZU
Target year Brd y	ear students or ab	ove Number o	of credit	s 2	Year/	/semesters	2020/First semester
Days and periods Wed	.1 Cla	ass style	Lecture			Language of instruction	Japanese
[Overview and pu	urpose of th	he course]					
[Course objective	es]						
[Course schedul	e and conte	ents]					
,1time,							
,2times,							
,2times,							
,2times,							
,1time,							
,1time,							
,1time,							
,2times,							
,2times,							
,1time,							
[Course requiren	nents]						
None							
[Evaluation meth	ods and po	olicy]					
[Textbooks]							
[References, etc.	.]						
(Reference boo	oks)						
					Co	intinue to 物理化学II(_工業基礎化学) [工化1・工化3] (2)↓↓↓

L学数学 I (工業基礎化学)(2)	
[References, etc.]	
(Reference books)	
[Study outside of class (preparation and review)]	
(Other information (office hours ate))	
Please visit KIII ASIS to find out about office hours	
Tease visit KOLASAS to find out about office nours.	

udy outside of	class (preparation	and review)]		
Other informatio	n (office hours, etc	.))		
ease visit KULAS	S to find out about of	lice hours.		

							未更新
Course numbe	r U-ENG27 3	7208 LJ60					
Course title (and course title in Physi English)	七学II(工業基礎化学 cal Chemistry II (Fui	?) [工化2・ adamental Ch	工化4] Ins emistry) an of	structor's me, job ti d departm affiliation	tle, nent	Graduate Scl Professor,SA Graduate Scl Associate Prof Graduate Scl Associate Profe Institute for O Professor,MI	nool of Engineering TO HIROFUMI nool of Engineering ofessor,ITOU AKIHIRO nool of Engineering ssor,HIGASHI MASAHIRO Chemical Research ZUOCHI NORIKAZU
Target year	rd year students or above	Number	of credits	2	Yea	r/semesters	2020/First semester
Days and periods W	red.1 Clas	s style	Lecture			Language of instruction	Japanese
[Overview and	purpose of the	course]					
[Course sched Guidance, 2times, Basic knowledge detection. Intrusion Detectic based IDS by stu issued from IDS a Intrusion Detectic traffic by machine Presentation, 1tim machine learning	ule and conten Guidance on how on the role of IDS on by Signature-Ba dying open source and communication by Machine Lea e learning algorith e,Based on the exa and discuss it wit	ts] this class is in network ased IDS,5ti signature-b- ns, and addi rming,7time ms and puble crease, stude ho other stud	operated, a security ar mes,Learn ased IDS a ng signatu es,Learn the lic dataset i nts present	and how n nd how n the mec nd attack res to det e method for bench s their m s their m	to use nachin hanism ts, suc tect att l of cla marki uethod	computing fa e learning car n of intrusion h as correspor tacks. assifying norm ing intrusion c s of intrusion	cility for this class.\ help the intrusion detection by signature- idence between alarms hal and malicious letection performance. detection using
[Course requir None	ements]						
[Evaluation me	ethods and poli	cvl					
- [Textbooks]	• •						
	-						
[References, e	tc.]						
(Reference t	IUUKS/						
					(Continue to 物理化学II(工業基礎化学) [工化2・工化4] (2)↓↓

Course numb Course title (and course 有機 title in Org English)	er U-EN 幾化学II(工業基 anic Chemistry	G27 37209 LJ6 基礎化学) [工化: II (Fundamental	60 I・工作3] Chemistry) a	structor's ame, job tit nd departm f affiliation	le, ient	Graduate Scl Professor,SU Institute for Professor M	hool of Engineering IGINOME MICHINOR Chemical Research URATA YASUJIROU			
Target year	et vear Brd vear students or above Number of credits 2 Year/semesters 2020/First competer									
Days and periods	Wed.2	Class style	Lecture			Language of instruction	Japanese			
This course is de major parts. The focuses on the re elimination are i compounds beau	esigned for stu esigned for stu first part con eaction of satu involved in thi ring p-electror ctives]	ident who alrea cerns stereoche irated organic c is part. The thir ns such as alker	dy learned b mistry of or compounds b d part gives les, enols, er	asic orgar ganic com earing lea the details olates, an	nic che pound ving g of the d aron	emistry. This ls and reactio groups. Nuced e reactivities natic compou	course consists of thre ns. The second part philic substitution and of unsaturated organic nds.			
Optical resolution Nucleophilic Su Elimination, 21th leaving group; S Electrophilic Ac electrophilic Ac electrophilic Ac electrophilic Ac electrophilic ac Aromatic Electr para and meta p Examination, 1 ti ICourse requ	on (Chapter 14 bostitution, 3tin bostitution, 3tin Rearrangeme nes, Effect of 1 Stereochemisth dition to Alkd dition; addition Reaction of Er ble enols; Rea oxygen atoms ophilic Substi references (Cl me, irements]	+) nes,Mechanism nt (Chapter 15) Vucleophiles or ry of eliminatio nes,3times,Brr n to conjugated iols and Enolata ctions involvin, of enol and eno tution,2times,E aapter 21)	; SN1 and S a Elimination n; E1cB reac mination, E dienes; Mec c,2times, Ket g enols and d plate; Reacti lectrophilic	N2 reaction a and Substition (Cha poxidation shanism, F o-enol Tar enolates as onts of eno substitution	ons; Le stitutio pter 1' n; Reg Halolad utome: s interr l ether on of b	eaving group; pn; E1 and E2 7) io- and stereor tonization ((rization; Acie mediates; Sta rs (Chapter 20 enzene, phen	Nucleophiles; Elimination; Role of chemistry of Chapter 19) I- and base-catalyzed ble enolate equivalents D) ol, and anilines; ortho/			
None										
[Evaluation n	nethods and	I policy]								

物理化学II(工業基礎化学) 「工化2・工化4」(2)
[Study outside of class (preparation and review)]
(Other Information (office nours, etc.)) *Please visit KULASIS to find out about office hours.

有機化学II(工業基礎化学) [工化1・工化3](2)

_____ [Textbooks]

Organic Chemistry (Second Edition; Clayden, Greeves, Warren; Oxford University Press: 2012) isbn{}{

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

										未更新	
Course n	umber	U-EN	G27 372	209 LJ60							L L
Course title (and course title in English)	有機化 Organic	学II(工業基 Chemistry	。礎化学) II (Funda	[工化2・ amental Ch	工化4] emistry)	Inst nan and of a	ructor's ne, job ti departn ffiliation	tle, nent	Graduate Sc Associate Prof	hool of Engineering sssor,FUJIHARA TETSUAKI	
Farget yea	ir Brd	year students o	or above N	lumber	of credi	its	2	Yea	r/semesters	2020/First semester	
Days and peri	ods Wea	1.2	Class	style	Lecture				Language of instruction	Japanese	
[Overviev	v and p	ourpose o	of the c	ourse]							I
This course major parts. focuses on t elimination compounds	is desig The fir the react are invo bearing	ned for stu st part cond ion of satu plved in thi p-electron	ident wh cerns ste irated or is part. T is such a	to already ereochem ganic cor The third is alkenes	v learned istry of o npounds part give , enols, o	bas orga bea s th enol	sic orga nic con tring lea e detail ates, an	nic ch ipoun iving s of th d arou	emistry. This ds and reaction groups. Nuce e reactivities natic compou	course consists of three ns. The second part ophilic substitution and of unsaturated organic nds.	
ICourse o	biectiv	/esl				_					ľ
											ŀ
[Course s	chedu	le and co	ontents]							
Basic know detection. Intrusion De based IDS t issued from Intrusion De traffic by m Presentation machine lea	ledge or etection by study IDS an etection achine 1 n,1time, arning, a	n the role o by Signatu ing open so d communi by Machir earning alg Based on th nd discuss	of IDS in ure-Base ource signications ne Learn gorithms he exerce it with	a network ed IDS,5ti gnature-b , and addi ning,7time s and pub cise, stude other stude	security imes,Lea ased IDS ing signa es,Learn lic datase ents prese lents and	and and and and and the et fo ents ins	I how n he mec d attack es to det method or bench their m tructors	hanisi s, suc ect at of cl mark ethod	e learning ca n of intrusion h as correspo tacks. assifying norr ing intrusion s of intrusion	n help the intrusion detection by signature- ndence between alarms nal and malicious detection performance. detection using	1
[Course r	equire	ments]									1
None											ł
[Evaluation	on met	hods and	l policy	/]							1

	0 11(027 572	10 LJ00				
Course title (and course title in English)	·II(工業基礎化学) : Chemistry II (Fund	[工化1・工化3] amental Chemistry)	Instructor's name, job tit and departm of affiliation	G P In P C A C A In In P P A C P T A C P P T P P T P T P T P T C C T C C C C	raduate School of rofessor, AB stitute for Intej stitute for Intej iraduate Sch ssociate Profe iraduate Sch issociate Profe iraduate Sch ssociate Profe stitute for A rofessor, FUI hstitute for A ssociate Profe riaduate Sch ogram-Specific Se	f Global Environmental Studie E TARESHI grated Cell-Material Science KAZAWA AIKO kool of Engineering Sessor, MIKI KOUJI loool of Engineering sor, SAKAMOTO RYOT, Advanced Study RUKAWA SHIYUUHE sor, JAKAMOTO RYOT, Advanced Study essor, HORIKE SATOSH fool of Engineering min Leture, TAKATSU HIROSF
Target year Brd y	ear students or above	lumber of cred	lits 2	Year/s	emesters	2020/First semester
Days and periods Mon.	.2 Class	style Lectur	e		Language of instruction	Japanese
[Course objective Understanding of the in metal complexes a	es] basis of steric st and organometalli	d. ructure, electroni c compounds	c structure, e	electroni	ic spectra an	d reaction mechanism
[Course schedule 19. d-Metal complex 20. Coordination che 21. d-Metal organom Lecture review, 1time	e and contents tes: electronic stru- emistry: reactions netallic chemistry e,	l icture and spectra of complexes,4ti 3times,	a,7times, mes,			
[Course schedule 19. d-Metal complex 20. Coordination che 21. d-Metal organom Lecture review, 1time [Course requirem	e and contents res: electronic strr emistry: reactions netallic chemistry e, nents]	cture and spectra of complexes,4ti 3times,	a,7times, mes,			
[Course schedult 19. d-Metal complex 20. Coordination che 21. d-Metal organom Lecture review, Itimo [Course requirem None	e and contents ses: electronic stru- emistry: reactions netallic chemistry e, nents]	cture and spectra of complexes,4ti 3times,	a,7times, mes,			

[檣化学Ⅱ(工業基礎化学)「工化2・工化4](2)

[Textbooks]

Organic Chemistry (Second Edition; Clayden, Greeves, Warren; Oxford University Press: 2012) isbn{}{ 9780199270293}

_ _ _ _

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

*Please visit KULASIS to find out about office hours.

無機化学II(工業基礎化学) [工化1・工化3](2)

[Textbooks]

Schiver and Atkins Inorganic Chemistry [4th edition, Tokyo Kagakudojin] P.W.Atkins T.L.Overton J.P. Rourke M.T.Weller F.A.Armstrong, (translators) K.Tanaka, K.Hirao, S.Kitagawa ibid{}{B02556341}

_ _ _ _ _ _ _ _

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

d-Metal complexes, Electronic spectra, Steric structure and reaction mechanism of coordination compounds, Organometallic compounds

*Please visit KULASIS to find out about office hours.

							112011
Course number	U-ENG2	27 37210 LJ60					
Course title (and course title in English)	Ⅶ(工業基礎 : Chemistry II	代学) [工化2・ (Fundamental Ch	工化4] emistry)	Instructor's name, job tii and departm of affiliation	tle, nent	Graduate School Professor, AL Institute for Inte Professor, FU Graduate Scl Associate Prof Graduate Scl Associate Prof Graduate Scl Institute for r Professor, FU Institute for r Associate Prof Graduate Scl Program-Specific S	of Global Environmental Studies BE TAKESHI grated Cell-Material Sciences [KAZAWA AIKO nool of Engineering ofsesor, MKIK KOUI nool of Engineering sosr, SAKAMOTO RYOTA Advanced Study RUKAWA SHIYUUHEI Advanced Study lessor, HORIKE SATOSHI nool of Engineering enio Leture; TAKATSU HIROSHI
Target year Brd y	ear students or a	above Number o	of credit	t s 2	Year	semesters	2020/First semester
Days and periods Mon	.2 C	lass style	Lecture			Language of instruction	Japanese
[Overview and p	urpose of	the course]					
Inorganic Chemistry	II is an adv	anced course af	ter learn	ing Basic I	norgan	ic Chemistry	and Inorganic

Chemistry I. Chemistry I. Structures, electronic spectra and reaction mechanism in coordination chemistry of metal complexes and organometallic compounds are lectured.

[Course objectives]

Understanding of the basis of steric structure, electronic structure, electronic spectra and reaction mechanism in metal complexes and organometallic compounds

[Course schedule and contents]

Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection.

Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks.

Instruction Detection by Manufactions, and acting signatures to detect address. Intrusion Detection by Machine Learning, 7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, ltime,Based on the exercise, students presents their methods of intrusion detection using nachine learning, and discuss it with other students and instructors.

[Course requirements]

None

______Continue to 無機化字』(工業基礎化字)「工化2・工化4」(2)↓↓↓

未更新

										不又利
Course nun	nber	U-ENO	327 3	7211 LJ61						
Course title (and course ∮ title in A English)	分析化当 unalytical	学II(工翥 l Chemistry	養基礎 Ⅱ(Fu	哲化学) ndamental Ch	temistry)	Insti nam and of af	ructor's le, job til departm ffiliation	tle, Anent	Graduate School Professor, AH Professor, KA Graduate Scl Associate Pr nstitute for Integr Associate Profe Graduate Scl Senior Lecture Senior Lecture Saraduate Scl Assistant Profestion	of Global Environmental Stud BE TAKESHI Chemical Research AJI HIRONORI hool of Engineering ofessor, NISHI NAOY atel Radiation and Nucleur Sicio ssor, TAKAMIYA KOUIC hool of Engineering r, TAMURA TOMONO hool of Engineering fressor, NAKAO AKIT
Target year	3rd ye	ear students o	r above	Number	of cred	its	2	Year/	semesters	2020/First semester
Days and period	ls Tue.2	2	Class	s style	Lecture	;			Language of instruction	Japanese
[Overview a	and pu	irpose o	f the	course]						
As an introduce electroanalytic	ctory co cal cher	ourse of in mistry, an	nstrum d mas	nental analy ss spectrom	sis, the etry, wil	lectu 1 be	ires on given,	chroma	tography, sp	ectroscopy,
[Course ob	iective	esl								
[Course scl Chromatograp Spectroscopy, Electroanalyti Mass spectroe ,1time, ,2times, [Course rec	hedule phy,3tin ,4times, ical Che emtry,2t	e and co nes, , emistry,3t times,	ntent	ts]						
None	quirein	ientaj								
1 tone										
[Evaluation Grading will b the reports sul	metho be main bmitted	ods and ily based of I may also	polic on the be co	cy] e score of th onsidered in	e exami evaluat	natio ion.	on at the	e end of	f the semeste	er. Attendance rate and
[Textbooks	1									
Daniel C. Har			Cham	nical Analys	is (W I	- Fr	reeman,	8th-ed	2010) ishr	
	rris, Qua	antitative	Chem	near Anary:	515 (** . 1				., 2010) 1501	{}{9781429239899}
[References	rris, Qua s, etc.]	antitative			515 (W. 1				., 2010) 1501	{}{9781429239899}
[References (Reference	rris, Qua s, etc.] ce boo	antitative]]]bks)	Cnem		515 (W. 1				., 2010) 1501	{ }{9781429239899 }
[References (Referenc	rris, Qua s, etc.] ce boo	antitative] oks)							ntinue to 43454	{}{97814292398!
[References (Reference	s, etc.] ce boo	antitative						Co	n 1010) 1881	(}{97814292: 上学II (工業基礎化:

無機化学II(工業基礎化学) [工化2・工化4](2)
[Evaluation methods and policy]
Grades based on attendance and a final exam.
[Textbooks]
Shriver and Atkins Inorganic Chemistry [4th edition, Tokyo Kagakudojin] P.W.Atkins T.L.Overton J.P. Rourke M.T.Weller F.A.Armstrong, (translators) K.Tanaka, K.Hirao, S.Kitagawa ibid{}{BB02556341}
[References, etc.]
(Reference books)
[Study outside of class (preparation and review)]
(Other information (office hours, etc.))
d-Metal complexes, Electronic spectra, Steric structure and reaction mechanism of coordination compounds, Organometallic compounds *Please visit KULASIS to find out about office hours.

------[Study outside of class (preparation and review)] (Other information (office hours, etc.)) Please visit KULASIS to find out about office hours.

分析化学II(工業基礎化学)(2)

										未更新
Course nur	nber	U-ENO	327 3	7212 LJ61						
Course title (and course title in English) Course title Introduction to Green Chemistry English									Ith, Safety and Environment SHIMOTO SATOSHI tool of Engineering CUCHI KOUICHI tool of Engineering GOSHI TOMOKI	
Target year	Target year Bird year students or above Number of credits 2 Year/semesters 2020/First semester									2020/First semester
Days and period	ls Thu. I	1	Class	s style	Lecture	e			Language of instruction	Japanese
[Overview a	and pu	irpose o	f the	course]						
[Course ob	jective	es]								
[Course sc	hedule	and co	ntent	s]						
,5times,				-						
,5times,										
,5times, 4times										
,1time,										
[Course red	quirem	nents]								
None										
[Evaluation	meth	ods and	polio	>y]						
[Textbooks]									
[Reference:	s, etc.]								
(Referend	ce boo	oks)								
[Study outs	side of	class (p	repa	ration and	d revie	w)]				
(Other info	ormati	on (offic	e hou	urs, etc.))						
*Please visit I	KULAS	SIS to find	l out a	bout office	hours.					

[Textbooks]			
[Textbooks]			
[References, etc.]			
(Reference books)			
		-	
[Study outside of cla	ss (preparation and review)		
(Other information (office hours, etc.)		
*Please visit KULASIS	o find out about office hours.		
Courses delivered h	v instructors with practical	work experience]	
(1) Category	y monuolois wan praonoai	Nork experience]	
A course with practical c	ontent delivered by instructors w	ith practical work experience	
(2) Details of instructors	practical work experience rela	ted to the course	
(3) Details of practical cl	asses delivered based on instruct	ors' practical work experienc	e

						未更新
U-ENG27	37213 LJ61	U-ENG2	7 37213	LJ62		
봗Ⅰ(工業基礎 Biochemistry I (Fu	化学) ndamental Cher	Ins nai mistry) an of	tructor's ne, job tit d departm affiliation	tle, nent	Graduate Sch Professor,AT Graduate Sch Professor,MC Graduate Sch Senior Lectun Graduate Sch Associate Pro Graduate Sch Professor,HA	tool of Engineering OMI HARUYUKI 1000 of Engineering DRI YASUO 1000 of Engineering rer,KANAI TAMOTSU 1000 of Engineering fressor,HARA YUUJI 1000 of Engineering MACHI ITARU
l year students or abov	Number o	f credits	2	Yea	r/semesters	2020/First semester
e.1 Clas	s style	Lecture			Language of instruction	Japanese
ourpose of the	course]					
ves]						
Ile and conten	ts]					
ements]						
hods and poli	cy]			_		
				(Continue to 生化学	₽ 「(工業基礎化学) (2)↓↓↓
	U-ENG27 : ¥ I (工業基礎 Biochemistry I (Fur d year students or above e.1 Class purpose of the ves] alle and contern ements] thods and poli	U-ENG27 37213 LJ61 学 I (工業基礎化学) Biochemistry I (Fundamental Che d year students or above Number o e.1 Class style [] purpose of the course] ves] alle and contents] ements] thods and policy]	U-ENG27 37213 LJ61 U-ENG27 第 I (工業基礎化学) Biochemistry I (Fundamental Chemistry) In an and d year students or above Number of credits e.1 Class style Lecture purpose of the course] ves] alle and contents] ements] thods and policy]	U-ENG27 37213 LJ61 U-ENG27 37213 ¥ I (工業基礎化学) Biochemistry I (Fundamental Chemistry) d year students or above Number of credits 2 e.1 Class style Lecture purpose of the course] ves] and departs thods and policy]	U-ENG27 37213 LJ61 U-ENG27 37213 LJ62 学 I (工業基礎化学) Biochemistry I (Fundamental Chemistry) d year students or above Number of credits 2 Year e.1 Class style Lecture purpose of the course] ves] alle and contents] ements] thods and policy]	U-ENG27 37213 LJ61 U-ENG27 37213 LJ62 Graduate Sch Professor,AL Biochemistry I (Fundamental Chemistry) d year students or above Number of credits 2 Year/semesters e.1 Class style Lecture

										未更新
Course nu	ımbe	er U-EN	G27 3	7214 LJ60						
Course title (and course title in English)	高分 Introdi	了子化学概論 uction to Polymer	i I (.: Themistry	工業基礎化 I(Fundamental	(学) Chemistry)	Inst nan and of a	tructor's ne, job ti I departn affiliation	tle, nent	Graduate Sch Professor,OC	nool of Engineering GOSHI TOMOKI
Target yea	r	3rd year students	or above	Number	of cred	its	2	Year	r/semesters	2020/First semester
Days and perio	ods T	'hu.2	Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview	and	d purpose o	of the	course]						
[Course o	bjec	tives]								
[Course s	cheo	dule and co	onten	ts]						
,3times,										
,3times,										
,1time,										
2times										
.2times.										
,1time,										
[Course re	aui	rementsl								
None		,				_				
[Evaluatio	n m	ethods and	l poli	cvl		_				
[Textbook	s]									
[Referenc	es, e	etc.]								
(Referer	nce l	books)								
[Study ou	tside	e of class (prepa	ration and	d revie	w)]				
Other in	form	nation (offici	e ho	urs, etc.))						
*Please visit	KU	LASIS to fin	d out a	ibout office	hours.					

											未更新	
Course nu	umbe	er	U-EN	G27 3	7215 LJ60							
Course title (and course title in English) 有機化学III(工業基礎化学)〔工化1・工化3] Instructor's name, job title, and department of affiliation Graduate School of Engineerin Associate Professor, KONDOU TERUYU (Graduate School of Engineerin Associate Professor, COMURA TOSHI Associate Professor, KIMURA										hool of Engineering ONDOU TERUYUKI hool of Engineering ssor,OOMURA TOSHIMICH hool of Engineering ofessor,KIMURA YUU		
Target yea	Target year Srd year students or above Number of credits 2 Year/semesters 2020/Second semester											
Days and perio	ods T	ue.2		Class	s style	Lecture	e			Language of instruction	Japanese	
[Overview	and	d pu	rpose o	f the	course]							
[OVERVIEW and purpose of the course] The lecture is given on Organic Chemistry which is indispensable to a researcher and an engineer. After the Organic Chemistry I (2nd year, 2nd term) and the Organic Chemistry II (3rd year, 1st term), the lecture is given on the chapters 22 - 26 of the same textbook, which covers characteristic reactions of electron-deficient alkenes and aromatic compounds, protection and deprotection of functional groups, and chemistry of carbonyl compounds including various reactivity of enolates.												

[Course objectives]

Comprehensive understanding of reactions of aromatic compounds, reactivities of functional groups, and chemistry of carbonyl compounds including alkylation of enolates, the aldol reaction, and other condensate the state of t reactions is a goal of this course. By combining ideas learned in the Organic Chemistry I and the Organic Chemistry II, high-level knowledge of organic chemistry must be acquired which is indispensable for a accomplished researcher and engineer.

[Course schedule and contents]

onjugate addition and nucleophilic aromatic substitution,3times,Conjugate addition reactions, conjugate substitution reactions, nucleophilic epoxidation, electrophilic aromatic substitution, addition-elimination mechanism, diazonium compounds, reactions via benzyne intermediate (Chapter 22) Chemoselectivity and protecting groups, 3times, Reducing agents, reduction of carbonyl groups, catalytic

hydrogenation, removal of functional groups, dissolving metal reductions, selectivity in oxidation reactions, reactivities of functional groups, protecting groups (Chapter 23) Regioselectivity, 2times, Regioselectivity in electrophilic atomatic substitution reactions, electrophilic attack

on alkenes, regioselectivity in radical reactions, nucleophilic attack on allylic compounds, electrophilic attack

on conjugated dienes, direct addition vs. conjugate addition (Chapter 24) Alkylation of enolates,3times,Alkylation of nitriles and nitroalkanes, electrophiles for alkylation, alkylation of lithium enolates, alkylation using enolate equivalents, alkylation of beta-dicarbonyl compounds regioselectivity in alkylation of ketones (Chapter 25)

Reactions of enolates with carbonyl compounds: the aldol and Claisen reactions, 3 times, The aldol reaction, cross aldo condensation, aldol reactions using enolates and their equivalents, intramolecular aldol reaction, acylation of enolates, Claisen condensation, cross Claisen condensation, intramolecular cross Claisen condensation (Chapter 26)

.1time 1time,

[Course requirements]

有機化学Ⅲ(工業基礎化学) [工化1・工化3](2)

Basic Organic Chemistry A, Basic Organic Chemistry B, Organic Chemistry I(Fundamental Chemistry), Basic Organic Chemistry A, Basic Organic Chemistry) Organic Chemistry II(Fundamental Chemistry) Continue to 有能停車「工業基礎(学) [I任1・I(d] (d]] ↓

title in English)	有機 Orga	化学III(工参 nic Chemist	業基礎化勻 ry III (Fu	^生) [工化2・ ndamental Ch	工化4] emistry) a	Instructor's name, job t and depart of affiliation	itle, nent	Professor,KO Graduate Sc Associate Profe Graduate Sc Associate Pr	hool of Engineering ONDOU TERUYUK hool of Engineering ssor,OOMURA TOSHIMI hool of Engineering ofessor,KIMURA YU
Target yea	r	3rd year studer	nts or above	Number	of credit	ts 2	Year/	semesters	2020/Second semes
Days and peri	ods 7	ue.2	Clas	s style	Lecture			Language of instruction	Japanese
[Overview	/ and	d purpose	e of the	course]					
alkenes and carbonyl co	aron mpor	hatic comp ands includ	ounds, p ling varie	rotection an ous reactivit	d deprote y of enol	ection of f lates.	unctiona	al groups, an	nd chemistry of
Comprehen	sive	tives]	ing of re	actions of a	romatic c	compound	s. reacti	vities of fun	ctional groups, and
Comprehense chemistry of reactions is Chemistry I accomplishe	sive f carl a goa I, hig ed res	tives] understandi oonyl comp al of this co h-level kno searcher an	ing of rea pounds in purse. By owledge id engine	actions of a neluding alk combining of organic er.	romatic c sylation o ideas lea chemistry	compound of enolates arned in th y must be	s, reacti , the ald e Organ acquired	vities of fund ol reaction, iic Chemistr I which is in	ctional groups, and and other condensation y I and the Organic dispensable for a
Comprehense chemistry of reactions is Chemistry I accomplishe	sive f carl a goa I, hig ed res	tives] inderstandi oonyl comp il of this co th-level kno searcher an dule and	ing of re- pounds in purse. By owledge id engine	actions of a neluding alk of organic of er. ts]	romatic c cylation o ideas lea chemistry	compound of enolates arned in th y must be	s, reacti , the ald e Orgar acquireo	vities of fun lol reaction, lic Chemistr l which is in	ctional groups, and and other condensation y I and the Organic dispensable for a

U-ENG27 37215 LJ60

Course number

[Course requirements]

Basic Organic Chemistry A, Basic Organic Chemistry B, Organic Chemistry I(Fundamental Chemistry), Organic Chemistry II(Fundamental Chemistry)

[Evaluation methods and policy]

The grade is given based on the final examination Attendance and reports during the class could be considered.

_____Continue to 有限化学Ⅲ(工業基础化学)「工化2・工化4」(2)↓↓

[Evaluation methods and policy] The grade is given based on the final examination. Attendance and reports during the class could be considered. [Textbooks] Organic Chemistry Second Edition (J. Clayden, N. Greeves, S. Warren, Oxford University Press, 2012) isbn{ }{9780199270293}

[References, etc.] (Reference books)

(Reference books) マクマリー有機化学 - 生体反応へのアプローチ(マクマリー著:柴崎正勝,岩澤伸治,大和田智 彦, 増野匡彦 監訳;東京化学同人, 2009) isbn{}{9784807906918}

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

wo classes are lectured at the same time

*Please visit KULASIS to find out about office hours

[Courses delivered by instructors with practical work experience]

Category
 A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

有機化学Ⅲ(工業基礎化学) [工化2・工化4](2)

[Textbooks]

Organic Chemistry Second Edition (J. Clayden, N. Greeves, S. Warren, Oxford University Press, 2012) isbn{ }{9780199270293}

[References, etc.]

(Reference books) (Meterenice books) マクマリー有機化学 - 生体反応へのアプローチ(マクマリー著:柴崎正勝,岩澤伸治,大和田智 彦, 増野匡彦 監訳;東京化学同人, 2009) isbn{}{9784807906918}

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

vo classes are lectured at the same time

*Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

(1) Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

Course number U-ENG27 37216 LJ60 Course title (and course fifthe in English) 新理化学頂 (工業基礎化学) Physical Chemistry III (Fundamental Chemistry) ind year students or abov Instructor's name, job title, or difficution of affiliation Graduate School of Engineering Associate Professor, UBC1AMA TOMOKADL Graduate School of Engineering School Of								未更	新		
Course tile (and course intering english) 物理化学证(工業基礎化学) Physical Chemistry III (Fundamental Chemistry) of affiliation affiliation affiliation affiliation Instructor's raduate School of Engineering Associate Professor, SUGASE KENJ, Graduate School of Engineering Associate Professor, UGASE KENJ, Graduate School of Engineering Senior Lecture-HIGASHIGUCHI KENJ Target year Ind year students or abov Tue.1 Lass style Lecture Japanese Deverview and purpose of the courseJ Lecture Japanese Instructor's Graduate School of Engineering Senior Lecture-HIGASHIGUCHI KENJ Fundamentals of spectroscopy, Molecular structure and rotational and vibrational spectra, Electronic transitions and photochemistry, Magnetic resonance, Statistical thermodynamics, Molecular Interactions Interactions ICourse schedule and contentsJ English Fundamentals of spectroscopy, Himes Electronic transitions and photochemistry, 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Lecture review, Itime Interactions ICourse requirementsJ The following are prerequisites for this class: Physical Chemistry II Interactions and photochemistry, 2times Magnetic resonance, 3times Instruction methods and policyJ Graduate School of Engineering Continue to 物理化学m (ITI暴躍化学m (ITII agath again a	Course number	U-ENG27	7 37216 LJ60								
Target year ad year students or above Number of credits 2 Year/servests 2020/Second semester Days and periods Tue.1 Class style Lecture tagaget itstick Japanese IOverview and purpose of the course] Events Interactional and vibrational spectra. Electronic transitions and photochemistry. Magnetic resonance, Statistical thermodynamics. Interactions Interactions ICourse objectives] The goal of this course is to understand basic concept of spectroscopy and statistical thermodynamics. Interactions Fundamentals of spectroscopy, ltime Rotational and vibrational spectroscopy, 4times Electronic transitions and photochemistry. 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Electronic transitions and photochemistry. 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Electronic transitions and photochemistry. 2times Physical Chemistry I Interaction methods and policy Interactions Interactions Interactions Physical Chemistry II Interactions Interactions Interactions Interaction and vibrational spectroscopy. Itime Interactions Interactions Intereduction are precessitites of this class:	Course title (and course title in Physica English)	ourse title nd course tet in nglish omg (上学 III (工業基礎化学) Physical Chemistry III (Fundamental Chemistry) nglish									
Days and periods Tue.1 Class style Lecture unpup of the counce IOverview and purpose of the counceJ Fundamentals of spectroscopy, Molecular structure and rotational and vibrational spectra, Electronic transitions and photochemistry, Magnetic resonance, Statistical thermodynamics, Molecular Interactions ICourse objectivesJ The goal of this course is to understand basic concept of spectroscopy and statistical thermodynamics. ICourse schedule and contentsJ Fundamentals of spectroscopy, Itime Rotational and vibrational aphotochemistry, 2times Fundamentals of spectroscopy, 1time Rotational and vibrational spectroscopy, 4times Electronic transitions and photochemistry, 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Lecture review, 1time Imagendition The following are prerequisites for this class: Physical Chemistry I Physical Chemistry I Imagendition Roades will be evaluated based on final examination, short reports, and class attendance. Imagendition IfextbooksJ Physical Chemistry, 10th edition (Oxford University Press)	Target year Brd year students or above Number of credits 2 Year/semesters 2020/Second semester										
IOverview and purpose of the course] Fundamentals of spectroscopy, Molecular structure and rotational and vibrational spectra, Electronic transitions and photochemistry, Magnetic resonance, Statistical thermodynamics, Molecular Interactions ICourse objectives] The goal of this course is to understand basic concept of spectroscopy and statistical thermodynamics. ICourse schedule and contents] Fundamentals of spectroscopy, 1time Rotational and vibrational spectroscopy, 4times Electronic transitions and photochemistry, 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Lecture review, 1time ICourse requirements] The following are prerequisites for this class: Physical Chemistry I IPhysical Chemistry II IEvaluation methods and policy] Grades will be evaluated based on final examination, short reports, and class attendance. IPexbooks] P. W. Atkins "Physical Chemistry, 10th edition] (Oxford University Press)	Days and periods Tu	e.1 Cla	ass style I	Lecture			Language of instruction	Japanese			
Fundamentals of spectroscopy, Molecular structure and rotational and vibrational spectra, Electronic transitions and photochemistry, Magnetic resonance, Statistical thermodynamics, Molecular Interactions [Course objectives] The goal of this course is to understand basic concept of spectroscopy and statistical thermodynamics. [Course schedule and contents] Fundamentals of spectroscopy, 1times Rotational and vibrational spectroscopy, 4times Electronic transitions and photochemistry, 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Lecture review, 1time [Course requirements] The following are prerequisites for this class: Physical Chemistry I Physical Chemistry I [Evaluation methods and policy] Grades will be evaluated based on final examination, short reports, and class attendance. [Pexbooks] P. W. Atkins "Physical Chemistry, 10th edition] (Oxford University Press)	[Overview and	ourpose of th	ne course]								
ICourse objectives] The goal of this course is to understand basic concept of spectroscopy and statistical thermodynamics. ICourse schedule and contents] Fundamentals of spectroscopy, Itime Rotational and vibrational spectroscopy, 4times Electronic transitions and photochemistry, 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Lecture review, 1time ICourse requirements] The following are prerequisites for this class: Physical Chemistry I Physical Chemistry I Physical Chemistry I Grades will be evaluated based on final examination, short reports, and class attendance. ICextooks] P. W. Atkins 「Physical Chemistry, 10th edition」 (Oxford University Press) Continue to 物理化学用(江葉基礎化学)(2)↓1↓	Fundamentals of sp transitions and pho	ectroscopy, M tochemistry, N	lolecular structu lagnetic resona	ire and i nce, Sta	rotational a atistical the	and vil rmody	brational spect namics, Mole	tra, Electronic cular Interactions	s		
The goal of this course is to understand basic concept of spectroscopy and statistical thermodynamics.	[Course objecti	ves]									
ICourse schedule and contents] Fundamentals of spectroscopy, Itime Rotational and vibrational spectroscopy, 4times Electronic transitions and photochemistry, 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Lecture review, Itime ICourse requirements] The following are prequisites for this class: Physical Chemistry: Fundamentals and Exercises Physical Chemistry I Physical Chemistry II IEvaluation methods and policy] Grades will be evaluated based on final examination, short reports, and class attendance. IEvaluation Sphysical Chemistry, 10th edition_I (Oxford University Press) P. W. Atkins "Physical Chemistry, 10th edition_I (Oxford University Press)	The goal of this co	urse is to under	rstand basic con	cept of	spectrosco	py an	d statistical th	ermodynamics.			
Fundamentals of spectroscopy, Itime Rotational and vibrational spectroscopy, 4times Electronic transitions and photochemistry, 2times Magnetic resonance, 3times Statistical thermodynamics, 4times Lecture review, Itime [Course requirements] The following are prerequisites for this class: Physical Chemistry: Fundamentals and Exercises Physical Chemistry I Physical Chemistry I [Evaluation methods and policy] Grades will be evaluated based on final examination, short reports, and class attendance. [Textbooks] P. W. Atkins 『Physical Chemistry, 10th edition』(Oxford University Press) Continue to 物理化学用(正葉基礎化学)(2)↓1↓	[Course schedu	le and conte	ents]								
[Evaluation methods and policy] Grades will be evaluated based on final examination, short reports, and class attendance. [Textbooks] P. W. Atkins 『Physical Chemistry, 10th edition』 (Oxford University Press) Continue to 物理化学Ⅲ(江葉基礎化学)(2)↓↓↓	Rotational and vib Electronic transitic Magnetic resonanc Statistical thermod Lecture review, 1ti [Course require The following are Physical Chemistry Physical Chemistry	ments] ments]	or this class: s and Exercises	5							
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[Textbooks] P. W. Atkins 『Physical Chemistry, 10th edition』 (Oxford University Press) Continue to 物理化学Ⅲ(江葉基礎化学)(2)↓↓↓	Grades will be eva	uated based or	n final examinat	ion, sho	ort reports,	and c	lass attendanc	е.			
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「 Continue to 物理化学Ⅲ(工業基礎化学)(2)↓↓↓	P. W. Atkins Ph	ysical Chemist	ry, 10th edition,	J (Ox	cford Univ	ersity	Press)				
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	U-ENG27	37217 LJ61	U-ENG27 372	17 LJ62								
Course tile (and course tile in English) 無機化学III(工業基礎化学) Instructor's name, job tile, English) 「可容asic Chemistry III (Fundamental Chemistry) 」 ので要素がで、KAGEYAMA HIROSH Graduate School of Engineering Professor, KGUCHI KOUICHI Graduate School of Engineering Graduate School of En												
Target year Brd y	ear students or abo	Number	of credits 2	Yea	r/semesters	2020/Second semester						
Days and periods Fri.1	Cla	ss style	Lecture		Language of instruction	Japanese						
This class deals with properties	Loverview and purpose of the course] This class deals with the topics related to inorganic solids, such as synthesis methods, structures, and properties											
[Course objectives] Goal of the class is to understand the synthesis method and characterization of inorganic solids, crystals structure, crystallography and diffraction techniques, phase diagrams, crystal defects, non-stoichiometry, solid solutions, and bonding in solids.												
[Course schedul	e and conter	nts]										
electrochemical methods, single crystal growth, and hydrothermal methods will be lectured. Characterization of solids, 2times, The characterization of solids will be lectured, such as optical microscope, electron microscope, IR spectroscopy, Raman spectroscopy, NMR, XAFS, and thermal analysis. Crystal Structure, 2times, Symmetry in crystals will be lectured from the point view of the crystal structures. Crystal Ography and diffraction techniques, 2times, Crystallography and x-ray diffraction methods will be lectured. Crystal diffects, non-stoichiometry, solid solutions, 2times, Solid solution, several types of the defects in solids will be lectured. Electrical properties, 2times, Metallic conductivity, superconductivity, semiconductivity, and ionic conductivity will be lectured. Term-end examination, 1time, Understanding of this class will be examined.												
[Course requiren	nents]											
[Course requiren	nents]											
[Course requiren None [Evaluation meth	nents] ods and pol	icy]										
[Course requiren None [Evaluation meth Grading will be dete	nents] ods and pol rmined by a te	icy] rm-end exar	nination									

[References, etc.]
(Reference books)
W. J. Moore [Physical Chemistry, 4th edition] (Prentice-Hall)
The base of the finance of the second s
[Study outside of class (preparation and review)]
The basic knowledge of quantum mechanics is prerequisite for this class, so we recommend to review it
before the class.
(Other information (office hours, etc.))
Two parallel classes will be held based on the class assignment.
*Please visit KULASIS to find out about office hours.
[Courses delivered by instructors with practical work experience]
(1) Category
A course with practical content delivered by instructors with practical work experience
(2) Details of instructors practical work experience related to the course
(3) Details of practical classes delivered based on instructors' practical work experience
(5) Details of practical classes derivered based on histractors practical work experience
1

物理化学Ⅲ(工業基礎化学)(2)

無機化学III(工業基礎化学)(2)

Basic Solid State Chemistry (Second Edition), A.R.West, John Wiley ampSons (1999) isbn{}{ 9780471987567} ウエスト固体化学入門(講談社) isbn{}{4061533711}

[References, etc.]

(Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

Homework is to read the textbook before the class and to solve the problem.

*Please visit KULASIS to find out about office hours.

[Overview and purpose of the course]

Characteristic structures (such as crystalline and amorphous structures) and characteristic properties (such as viscoelasticity) of polymers result from the thread-like primary structure of polymer molecules. Focusing on this point, this lecture addresses the structures and properties of polymers in solutions, in melts, and in solids.

[Course objectives]

To understand molecular origin(s) of the characteristic structures, dynamics, and properties of polymers.

[Course schedule and contents]

Conformation of Polymer Chain, 2 times, The conformation distribution of flexible polymers and the relationship between their average size and molecular weight are explained. Solution Properties, 3 times, The thermodynamic behavior of polymer solutions, such as the osmotic pressure and phase separation, is explained on the basis of the Flory-Huggins theory. For this purpose, molecular expressions are derived for the mixing entropy, mixing enthalpy, and chemical potential. In addition, a brief introduction is given for methods of molecular weight determination on the basis of the solution properties. Structure in Solid State, 2 times, Various morphology of crystalline polymers, i.e., single crystal, spherulite, lamellar crystalline, and extended chain crystal, are introduced and basic crystallization processes giving this variety of morphology are explained. In addition, methods of analysis of these crystalline structures are intriduced and the results of the analysis are explained. Glass Transition, I time, The glass transition phenomenon is explained in relation to the thermal motion of

polymer chains. Changes of the thermal and mechanical properties on this transition are explained are related to the motion of the polymer chains. Rubber Elasticity,2times,From a molecular point of view, the conformation distribution of flexible polymer

chains above the glass transition point is related to the rubber elasticity. The molecular expression is derived

for the stress and modulus of rubbers. Polymer Dynamics,4times,The viscoelastic behavior of flexible polymer melts is related to the large scale motion of the polymer chains. In particular, the entangle ment effect due to the uncessability of the chains is explained from a molecular point of view, and some basic models are introduced. In addition, for polymers having type-A dipoles parallel along the chain backbone, a relationship between viscoelastic and dielectric properties is explained. Summary, I time, Essence of the whole lecture and a relationship among all items in the lecture are

summarized, thereby improving the understanding of the attending students in particular for the items not vell addressed in the the exams.

Course nur	nber	U-EN	G27 4	7219 LJ60						
Course title (and course f title in S English)	七学統i tatistical M	計力学(コ Aechanics for	二業基 Chemistr	礎化学) ry (Fundamental	Chemistry)	Ins nar and of a	tructor's ne, job ti d departn affiliation	tle, nent	Graduate Scl Professor,SE	hool of Engineering KI SYUHEI
Target year	4th y	ear students	or above	Number	of cred	lits	2	Year	/semesters	2020/First semester
Days and period	s Mon	.2	Clas	s style	Lecture	e			Language of instruction	Japanese
[Overview a	and pu	urpose o	of the	course]						
[Course ob	jectiv	es]								
[Course sc	hedul	e and co	onten	ts]						
,2times,										
,Itime,										
,2times,										
3times										
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,2times,										
,1time,										
[Course red	quiren	nents]								
None						_				
[Evaluation	meth	ods and	l poli	cvl						
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Textbooks	1									
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[Reference	s, etc.]					_	_		
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lotnah onte	side of	r class (prepa	iration an	a revie	w)]				
(Other info	ormati	on (offic	e ho	urs, etc.))		_			_	
*Please visit I	KULA	SIS to fin	d out a	about office	e hours.					

[Course requirements] The students taking this class are desired to learn the basic part of polymer science at the class quoIntroduction to Polymer Chemistry 1 (Fundamental Chemistry)quot. [Evaluation methods and policy] Judged on the basis of home-work reports and the final exam. [Textbooks] Printed documents are distributed in the class. [References, etc.] (Reference books) Shin Kobunshi Kagaku Joron (a book published from Kagaku Dojin) isbn{}{4759802584} Kobunshi no Kouzou to Bussei (a book published from Koudansha) ISBN978-4-06-154380-5 isbn{}{9784061543805} [Istudy outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	局万于化子倾扁Ⅱ、(上果签啶化子) (4)
The students taking this class are desired to learn the basic part of polymer science at the class quotIntroduction to Polymer Chemistry I (Fundamental Chemistry)quot. [Evaluation methods and policy] Judged on the basis of home-work reports and the final exam. [Textbooks] Printed documents are distributed in the class. [References, etc.] (References, etc.] (References, etc.] (References, etc.] (Beferences, etc.] (References, etc.] (References, etc.] (References, etc.] (References, etc.] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[Course requirements]
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Judged on the basis of home-work reports and the final exam. [Textbooks] Printed documents are distributed in the class. [References, etc.] (Reference books) Shin Kobunshi Kagaku Joron (a book published from Kagaku Dojin) isbn{}{4759802584} Kobunshi no Kouzou to Bussei (a book published from Koudansha) ISBN978-4-06-154380-5 isbn{}{ 9784061543805) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[Evaluation methods and policy]
[Textbooks] Printed documents are distributed in the class. [Reference books) Shin Kobunshi Kagaku Joron (a book published from Kagaku Dojin) isbn{}{4759802584} Kobunshi no Kouzou to Bussei (a book published from Koudansha) ISBN978-4-06-154380-5 isbn{}{ 9784061543805) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	Judged on the basis of home-work reports and the final exam.
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[References, etc.] (Reference books) Shin Kobunshi Kagaku Joron (a book published from Kagaku Dojin) isbn{}{4759802584} Kobunshi no Kouzou to Bussei (a book published from Koudansha) ISBN978-4-06-154380-5 isbn{}{ 9784061543805) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	Printed documents are distributed in the class.
(Reference books) Shin Kobunshi Kagaku Joron (a book published from Kagaku Dojin) isbn{}{4759802584} Kobunshi no Kouzou to Bussei (a book published from Koudansha) ISBN978-4-06-154380-5 isbn{}{ 9784061543805) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[References, etc.]
[Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	(Reference books) Shin Kobunshi Kagaku Joron (a book published from Kagaku Dojin) isbn{}{4759802584} Kobunshi no Kouzou to Bussei (a book published from Koudansha) ISBN978-4-06-154380-5 isbn{}{ 9784061543805}
(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	[Study outside of class (preparation and review)]
(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.	
*Please visit KULASIS to find out about office hours.	(Other information (office hours, etc.))

Course n	umb	ər	U-EN	G27 3	7220 I J61	U-ENG	27 37220	LJ55				
Course title (and course Field, 在站线器分析科学(工業基礎化学) Frontiers in Instrumental Analytical Science (Fundamental Chemistry) english)												
Target yea	Farget year 4th year students or above Number of credits 2 Year/semesters 2020/First semester											
Days and periods Wed.2 Class style Lecture Language distinution Japanese												
[Overview	an	d pu	irpose o	f the	course]							
Advanced ir	Advanced instrumental methods in analytical chemistry will be delivered.											
[Course o	bjeo	ctive	es]									
[Course s	che	dule	e and co	nten	ts]							
Introduction	to a	dvar	nced instr	ument	al analysis,	1time,						
Highly func Fundamenta	tiona le ar	ulizeo ad an	d column	packi	ng and its a	ipplication	to separa	tion a	nalysis,4times	3,		
Fundamenta	ls ar	id ap	plication	s of pl	H meters,6t	imes,	uon anai	y 515,4U	inics,			
[Course re	equi	rem	ents]									
Analytical C	Them	istry	/ I and II	are hi	ghly recom	mended.						
[Evaluatio	n m	eth	ods and	poli	cv]							
- The attendar	nce r	ate a	und the re	ports :	submitted w	vill be cor	sidered ir	evalu	ation.			
[Textbook	s]											
None												
[References, etc.]												
(Reference books)												
None												
[Study outside of class (preparation and review)]												
(Other information (office hours, etc.))												
*Please visit	KU	LAS	SIS to fine	l out a	about office	hours.						

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Course nu	ımbe	er U-EN	G27 2	7300 LJ60							
Course title (and course title in English)	ind course title Ind course fitte Ind course Itte Itte Ind Course Itte Itte Itte Itte Itte Itte Itte It										
Target yea	rget year Brd year students or above Number of credits 2 Year/semesters 2020/First semester										
Days and peric	ods F	ri.1	Clas	s style	Lectur	e			Language of instruction	Japanese	
[Overview	and	d purpose o	f the	course]							
10											
[Course o	bjec	tives									
[Course se	che	dule and co	nten	s]							
,2times,											
,Itime, 3times											
.1time.											
,4times,											
,3times,											
,1time,											
[Course re	equi	rements]									
None											
[Evaluatio	n m	ethods and	poli	>y]							
[Textbook	s]										
[Reference	es, e	etc.]			_		_				
Referer	nce	books)									
[Study out	tsid	e of class (p	orepa	ration and	d revie	w)]	_				
(Other inf	form	nation (offic	e ho	urs, etc.))							
*Please visit	KU	LASIS to find	l out a	bout office	hours.						

UP.	[Textbooks]
1	ick Greeves, Stuart Warren, Peter Wothers, Jonathan Clayden 『Organic Chemistry 2nd Edition』 (Dxford University Press) ISBN:978-0-199-27029-3
	[References, etc.]
	(Reference books)
	[Study outside of class (preparation and review)]
ł	3efore the class, read the textbook and check the contents. When you have a question, ask via e-mail (kojimiki@scl.kyoto-u.ac.jp or anagaki@sbchem.kyoto-u.ac.jp
	(Other information (office hours, etc.))
ł	Better to bring the textbook.

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有機化学Ⅳ(工業基礎化学)(2)

Course nu	umber	U-ENG27 3	7224 EJ61					
Course title (and course title in English)	有機化 ⁴ Organic (学IV(工業基础 Chemistry IV (Fur	遊化学) ndamental Ch	emistry)	Instructor's name, job ti and departn of affiliation	tle, nent	Graduate Scl Associate Pro Graduate Scl Associate Profe	hool of Engineering ofessor,MIKI KOUJI hool of Engineering essor,NAGAKI AIICHIROU
Target yea	r 4th y	ear students or above	Number	of cred	its 2	Yea	r/semesters	2020/First semester
Days and perio	ods Fri.2	Class	s style	Lecture			Language of instruction	Japanese
[Overview	and pu	urpose of the	course]					
Organic tran radical react medicine an compounds reactions, ar	isformati ions, are d materia as well a e explair	ons including s reliable methor als. In the class, as non-ionic tran- ned.	tereoselecti ds to constr , stereoselection nsformation	ive and s uct com ctive and s, such a	tereospecifi plicated fra l stereospec as pericyclic	ic reac mewo ific re c react	etions, pericyc rks in highly- actions of cyc ions, rearrang	ic reactions, and functionalized functionalized functionalized ement, and radical
[Course o	hiective	ae1						
Taundant	Djective	10 Jan 1 Jan						
-To understa -To understa	and stere	ionic transform	ations, such	as peric	ons of cycli cyclic reacti	c and ons, re	non-cyclic co earrangement,	mpounds. , and radical reactions.
[Course s	chedule	e and content	ts]					
-Stereoselec	tivity in	cyclic molecule	es, 2 times					
-Diastereose	lectivity	, 2 times						
 Pericyclic r 	eactions	: cycloadditions	s, 2 times					
 Pericyclic r 	eactions:	: sigmatropic ar	nd electrocy	clic read	ctions, 2 tin	nes		
 Rearrangen 	nents, 2 t	imes						
-Fragmentat	ion, 1 tin	ne						
-Radical rea	ctions, 3	times						
-Final exam	ination, 1	l time						
[Course re	equirem	nents]						
It is desirabl this class.	e for stu	dents to take cla	asses of Org	ganic Ch	emistry I, I	I, & II	I (Fundament	al Chemistry) before
[Evaluatio	n meth	ods and polic	cy]					
Evaluation v (20%).	vill be ba	used on examination	ations (80%) and cl	ass perform	ance i	ncludes attend	dance and short reports
						(Continue to 有機化	上学Ⅳ(工業基礎化学)(2)↓↓↓

										未更新
Course nu	umbe	er U-ENG	323 2	3504 LE57						
Course title (and course title in English)	工業 Funda	《基礎化学実』 mental Chemistry La	険 I iborator	(工業基礎 / I(Fundamental (化学) Chemistry)	Inst nan and of a	tructor's ne, job tit I departm offiliation	tle, nent	Graduate Sch Professor,TA Faculty of Er 工基化学実际	nool of Engineering NAKA TSUNEHIRO ngineering 僉関連教員
Target yea	r	3rd year students o	r above	Number o	of cred	its	7	Year	/semesters	2020/First semester
Days and perio	odsTue	3,4,5,Wed.3,4,5,Thu.3,4,5	Clas	s style	Experi	men	t		Language of instruction	Japanese
[Overview	anc	l purpose o	f the	course]						
[Course o	bjec	tives]								
[Course s	cheo	dule and co	ntent	s]						
,18times, ,18times, ,18times, ,11times, ,7times,										
[Course re	equi	rements]								
None										
[Evaluatio	n m	ethods and	polic	>y]						
				-						
[Textbook	s]									
[Referenc	es, e	etc.]								
(Refere	nce l	books)								
[Study ou	tside	e of class (p	repa	ration and	d revie	w)]				
(Other in	form	nation (offic	e hoi	urs, etc.))						
*Please visi	KU	LASIS to find	out a	bout office	hours.					

Course number	U-ENG23 23505 LE	255				
Course title (and course title in English)	遊化学実験Ⅱ(工業基 d Chemistry Laboratory II(Fundamo	礎化学) na ental Chemistry) an of	structor's me, job ti d departn affiliation	tle, nent	Graduate Sch Professor,TA Faculty of Er 工基化学実験	ool of Engineering NAKA TSUNEHIRO gineering 魚関連教員
Target year Brd y	ear students or above Numb	er of credits	7	Year	/semesters	2020/Second semester
Days and periodsTue3,4,5,W	Ned.3,4,5,Thu.3,4,5 Class style	Experime	nt		Language of instruction	Japanese
[Overview and pu	urpose of the course	9]				
[Course objective	es]					
[Course schedule	e and contents]					
,18times,						
,18times,						
,11times,						
,/times,						
[Course requirem	nents]					
None						
[Evaluation meth	ods and policy]					
Laraaaaa	oue and peney]					
[Textbooks]						
[References, etc.]	1					
(Reference boo	oks)					
[Study outside of	class (preparation	and review)				
(Other information	on (office hours, etc	: .))				
*Please visit KULAS	SIS to find out about of	fice hours.				

未更新

未更新

生命化学基礎(工業基礎化学)(2)

Study outside of clas	ss (preparation and review)]	
		_
Other information (o	office hours, etc.))	
Please visit KULASIS to	p find out about office hours.	
Courses delivered by	v instructors with practical work experience]	
1) Category		
a course with practical co	intent delivered by instructors with practical work experience	
2) Details of instructors'	practical work experience related to the course	

Course number U-ENG25 35169 SJ71 Graduate School of Engineering Professor,ATOMI HARUYUKI Graduate School of Engineering Professor,MORI YASUO Graduate School of Engineering Senior Lecturer,KANAI TAMOTSU Graduate School of Engineering Associate Professor,HARA YUUJI Graduate School of Engineering Professor,HAMACHI ITARU Graduate School of Engineering Senior Lecturer,TAMURA TOMONORI Instructor's name, job title, and department of affiliation Course title 生命化学基礎(工業基礎化学) Chemical Basis of Life(Fundamental Chemistry) (and course title in English) 2nd year students or above Number of credits 2 Year/semesters 2020/Second semester Target year Days and periods Tue.1 Language of instruction Japanese Class style Lecture [Overview and purpose of the course] [Course objectives] [Course schedule and contents] ,2times, ,2times, ,3times, ,3times, ,3times, ,1time, ,1time, [Course requirements] None [Evaluation methods and policy] [Textbooks] Continue to 生命化学基礎 (工業基礎化学) (2)↓↓↓

Course nu	umber	U-ENO	G29 19	9124 LJ11						
Course title (and course title in English)	rse title d course in scientific English					Inst nam and of a	Graduate School of Engineeri Professor,MORI YASUO Graduate School of Engineeri name, job title, and departmen of affiliation			
						L			Part-time Lect	arer,BOLSTAD, Francesco
Target yea	r 31	rd year students o	or above	Number	of cred	lits	2	Year	/semesters	2020/Second semester
Days and perio	ods Me	on.3	Class	style	Lectur	e			Language of instruction	English
[Overview	and	purpose o	f the	course]						
To understa especially E	nd scie nglish	entific and te for practica	chnol 1 use i	ogical Engl n the field	lish, and of scien	l to l ce ai	earn ho nd techr	w to e: iology	xpress your i	deas in English,
[Course o	bject	ives]								
To play an a quotpractica questions, o	ctive i lquot bject,	role internati English is ga methods, res	ionally ained t sults, d	as scientis hrough und liscussion c	sts and e lerstand of the str	engir ling 1 udy i	neers, ar the way in Engli	1 abilit to wri sh.	y for express ite and explai	ing things in n backgrounds,
[Course s	ched	ule and co	ntent	s]						
,1time,Work ,4times,To u ,4times,Tecl ,5times,Shor	inders inders inical rt pres	and talk with tand method writing. entations.	s of ex	ive speaker	1 scienti	ific p	apers a	nd rep	orts.	
[Course re	equir	ements]								
None										
[Evaluatio	n me	thods and	polic	;y]						
Regular eas	y repo	rts.								
[Textbook	s]									
None										
[Referenc	es, et	tc.]								
(Referen	nce b	ooks)								
1								С	Continue to 科学	英語(工業基礎化学)(2)↓↓↓

科字英語	(工業基礎化学)	(2)
科子央語	(丄業基礎化子)	(2)

 [N/A) [Study outside of class (preparation and review)] [X/A (Other information (office hours, etc.)) (vailable according to students#039 requests. Please visit KULASIS to find out about office hours. [Courses delivered by instructors with practical work experience] 1) Category An omnibus course delivered by invited lecturers and guest speakers from different companies, etc 2) Details of instructors' practical work experience related to the course 3) Details of practical classes delivered based on instructors' practical work experience 	[Study outside of class (preparation and review)] i/A (Other information (office hours, etc.)) tvailable according to students#039 requests.
Study outside of class (preparation and review)] A Other information (office hours, etc.)) vailable according to students#039 requests. Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical work experience] 0 Category 1 onnibus course delivered by invited lecturers and guest speakers from different companies, etc 0 Details of instructors' practical work experience related to the course 1 Details of practical classes delivered based on instructors' practical work experience	Study outside of class (preparation and review)] A Other information (office hours, etc.)) railable according to students#039 requests.
A Other information (office hours, etc.)) vailable according to students#039 requests. Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical work experience]) Category n omnibus course delivered by invited lecturers and guest speakers from different companies, etc) Details of instructors' practical work experience related to the course) Details of practical classes delivered based on instructors' practical work experience	A (Other information (office hours, etc.)) vailable according to students#039 requests.
(Other information (office hours, etc.)) vailable according to students#039 requests. Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical work experience] () Category in omnibus course delivered by invited lecturers and guest speakers from different companies, etc 2) Details of instructors' practical work experience related to the course 3) Details of practical classes delivered based on instructors' practical work experience	(Other information (office hours, etc.)) vailable according to students#039 requests.
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Please visit KULASIS to find out about office hours. Courses delivered by instructors with practical work experience] 1) Category an omnibus course delivered by invited lecturers and guest speakers from different companies, etc 2) Details of instructors' practical work experience related to the course 3) Details of practical classes delivered based on instructors' practical work experience 3) Details of practical classes delivered based on instructors' practical work experience	
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 Category n omnibus course delivered by invited lecturers and guest speakers from different companies, etc 2) Details of instructors' practical work experience related to the course 3) Details of practical classes delivered based on instructors' practical work experience 	[Courses delivered by instructors with practical work experience]
2) Details of instructors' practical work experience related to the course 3) Details of practical classes delivered based on instructors' practical work experience	 Category An omnibus course delivered by invited lecturers and guest speakers from different companies, et and a speakers from different companies (speakers) (speaker
3) Details of practical classes delivered based on instructors' practical work experience	2) Details of instructors' practical work experience related to the course
	3) Details of practical classes delivered based on instructors' practical work experience

科学英語(工業基礎化学)(2)

(Related URLs)

(N/A)

[Study outside of class (preparation and review)] N/A

(Other information (office hours, etc.))

Available according to students#039 requests.

*Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

Category An omnibus course delivered by invited lecturers and guest speakers from different companies, etc.

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

土面鉱

Course number U-ENG29 19124 LJ11 Course title (and course English) 科学英語(工業基礎化学) Instructor's instructor's cientific English Graduate School of Engineering Professor.MRRAWA MASAHIR Graduate School of Engineering Associate Professor.MRRAWA MASAHIR Graduate School of Engineering Associate Professor.MRRAWA MASAHIR Ordersor.MRRAWA MASAHIR Graduate School of Engineering Associate Professor.MRRAWA MASAHIR Part im Letture.BOLSTAD, Francesc 2020/Second senester To understand scientific and technologic.E ICourse objectives] Lecture upge/instant professor.MRRAWA Part imported for expressing things in quotipracticalquot English is gianed through understanding the way to write and explain backgrounds, questions.object. methods, results, discussion of the study in English. ICourse schedule and contents] Guidance.2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of DS in network security and how machine learning can help the intrusion detection by Machine Learning frimes,Learn the methods of intrusion detection performance. Presentation, 1time,Based on the exercise, students and instructors. Itrusion Detection by Machine Learning frimes,Learn the methods of intrusion detection using machine learning, and discuss it w											不又利	
Course title (and course) 科学英語 (工業基礎化学) Scientific English Instructor's name, job title, and department, of affiliation Graduate School of Engineering Professor,SNIRAKAWAMASAHIRG (Faduate School of Engineering Associate Professor,SNIRAKAWAMASAHIRG raduate School of Engineering Professor,SNIRAKAWAMASAHIRG (Faduate School of Engineering Professor,SNIRAKAWAMASAHIRG raduate School of Engineering Professor,SNIRAKAWAMASAHIRG raduate School of Engineering Professor,SNIRAKAWAMASAHIRG (Faduate School of Engineering Professor,SNIRAKAWAMASAHIRG raduate School of Engineering Professor,SNIRAKAWA raduate School of Engineering Professor,SNIRAKAWAMASAHIRG raduate School of Engineering Professor,SNIRAKAWAMASAHIRG raduate School of Engineering Professor,SNIRAKAWA raduate School of School of Engineering Professor,SNIRAKAWA raduate School of Engineering Professor,SNIRAKAWA raduate School of the Courses raduate School of How this class to perfect atacks. Intrusion Detection by Signature-Based IDS, Stimes, Learn the mechanism of intrusion detection by signature- based IDS by st	Course nu	umber	U-EN	G29 19	0124 LJ11							
Target year Indyear students or above Number of credits 2 Year/semesters 2020/Second semester Days and periods Mon.4 Class style Lecture angupt dimbod English IOverview and purpose of the course] To understand scientific and technological English, and to learn how to express your ideas in English, especially English for practical use in the field of science and technology. English IOverview and purpose of the course] To understand scientific and technological English, and to learn how to express your ideas in English, especially English for practical use in the field of science and technology. English ICourse objectives] To play an active role internationally as scientists and engineers, an ability for expressing things in quotracticalquot English is gained through understanding the way to write and explain backgrounds, questions, object, methods, results, discussion of the study in English. ICourse schedule and contents] Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, stimes, Learn the mechanism of intrusion detection by signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, 7times, Learn the methods of intrusion detection performance. <t< td=""><th>Course title (and course title in English)</th><td colspan="6">Course title and course Atle in English)</td><th>ructor's ne, job ti departn ffiliation</th><td>tle, nent</td><td colspan="3">Graduate School of Engineering Professor,MORI YASUO Graduate School of Engineering Professor,SHIRAKAWA MASAHIRC Graduate School of Engineering Associate Professor,MIKI KOUJI</td></t<>	Course title (and course title in English)	Course title and course Atle in English)						ructor's ne, job ti departn ffiliation	tle, nent	Graduate School of Engineering Professor,MORI YASUO Graduate School of Engineering Professor,SHIRAKAWA MASAHIRC Graduate School of Engineering Associate Professor,MIKI KOUJI		
Target year pit year students or above Number of credits 2 Teal/Settinesters 2020/Second semester Days and periods Mon.4 Class style Lecture angup dirited English IOverview and purpose of the course] To understand scientific and technological English, and to learn how to express your ideas in English, especially English for practical use in the field of science and technology. English English To play an active role internationally as scientists and engineers, an ability for expressing things in quotractical quote factical quotientications, object, methods, results, discussion of the study in English. To course schedule and contents] Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, stimes, Learn the mechanism of intrusion detection by signature-based IDS and adding signatures to detect attacks. Intrusion Detection by Machine Learning, 7times, Learn the methods of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, Itime, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors. English ICourse requirements] None Intrusion Detection	.			.				2	Von	r/comostors	Iner,BOLSTAD, Francesco	
Days and periods Mon.4 Class style Lecture anape #instant English IOverview and purpose of the course] To understand scientific and technological English, and to learn how to express your ideas in English, especially English for practical use in the field of science and technology. Image #instant Image #instant </th <th>Target yea</th> <th>r Srd</th> <th>year students of</th> <th>or above</th> <th>Number</th> <th>of crea</th> <th>Its</th> <th>2</th> <th>rea</th> <th>i/semesters</th> <th>2020/Second semester</th>	Target yea	r Srd	year students of	or above	Number	of crea	Its	2	rea	i/semesters	2020/Second semester	
IOverview and purpose of the course] To understand scientific and technological English, and to learn how to express your ideas in English, especially English for practical use in the field of science and technology. [Course objectives] To play an active role internationally as scientists and engineers, an ability for expressing things in quopractical quote fields is sained through understanding the way to write and explain backgrounds, questions, object, methods, results, discussion of the study in English. [Course schedule and contents] Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, Stimes,Learn the mechanism of intrusion detection by signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, Itime,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] None [Peraluation methods and policy] Regular easy reports. [Textbooks] None [Referenc	Days and perio	ods Mor	1.4	Class	style	Lecture	•			Language of instruction	English	
To understand scientific and technological English, and to learn how to express your ideas in English, especially English for practical use in the field of science and technology. [Course objectives] To play an active role internationally as scientists and engineers, an ability for expressing things in quootpracticalquot English is gained through understanding the way to write and explain backgrounds, questions, object, methods, results, discussion of the study in English. [Course schedule and contents] Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, 5times, Learn the mechanism of intrusion detection by signature- based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, 7times, Learn the methods of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, Itime, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] None [Evaluation methods and policy] Regular easy reports. [Textbooks] None [References, etc.] (Reference books) N/A	[Overview	and p	urpose o	f the o	course]							
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To play an active role internationally as scientists and engineers, an ability for expressing things in quotpracticalquot English is gained through understanding the way to write and explain backgrounds, questions, object, methods, results, discussion of the study in English. [Course schedule and contents] Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] None [Evaluation methods and policy] Regular easy reports. [Textbooks] None [References, etc.] (Reference books) N/A	[Course o	bjectiv	es]									
[Course schedule and contents] Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,Stimes,Learn the mechanism of intrusion detection by signature-based IDS and datacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, Ttimes,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] None [Pevaluation methods and policy] Regular easy reports. [References, etc.] (Reference books) N/A	To play an a quotpractica questions, of	ctive ro lquot E bject, m	le internat nglish is g ethods, res	ionally ained tl sults, d	as scientis hrough und iscussion o	sts and e lerstand of the stu	ngii ing idy i	the way in Engli	n abili v to wr ish.	ty for express ite and explai	ing things in n backgrounds,	
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, Stimes,Learn the mechanism of intrusion detection by signature- based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, Itime,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] None [Evaluation methods and policy] Regular easy reports. [Textbooks] None [References, etc.] (Reference books) N/A Continue to 科学英語(工業基礎化学)(2)↓↓	[Course s	chedu	e and co	ntents	s]							
[Course requirements] None [Evaluation methods and policy] Regular easy reports. [Textbooks] None [References, etc.] (Reference books) N/A Continue to 科学英語(工業基礎化学)(2)↓↓	detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature- based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning and diverse it with other students and instructors											
None [Evaluation methods and policy] Regular easy reports. [Textbooks] None [References, etc.] (Reference books) N/A Continue to 科学英語(工業基礎化学)(2)↓ ↓	[Course re	eauirer	nents]									
[Evaluation methods and policy] Regular easy reports. [Textbooks] None [References, etc.] (Reference books) N/A Continue to 科学英語(工業基礎化学)(2)↓↓.	None											
Regular easy reports. [Textbooks] None [References, etc.] (Reference books) N/A Continue to 科学英語(江業基礎化学)(2)↓↓	[Evaluatio	n meth	hods and	polic	y]							
[Textbooks] None [References, etc.] (Reference books) NA Continue to 科学英語(工業基礎化学)(2)↓↓	Regular easy	y report	5.	-								
None [References, etc.] (Reference books) NA Continue to 科学英語(工業基礎化学)(2)↓↓	[Textbook	s]										
[References, etc.] (Reference books) N/A Continue to 科学英語(工業基礎化学)(2)↓↓	None											
(Reference books) N/AContinue to 科学英語(工業基礎化学)(2)↓↓	[Referenc	es, etc	.]									
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Course title (and course little in lengths) U-ENG23 33290 SJ15 U-ENG23 33290 SJ14 Course title (and course little in lengths) Phytical CF I a. (工業基礎化学) Phytical Chemistry Ia (Fundamental Chemistry and periods. Instructor's name, job title, and points. Graduate School of Engineering Associate Photoson TERANURA KRTARO Omer for Phomoson Identify Phyter School of Engineering Associate Photoson Identify Identi											未更新
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物理化学 I a(工業基礎化学)(2)	物理化学 I b(工業基礎化学)(2)
[Textbooks]	To de Carebell - Calination and the dimension and the dimensional Calination of "anterior" to a destinate
Not used	statistical mechanics, away from the hysterical/conventional definition of entropy in line of classical
	thermodynamics. The discussions on "statistical entropy" will be extended to represent a variety of
	intensive variables of some practical system via the concept of "Ensemble", followed by the discussions on
[References, etc.]	the feasibility of statistical mechanics for understanding the physical properties of matters/chemical reactions.
(Reference books)	
W. J. Moore著,藤代亮一訳『ムーア「物理化学(上)」第4版』(東京化学同人) ISBN:ISBN4-8079-	
0002-1 (第6, 7, 8, 9章) Datar Atling + Iulia da Daula著 山野元公・上田書洋・廟村米路・北河庫路訳『アトキンフ「物理化	[Course objectives]
$\phi(F)$ 第10版[(東京化学同人) ISBN:ISBN978-4-8079-0908-7 (第4, 5, 6章)	物理化学基礎及び演習で学んだことをもとにして、
Peter Atkins・Julio de Paula著,中野元裕・上田貴洋・奥村光隆・北河康隆訳『アトキンス『物理化	1) エントロビーの統計力学的な定義の理解と概念の会得
学(下)」第10版』(東京化学同人) ISBN:ISBN978-4-8079-0909-4 (第20, 21章)	2) 就訂力字的に表現できる糸の把握 1) 現実的たるへの最近た日世にたアンサンプルの考えての今復
	4)系を表現するさまざまな巨視的変数への展開
[Study outside of class (preparation and review)]	5)分光技術・材料や化学反応への応用
講義した内容を復習して、 期末試験に臨むこと。	を具体的な学習目標とします。基礎統計力学をもとにして、応用熱力学・化学反応理論などの分野
(Other information (office hours, etc.))	でこれを使いこなすための能力を養っことか目的です。今後誰もか目にする・耳にする情報を止し ノ判断するために、レアル重要な輝金、老うての一つレルア体計も受われうます。
注音:「物理化学I(工業基礎化学)」を すでに単位修得した学生が「物理化学Ia(工業基礎化	< 刊刷りるために、こしも重要な概念・与ん力の一つこしし秋日力子を捉んより。
学)」を履修し単位修得した場合、増加単位となる。	最終的には、Maxwell-Boltzmannによる古典統計力学の体系で系を表現することの限界と、「なぜ量
※オフィスアワーの詳細については、KULASISで確認してください。	子論的な取扱いが必要になるのか?」を理解し、一般的な輻射の理論をもとにした量子力学的取り
	扱いの要請とは異なる、「熱」を中心とした物質の性質を表現するための量子力学的な取扱いの要
*Please visit KULASIS to find out about office hours.	前に主るここを日泊します。
	Targets:
	1) Definition of entropy by statistical mechanics and understanding the concepts of entropy via mathematical
	derivations
	2) Requisites for statistical mechanical approach to the systems
	4) Derivation of a series of intensive variables representative of systems
	5) Feasibility of the above concepts to understand the practical systems, spectroscopic techniques, physical
	properties of matters, and practical chemical reactions.
	Finally we arread to the limitations of the algorization to the location to the design of superson
	mechanical treatment for the thermodynamic bodies: unlikely to the case for the requirements of the
	treatments in atomic structures/blackbody radiations. We finally discuss on the gap between Maxwell-
	Boltzmann systems and Fermi-Dirac/Bose-Einstein statistical systems.
	[Course schedule and contents]
	[course senedule and contents] 空1回・纮社力学の西班互動学的進進
	オコロ・MITI パテン//デジーテレンデア開 第2回:エントロピー:執力学的アプローチと統計力学的定義
	第3回:ボルツマンの原理へと至る過程とクラウジウスの理論
	第4回:並進運動の速度分布
	第5回:相転移における統計力学的取り扱い: 気化と気体の熱容量
	おの時代の100000000000000000000000000000000000
	Continue to 物理化字丨b(工業基礎化字)(3)↓↓↓

	第1回:統計力学の原理と数学的準備
	第2回:エントロピー:熱力学的アプローチと統計力学的定義
	第3回: ボルツマンの原理へと至る過程とクラウジウスの理論
	第4回:並進運動の速度分布
	第5回:相転移における統計力学的取り扱い: 気化と気体の執容量
	第6日・気体分子の連度分布と分離関数
	和DEL XIP7 J の速度力中で方面因数
	L
	Continue to 物理化学 I b(工業基礎化学)(3)↓↓↓
	物理化学丨b(工業基礎化学)(3)
	L
ıg	第7回:カノニカルアンサンブルと分配関数
	第8回:分配関数とさまざまな熱力学量の関係
h	第6回:統計力学の基礎に関する演習と列達直確認
SHI	第7回・秋田1万丁シン金硬に因うる(英日に対定及唯地)
	第11回:ブラウン連動と衝突・拡散理論
nester	第12回:アレニウスの式の導出と解釈
licster	第13回:活性錯合体理論と絶対反応速度論
	第14回:古典的取り扱いの限界
	第14回, 口來印从今近後, 2007年
	第13回・粒印刀子の応用液用と利建及確認
ぼて	1. Principles of Statistical Mechanics and Entropy; mathematical backgrounds
	2. Definition of Entropy: Approaches from statistical mechanics and conventional thermodynamics
冬在	3. Boltzmann Principles: Historical reviews starting from the discussions by Clausius
木口	4. Translational Motion of Atoms Molecules
文配	4. Translational Worldon of Atomis/Worldures
と思	5. Phase Transitions revisited by Statistical Mechanical Approaches: Heat Capacity of Matters
も「	6. Distribution of Molecular Motions in Gases: Partition Functions
· _ ·	7. Canonical Ensembles: Partition Functions
,	8 A Varieties of Intensive Variables: in relation to macroscopic thermodynamic systems
	0. En demontal Statistical Machania includio Encarias
	2. Fundamental Statistical Mechanics including Exercise
記こ	10. Entropy Elasticity
指し	11. Brownian Motions and the Collision Theory of Particles
	12. Arrhenius Equation and Law
	13. Evring Equations and the Transition State Theory
:⇒L#h	14. Limitations of Classical Statistical Machanics towards Quantum Statistical Machanics
は計照	14. Elimitatolis of Classical Statistical Mechanics Iowards Quantum Statistical Mechanics
特に	15. Statistical Mechanics Applications including Exercise
計理	
は特	[Course requirements]
	None
中能	
1八法	[Evaluation methods and policy]
1 <u> </u>	いての人」ののナナのます。「よ物が古いナカゼロ」で新年しします。
いと	以下のA, Bの方式のうち, 点数が高い力を抹用して計画とします。
	A方式:期末テスト(100点)のみ
	B方式:出席とOuestion Paper(各回2点)+ 中間テスト + 期末テスト
5 110	
ue -	対験にわけてタ 新姿料のせたい ひけ甘木的に 初めませり
ie to	武駅にわりる台種貝科の対う2000は基本内IIに応めまでん。 古田ニューのグ田についてはハロリアは必須でも必須でと後の東日たハまナステルドとります。
ever	中間アストの結果については公開KULASISを通して字精番号を公表することがめります。
liate	
he	※注意※ 中間・期末試験の再試験・追試は行いません。
nice	
liics	Scores will be made by the following dual ways (finalized by the better one)
to	scoles will be made by the following dual ways (mainzed by the better one)
	1) Active participation + midterm examination + final examination in total
	2) Final examination only
10	
-00	No makeup even after the final even institution
	ivo makeup eram arter tile inidi examination.
2)↓↓↓	
	Continue to 彻理化学 I b(上集基礎化学)(4) 4 4 4

Course tit Graduate School of Engineerin name, job title, and department of affiliation 物理化学 Ib(工業基礎化学) (and course Professor.SEKI SYUHEI title in Physical Chemistry Ib (Fundamental Chemistry Institute for Chemical Research Professor,WATANABE HIRC English) 2nd year students or above Number of credits 2 Year/semesters 2020/Second sen Target year Days and periods Thu.2 Class style Language of instruction Japanese Lecture [Overview and purpose of the course] [Overview and purpose of the course] 物理化学は「繰り返し」の学問です。固体物理学とともに、おなじ概念を何度も何度も考え直 とで、最終的に理解が進む分野でしょう。さまざまな自然科学の分野で、「概念(コンセプト を会得できるまでには長い時間を要します。さまざまなデータや現象に接したときに、「この を変えればこのデータは・この現象はこのような変化をするはずだ」、「このデータ・現象を している因子は何なのか、それを調べるためにはこの条件を変化させてみよう」、などが自然 い浮かぶというのが例えば「概念の体得」にあたります。そういう意味では熱統計力学はとて 物理化学」らしい分野でもあります。そして、いったん考えることをやめてしまったら、多分 生理解が進まずに、物理化学的なもののとらえ方ができなくなってしまうのでしょう。 この講義では、単なる知識ではない「物理化学的な考え方」を通じ、社会全般・自然界で引き される「現象」を定量的に理解するためのツールの一つとして活用できるようになることを目 ています。 物理化学分野の概念や理論構成のなかでも、私自身が最も「美しいもの」と思う統計力学・統 力学の体系を端緒に、授業の前半では主に「エントロピー」に着目した考え方を展開します。 古典的・歴史的な熱力学による間接的なエントロピーの発見と応用の展開からは一旦離れ、統 論に基づいた理論的なエントロピーの定義をとに、現実的な系を表現していきます。後半で に「エントロピー」をもとにした物質の性質や化学反応への応用を試みます。 ややレトリックな表現かもしれませんが、分子の結晶のような、エントロピーの小さな極限の は、だれが見ても美しいと考えると思いますが、さまざまな分子の個性を排除して、エントロ の極大状態にある熟統計力学系において、それを支配する方程式群は、前者よりももっと美し も見えることの体現を目指します。 Repetition of thinking again and again is only the way to master the Physico-Chemical concepts; there is shortcuts to learn them in principle. This is also the case to learn the concepts in Solid State Physics. One you master the concepts into yourselves, you will never forget and lose them. It will take a bit longer time master them, but everybody are able to master them by the "simple repetition of thinking", however he acquire the concepts if stop the thinking. Mastering the concepts will allow you to judge/make an immedi decision on critical factors controlling data/phenomena in our natural systems, or allow you to interpret th factors changing the systems. This is the "Master of (Physico-Chemical) Concepts". Statistical mechan and thermodynamics, the major target of the present class, are representative of Physical Chemistry due heir versatility to reproduce our practical systems. The major aim of the present class is: To understand macroscopic phenomena in our practical/natural system quantitatively by an use of Physic

Course number U-ENG26 36205 LJ72

物理化学丨b(工業基礎化学)(4)
Tradical al
ムーア 『物理化字(上)』(東京化字向人)ISBN:978-480/900022
[References, etc.]
(Keterence Dooks) 吉田武 『オイラーの贈物』(市海大学出版会)ISBN:078 //486018636
Richard P. Feynman Feynman Lectures on Physics Vol11 ISBN:978-0465024933
田崎晴明『統計力学I』(培風館)ISBN:978-4563024376
[Study outside of class (preparation and review)]
" Formi#完" と言うるとこた
・帰宅中などの時間を活用してでも、随時身の回りの現象について考え、事象を定量的に見積もっ
てみることをお勧めします。
man a state a a a state
Think quantitatively and calculate anything.
(Other information (office hours, etc.))
オフィスアワーは授業日の夕方17時から2時間 桂キャンパス Bクラスタ A4-009号室
甘木duに質問はOur-ting Deresを任用してください。
墨本山に負向なQuestion raperを沿用してくたとい。 場合によってはe-mailによる質問も受け付けます。
Welcome not only the questions during/at the end of classes, but also the question papers.
注音:「物理化学丨(工業基礎化学)」をすでに単位修得している学生が「物理化学丨b(工業基
礎化学)」を履修し単位修得した場合、増加単位となる。
※オノオス/ ソーの計補に JV・Cは、KULASIS C唯応してくたさい。
*Please visit KULASIS to find out about office hours.

 [Study outside of class (preparation and review)]

 For lectures using English textbooks, prepare in advance and understand the outline of the contents.

 Since we pose homework of 1-3 problems from the end of the chapter every week, please submit the report at the bigining of next lecture.

 (Other information (office hours, etc.))

 Implement as many exercises as possible according to the progress of the lecture and try to acquire the content of the lecture. Impose tasks every week. Bring a scientific calculator.

 *Please visit KULASIS to find out about office hours.

 [Courses delivered by instructors with practical work experience]

 (1) Category

 A course with practical content delivered by instructors with practical work experience

 (2) Details of instructors' practical work experience related to the course

 A lecture derived from an instructor' s practical work experience outside of academia

 (3) Details of practical classes delivered based on instructors' practical work experience

物理化学 I (化学工学)(2)

[References, etc.] (Reference books)

Course numb	ber	U-EN	G27 2	7301 LJ60							
Course title (and course title in English)	course title and course title in inglish) 初理化学 I (化学工学) Physical Chemistry I (Chemical Engineerin								Graduate Sch Professor,MA Graduate Sch Associate Pro Graduate Sch Associate Professor,	nool of Engineering AE KAZUHIRO nool of Engineering ofessor,MAKI TAISUKE nool of Engineering TANABE KATSUAKI	
Target year	2nd y	2nd year students or above Number of credits 2 Year/semesters 2020/Second seme									
Days and periods	ays and periods Wed.2 Class style Lecture Language distinction Japanese										
[Overview ar	nd pu	urpose o	of the	course]							
Thermodynami	cs is a	an essenti	al sub	ject to learr	n chemi	cal e	ngineer	ing. T	his class provi	ides an elementaly	
level of chemic	al eng	gineering	therm	odynamics.							
[Course obje	ctive	es]									
The goal is to le	earn t	he way to	apply	y the basics	of therr	nod	ynaaics	to che	mical process	caluculations.	
[Course sche	edule	e and co	nten	ts]							
Introduction,0.5	Stime	s,									
The First Low of	of Th	ermodyna	mics	and Other E	Basic Co	nce	pts,0.5ti	mes,			
Volumetric Pro	pertie	es of Pure	Fluid	ls,1.5times,							
Thermochemist	ry,1.:	5times,									
The Second Lo	w of '	Thrmody	namic	s,2times,							
Confirmation of	f the	Level of A	Attain	ment 1,1ti	ime,						
Balance for Ope	en Sy	stems,2ti	mes,	20							
Dhara E milihai	c Pro	perties of	Fluid	s,2times,							
Application of	um, I Thorr	time, nodvnam	ics to	Industrial D	rocassa	2+	imas				
Confirmation of	f the	Level of a	Attain	ment 2 1ti	ime	s ,2t	mies,				
Communation o	i uic		xuum		inic,						
[Course requ	iren	nents]			· .						
The basic know	ledge	e of physi	cal ch	emistry is r	equired.						
[Evaluation r	neth	ods and	poli	cy]							
The score is eva	iluate	ed by repo	orts (h	omeworks)	and exa	min	ations.				
[Textbooks]											
J. M. Smith and	H. C	C. Van Ne	ss : In	ntroduction 1	to Chen	nical	Engine	ering	Thermodynan	nics, Eighth Edition	
(McGraw-Hill I	nterr	national) i	sbn{}	{97812596	96527}						
+								,	Continue to mm		
								,	Jonuliue to 彻哇	:iu+ (10+⊥+) (4)↓↓↓	

												未更新
Course nu	ımbe	er (J-ENC	327 2	7302 LJ55	U-EN	G27	27302	LJ76			
Course title (and course title in English)	e title ourse 無機化学 I (化学工学) Inorganic Chemistry I (Chemical Engineering) of affiliation							tle, hent	Diraduate School of Lingan Ching Professor, SAKKA TETSUO Institute of Advanced Energy Professor, NOHIRA TOSHIYUKI Graduate School of Global Environmental Studie Professor, ABE TAKESHI Graduate School of Engineering Physical School of Global Environmental Studie Graduate School of Global Environmental Studie Associate Professor, FUKUTSUKA TOMOKAZ Graduate School of Global Environmental Studie Associate Professor, FUKUTSUKA TOMOKAZ Graduate School of Global Environmental Studie Associate Professor, ABE RYUU Graduate School of Global Environmental Studie Associate Professor, MIYAZAKI KOUHE			
Target yea	r	2nd year st	udents o	r above	Number	of cred	its	2	Year	/semesters	2020	/Second semester
Days and perio	ods N	Aon.2		Class	s style	Lecture	e			Language of instruction	Japar	iese
[Overview	and	d purpo	ose o	f the	course]							
In quotInorganic Chemistry I (Chemical Engineering)quot, following five topics will be explained: 1) Acids and bases of inorganic compounds 2) Oxidation and reduction 3) Concept of group theory, which is necessary for the understanding of molecular structures 4) Fundamentals of coordination compounds, 5) Corrosion												
[Course o	bjec	ctives]										
[Course s	che	dule ar	d co	ntent	s]							
Asids and B Oxidation at Corrosion,3 Molecular S Coordination Evaluation,1	ases, nd R imes ymn n con time	,4times, eductior s, netry,4ti mpound: 2,	n,4time mes, s,2tim	es, es,								
[Course re	equi	remen	ts]									
Based on the	e unc	lerstand	ing of	quotł	Fundamenta	ıl Inorga	nic	Chemis	tryquo	t, lectures wi	ll be d	one.
[Evaluatio	n m	ethods	and	polic	су]							
Grading is b submitted di	ased iring	on the o	examii irse m	natior ay be	held at the counted in	end of evaluati	the on.	semeste	r. The	attendance ra	te and	the reports
[Textbook	s]											
norganic Chemistry (4th edition) P. Atkins、T. Overton、J. Rourke、M. Weller、F. Armstrong isbn{} { 1199264635] Continue to 無機化学 I (化学工学)(2) ↓ ↓												

無機化学Ⅰ(化学工学)	(2)	
[References, etc.]		
(Reference books) Supplemental explanation	will be delivered at the first class.	
[Study outside of clas	s (preparation and review)]	
(Other information (o	ffice hours, etc.)	
*Please visit KULASIS to	find out about office hours.	
[Courses delivered by	instructors with practical wor	k experience]
(1) Category		
A course with practical co	ntent delivered by instructors with p	practical work experience
(2) Details of instructors'	practical work experience related to	o the course
(3) Details of practical class	sses delivered based on instructors'	practical work experience

[Study outside of class (preparation and review)] After each class of vector analysis, homework is given to students, and their solution will be shown at the class in two weeks. It is highly recommended that students solve them before the class. (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours. 未更新 Course number U-ENG27 37304 LJ60 Course tit Graduate School of Engineering 流体系分離工学 name, job title (and course Professor.SANO NORIAKI title in Fluid-Phase Separation Engineering and department of affiliation Graduate School of Engineering Associate Professor,NAKAGAWA KYUUYA English) Year/semesters Target year Brd year students or above Number of credits 2 2020/First semester Days and periods Thu.1 Class style inguage of instruc Lecture Japanese [Overview and purpose of the course] Chemical Processes consist of variety of units and operations. Here, distillation, gas absorption, extraction, and so forth which aim substance separation and purification will be lectured from basic principle and phenomena to kinetics and quantitative expressio

[Course objectives]

By taking typical separation operations as examples, mass balance, the students will understand the concept of mass transfer, and equilibrium, and they will master how to use them in quantitative manner. Additionally, they cultivate their ability to use differential contact operation and stage operation.

[Course schedule and contents]

化学工学数学 I (化学工学)(2)

[Evaluation methods and policy]

Basic knowledge on differentiation, integral, matrix operations

Grade will be evaluated by (i) the examination at the end of semester and (ii) homework during semester.

戸田 盛和 『ベクトル解析 (理工系の数学入門コース 3)』(岩波書店)ISBN:400007732 布川 昊 『ラプラス変換と常微分方程式』(昭晃堂)ISBN:4785670215

(Reference books) 佐藤 總夫 『自然の数理と社会の数理』(日本評論社)ISBN:4535603014 大岩 正芳 『化学者のための数学十講』(化学同人)ISBN:4759800085

[Course requirements]

[Textbooks]

[References, etc.]

Fundamental of mass separation and mass purification,3times,Principles and methods in substance separation and purity, which are important for chemical process, will be lectured. Fundamentals of molecular diffusion and mass transport will be explained.

gas absorption, 4times, Equilibrium of gas with liquid, diffusion in liquid phase, gas diffusion rate, and design of gas absorption will be lectured, and the students will understand the idea of differential contact operation. distillation 4/times, Method to correlate the gas-liquid equilibrium will be lectured, and fundamental principle of distillation operation is explained as operation for purification of liquid mixture. The design method of continuous rectifying trays tower will be lectured as the most simple multi-stage contact operation method. extraction,3times,Method to correlate the gas-liquid equilibrium will be lectured, and fundamental principle of distillation operation is explained as operation for purification of liquid mixture. The design method of continuous rectifying trays tower will be lectured as the most simple multi-stage contact operation method. Feedback class, I time, A supplementary lecture or exercise class will be conducted as an additional class to give advanced knowledge or to confirm the attainment level of the course goals on diffusion, gas absorption and distillation.

[Course requirements]

Introduction to Industrial Chemistry (Material and energy balances), Fundamentals of Chemical Process Engineering

[Evaluation methods and policy]

Evaluation will be made based on midterm exam, routine exam at the end of semester, and reports often giver in lectures

[Course schedule and contents] Vector Analysis, (7-times) We learn the following ite Vector Analysis (including differentiation of vectors) 2. Integration of vectors\ Integral Theorem (Gauss divergence Theorem, Stokes Theorem) Ordinary differential Equation, (4-times) We learn that various physical phenomena seen in our daily life can be described by ordinary differential equations.

U-ENG27 37303 LJ61 U-ENG27 37303 LJ76

Lecture

The aim of this class is to learn the fundamental mathematics commonly used in Chemical Process Engineering, Chemical System Engineering, such as ordinary differential equations, Laplace transform

methods to solve differential equations by using Laplace transformation, and vector analysis. The style of the

To attain the mathematical knowledge and skill how to calculate a line, surface and volume integrals, and to calculate differentiations of scalar and vector fields, and to solve ordinal differential equations by using Laplace transformations.

name, job title, and department of affiliation

Year/semesters

inguage of instruc

As a method to solve 1st and 2nd order ordinary differential equation, the following methods will be learned Method of separation of variables Method of variation of parameters

Course number

化学工学数学 I (化学工学)

[Overview and purpose of the course]

matics for Chemical Engineering I (Chemical Eng

2nd year students or above Number of credits 2

Class style

Course tit

(and cours

Target year

Days and periods Thu.1

class is mainly lecture style.

[Course objectives]

title in

English)

Laplace Transformation, (3-times) After learning the historical background and the discovery of Laplace transformation, we learn how to solve ordinal differential equations and integral equations by using Laplace transformation, and also learn applications of Laplace transformation to definite integration.

Confirmation of the level of attainment, (1-time) Confirmation of the level of attainment comments on the term-end Exam

Continue to 化学工学数学Ⅰ (化学工学) (2)↓↓↓

Graduate School of Engineering Associate Professor, NAGAMINE SHINSUKI

Graduate School of Engineering Associate Professor, TANIGUCHI TAKASH

Japanese

2020/Second semester

去伏豕公離工学(2)	
II 件示力離土于(2)	
Taythooks]	
uotGendai Kagaku Kogaku quot K. Hashimoto and F. Ogino (Sangyo Tosho) isbn{}{478282	50953
uotKanso Gijutu Jitsumu Nyumon,quot H. Tamon (Nikkan Kogyo Shinbun) isbn{}{9784526	069697}
References, etc.]	
(Reference books)	
uotKagakukikai no Riron to Keisan,quot S. Kamei (Sangyo Tosno) ison{}{4/82825099}	
Study outside of class (preparation and review)]	
(Other information (office hours, etc.))	
ecture will be given basen on the textbook. Exercise problems will be given to students to dee	pen
nderstanding in due course.	
Please visit KULASIS to find out about office hours.	

Course title (and course title in English)	化学 Math	工学数学II ematics for (Chemi	cal Engine	ering II	Instr nam and of af	ructor's ne, job tit departm ffiliation	tle, nent	Graduate Scl Associate Profes Graduate Scl Associate Profe	nool of Engineering ssor,NAGAMINE SHINSUI nool of Engineering ssor,TANIGUCHI TAKAS	
Target year Brd year students or above Number of credits 2 Year/semesters 2020/First semester											
Days and peri	ods Fr	i.1	Class	s style	Lecture	e			Language of instruction	Japanese	
[Overview	and	purpose o	f the	course]							
We will give subjects in t Partial Diffe	e a sei he che rentia	ries of lectur emical engin Il Equations.	es on 1 eering	course, es	nathema pecially	tical on P	knowle robabil	edge a ity and	nd skills when d Statistics, Fo	n students will learn ourier Transformation	
[Course o	bject	tives]									
Goal of the	class i	is that studen	its atta	in necessar	y mathe	emati	ical kno	wledg	e that is need	ed when students lear	
subjects in t	he che	emical engin	eering	course.							
[Course s	ched	ule and co	ntent	sl							
 Definiti Definiti Stochas (a) Prof (b) Ave (c) Mor (d) Multi-s (a) simu (b) mar (c) cova Probability 1-5. Various (a) bino (b) Paris (c) Gau 1-6. Law of Central Normal	on an onal p tic va aabilit vaaabilit vaabilit voo voo voo voo voo voo voo voo voo vo	d properties robability riable and its y distribution Expectation ust is variable ous distributi and condition e, correlation atistics, (2-ti bbution funct distribution funct distribution func- tribution func- theorem bution	of pro s prope n funct value, nction case ion fur nal pro n coeff imes) ion unction ctions	bability erties tion, Moment, nction bability icient ns							
Fourier Tra 3-1. Fourier 3-2. Fourier	nsforn integr transf	nation, (4-tin ral formation	nes)								

Course number U-ENG27 37305 LJ55 U-ENG27 37305 LJ76	化学工学数学II(2)
Course title (and course title in English) 物理化学II(化学工学) Physical Chemistry II (Chemical Engineering) and department of affiliation affiliation and department of affiliation	Equation of wave Diffusion equation, Multi-dimensional problem Confirmation of the level of attainment (1-time), Confirmation of the level of attainment
	[Course requirements]
Days and periods Fri.2 Class style Lecture Language or instruction Japanese	It is required that students have already had the lecture : Mathematics for Chemical Engineering I in the
[Overview and purpose of the course]	former semester.
component systems, etc. Also, you learn molecular and solid-state physical chemistry in the view of quantum	[Evaluation methods and policy]
theory.	Grading will be determined by a test at the end of series of lectures, and reports and short tests in class, if necessary.
[Course objectives]	[Taythooke]
Understand the phase-separation phenomenon of multi-component systems, and master how to read the phase diagrams. Further, understand the quantum theory, its difference and relation to the physical chemistry of macroscopic systems.	薩摩順吉『理工系の数学入門コース7.確率・統計』(岩波書店)ISBN:4000077775 阿部寛治 『フーリエ解析と偏微分方程式』(塔風館)ISBN:9784563011178
[Course schedule and contents]	
Physical chemistry of multi-component liquids and gases: 8 times	
Physical chemistry of molecules and solids: 6 times	[References, etc.]
Feedback lecture: 1 time	薩摩順吉 『岩波基礎物理シリーズ 10.物理の数学』(岩波書店)ISBN:4000079301
[Course requirements]	[Study outside of class (preparation and review)]
Assume the completion of Physical Chemistry I (Chemical Engineering)	After each class of Probability and Statistics, homework is given to students, and their solution will be shown
[Evaluation methods and policy]	It is highly recommended that students solve them before the class.
Final (end-term) exam score, etc.	(Other information (office hours, etc.))
[Taythooks]	*Please visit KULASIS to find out about office hours.
Atkins 『Physical Chemistry』 (10th edition, Chaps. 4-10)	
[References, etc.]	
(Reference books)	
[Study outside of class (preparation and review)]	
Remind the contents of Physical Chemistry I (Chemical Engineering).	
(Other information (office hours, etc.))	
*Please visit KULASIS to find out about office hours.	

土面鉱

Course numbe	er U-E	ENG27 3730	08 LJ61	U-EN	G27	37308	LJ76				
Course title (and course 反成 title in Che English)	eering II		Ins nar and of a	tructor's ne, job ti I departn affiliation	tle, nent	Graduate School of Engineering Associate Professor,NAKAGAWA HIROYUK Graduate School of Engineering Professor,KAWASE MOTOAKI Graduate School of Engineering Senior Lecturer ASHIDA RIYUUICH					
Target year	rget year Brd year students or above Number of credits 2 Year/semesters 2020/First se										
Days and periods N	ays and periods Mon.2 Class style Lecture Language of instructor Japanese										
[Overview and purpose of the course]											
Kinetic analysis and reactor design of heterogeneous chemical reactions and nonideal flow reactors are described.											
[Course object	ctives]										
Knowledge on the kinetic description of heterogeneous reactions. Knowledge on the design and operation of various reactors, including non-ideal flow reactors. Ability to perform such calculations for designing reactors.											
[Course sche	dule and	contents]									
Gas-solid reaction Solid-catalyst reaction Gas-liquid and g ,1time,	ons and read actions and as-liquid-se	ctors,3.5tim l reactors,3. olid-catalys	es, 5times, t reactior	ns and r	eact	ors,2tim	ies,				
None											
[Evoluction m	othodoo	nd notion			_						
Evaluation will t reports on assign	be based on ments con	a mark of t ducted.	the final	written	exa	m, subr	issior	of quizzes co	onducted in class, and		
[Textbooks]											
K. Hashimoto	K. Hashimoto THan'no Kogaku (revised and augmented). (Baifukan) ISBN:9784563046347										
[References,	etc.]										
(Reference	books)										
[Study outsid	e of class	s (preparat	tion and	revie	w)]						
Read through the chapter of the textbook by the class starts and learn by yourself if understanding is insufficient after the class.											
(Other inform	nation (of	fice hours	s, etc.))								
*Please visit KU	LASIS to 1	find out abo	ut office	hours.							

固相系分離工学(2)

[Evaluation methods and policy]

Evaluation will be made based on midterm exam, routine exam at the end of semester, and reports often given in lectures.

[Textbooks]

quoGendai Kagaku Kogaku,quot K. Hashimoto and F. Ogino (Sangyo Tosho) isbn{}{4782826095} quotKanso Gijutu Jitsumu Nyumon,quot H. Tamon (Nikkan Kogyo Shinbun) isbn{}{9784526069697}

[References, etc.]

(Reference books) quotKagakukikai no Riron to Keisan,quot S. Kamei (Sangyo Tosho) isbn{}{4782825099}

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

Lecture will be given basen on the textbook. Exercise problems will be given to students to deepen understanding in due course.

*Please visit KULASIS to find out about office hours.

未更新

Course ni	umber	U-EN	G27 373	309 LJ60						11,2471		
Course title (and course title in English) Solid-Phase Separation Engineering of affiliat									Graduate Scl Associate Profe Graduate Scl Professor,SA	chool of Engineering fessor,WATANABE SATOSHI chool of Engineering ANO NORIAKI		
Target yea	get year Brd year students or above Number of credits 2 Year/semesters 2020/Second seme											
Days and perio	ays and periods Wed.2 Class style Lecture Language distruction Japanese											
To understar phenomena, adsorption,	nd varior transpor menbrar	us separat rt properti ne separat	ion oper es, meth ion and	rtions used hods to de crystalliza	1 in indu sign sep ation wi	ustri barat 11 be	ial chem tion ope e taken a	iical pi ration as prac	rocesses, mult s will be lectu ctical example	iphase transport red. Expecially, drying, s.		
[Course objectives] The present course aims at achieving the following three goals by taking some types of solid-phase separation operations for example: (1) understanding mass balance, heat balance, and simultaneous transport phenomena of mass and heat, (2) cultivating the ability to design and develop separation units and materials used for multi-phase separations, and (3) developing knowledge on recent trends of separation techniques.												
[Course s	chedul	e and co	ntents]								
Adsorption d in pores and operation an Humidificat transport of temperature Drying Oper dyring unit t Membrane S Crystallizati growth will apparatuses. give advance	Operatio at surfa d how to ion Oper heat and and how rations,4 ype will Separatic designs on Oper- be lectur Finally, ass,1tim ed know	ns,4times ce, adsorp o calculate rations,1ti mass at g v to use hi times,The be lecture on Operati of membr ations,2tir red, follow, studentsr e,A supple ledge or t	Adsorption rate breaktl me,Hun gas-liqui umidity mechai ed, relat ons,3tim ane sep nes,The ved by t squo un ementar o confir	otton equil e, and so f hrough cu nidication id interface chart. nisms and ing operation misms and ing operation in operat	brium a forth will rve in fi operati- e. The s kinetic: ion con the main pocesses sm of th ation on ng on th or exerc inment	s dy ll be ixed on v tude s of dist n foo will he cr n the he cc ise o leve	explain bed typ will be le ents will drying s ions wit cus on the be lect ystalliza popula ourse wi class wiel of the	equilib ned. In oceation ectured l under and ex- th prop- he gas ured. ation a tion ba 11 be to course	rum, adsorpt a addition, how orbing column d as example - trand the idea expertise to select erties of the c separation, pu- und kinetic and alance require ested. onducted as a e goals.	too isotherm, diffusion v to disign adsorption of simultaneous a of wet-bulb exet and desing of the fried products. ermeability equations alysis of the crystal d for the design of n additional class to		
Introduction	to Indus	strial Cher	nistry (Material	nd ener	av 1	alances	0				
Fundamenta Fluid-Phase	ls of Ch Separati	emical Pro	ccess Er	ngineering	,	gyt	Jaiances	,,				
								(Continue to	国相系分離工学(2)↓↓↓		

												1.20
Course nu	umb	er	U-EN	G27 2	7400 LJ	76	U-EN	G27	27400	LJ61		
Course title (and course title in English)	物理 Phy:	里化4 sical	学III(化 Chemistry	:学工≟ / Ⅲ (C	学) hemical E	Engir	neering)	Inst nan and of a	tructor's ne, job til I departm offiliation	tle, nent	Graduate Scl Professor,MI	ool of Engineering YAHARA MINORU
Target yea	r	3rd ye	ear students	or above	Numb	er c	of cred	its	2	Year	/semesters	2020/Second semester
Days and peri	ods 7	Tue.1		Clas	s style		Lecture	e			Language of instruction	Japanese
[Overview	/ an	d pu	irpose (of the	course	9]						
[Course o	bje	ctive	es]									
[Course s	che	dule	and co	onten	ts]							
,3times,												
,1time,												
,1time,												
,1.5times,												
,1.5times,												
,2times,												
,1time,												
,1time,												
,2times,												
,1time,												
[Course re	equi	irem	nents]									
None												
[Evaluatio	on m	neth	ods and	d poli	cy]							
[Textbook	(s]											
		_				-						
										0	Continue to 物理	化字Ⅲ(化字工字)(2)↓↓↓

物理化学Ⅲ(化学工学)(2)

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

[Courses delivered by instructors with practical work experience]

Category A course with practical content delivered by instructors with practical work experience

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

化学プロセス工学実験I(化学工学)(2)

Hashimoto, Hanno Kogaku (Baifukan)isbn{}{4563045187} Smith, Van Ness, Abbott, Introduction to Chemical Engineering Thermodynamics, 7th Ed.(McGraw Hill) isbn{}{0071247084}

[Study outside of class (preparation and review)]

(Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

										不定利		
Course nu	umber	U-ENO	327 27314	4 LJ61	U-EN	G27	27314	LJ76				
Course title (and course title in English) ChemicalProcessEngineeringLaboratoryI(Chemical Engineering) LaboratoryI(Chemical Engineering) La							nool of Engineering MAMOTO RYOICHI nool of Engineering ssor,NAKAGAWA KYUUYA ngineering 演関連教員					
Target year Bit year students or above Number of credits 5 Year/semesters 2020/First semester												
Days and periods Thu.3,4,5,Fri.3,4,5 Class style Experiment Laquage distution Japanese												
[Overview	[Overview and purpose of the course]											
Experimental training on chemical analyses (gravimetric analysis, titration analysis) and fundamentals of chemical engineering (physical chemistry, transport phenomena, reaction engineering, etc.)												
[Course o	bjectiv	es]										
This course will enhance studentsrsquo understanding of quantitative chemical analysis and chemical engineering.												
[Course s	chedul	e and co	ntents]									
Preservation Research Center is organized to learn waste liquid treatment. Chemical Engineering I/Physical Chemistry,14times,freezing point drop, precise measurement of liquid density and partial molar volume, Liquid-liquid equilibrium, gas-liquid equilibrium, measurement of gas diffusivity, fabrication of pH meter, surface tension and wettability Chemical Engineering I/Transport Phenomena,4times,viscosity and flow dynamics, pressure drop in liquid flow Chemical Engineering I/Reaction Engineering,4times,kinetic analysis in batch reactor, characterization of flow reactor Chemical Engineering I/Apparatus Setup,2times,electric-cooling temperature-controlled batch,												
[Course re	equiren	nents]										
Fundamenta Fluid Mecha	ls of Ch mics, Ch	emical Pro nemical Re	ecess Engi eaction En	ineering Igineerii	, Physiong I are	cal (reco	Chemist	ry I (C 1 to ta	Chemical Engi ke in advance	neering), Fundamental		
[Evaluatio	n meth	ods and	policy]									
Attendance,	perform	ance in ex	periments	s, report	s will b	e ev	aluated	•				
[Textbook	s]											
Textbook ed	lited by t	teaching st	aff in dep	artment	t of che	mica	al engin	eering	5			
[Referenc	es, etc.	.]										
(Referen Bird, Stewar Hashimoto	nce boo rt, Lightf and Ogin	oks) foot, Trans no, Genda	sport Pher i Kagaku	iomena, Kogaku	, 2nd Ec 1 (Sangy	1. (V 70 T	Viley) is 'osyo) is	sbn{}{ sbn{ <u>}</u> {	97804701153 (4782826095) Continue to 化学プロ	98} セス工学実験「 (化学工学) (2)↓↓↓		

Course nu	umber	U-ENG27 17	7405 LJ60									
Course title (and course title in English)	化学; Chemical	プロセス工学実駒 ProcessEngineeringLaborat	検Ⅱ(化学 oryII(Chemical E	工学) ngineering)	Inst nan and of a	tructor's ne, job tit I departm iffiliation	ile, nent	Graduate School of Engineering Professor,YAMAMOTO RYOICHI Graduate School of Engineering Associate Professor,NAKAGAWA KYUUYA Faculty of Engineering 化学工学実験関連教員				
Target yea	r Bro	And year students or above Number of credits 5 Year/semesters 2020/Second semes										
Days and periods Wed.3,4,5,Thu.3,4,5 Class style Experiment Language distuctor Japanese												
[Overview	[Overview and purpose of the course]											
Experimental training of chemical engineering fundamentals(transport phenomena, separation engineering, reaction engineering, powder technology, process control)												
[Course o	bjecti	ves]										
This course typical operation	This course will enhance students requo understanding of chemical engineering, and the students will learn typical operations in the experiments.											
[Course s	chedu	ile and content	s]									
flow, mass transport through interface Chemical Engineering II/Separation Engineering,9times,continuous distillation, pressure drop and gas absorption in packed bed tower, cyclone characteristics for particle sizes Chemical Engineering II/Reaction Engineering and Process Control,9times,gas-solid reaction, gas-solid catalytic reaction, , dynamic characteristics in process control												
[Course re	equire	ements]										
Physical Ch Chemical Re Control are	emistry eaction recomr	I, II (Chemical E Engineering I, II nend to take in ad	Engineering , Fluid Pha vance.	;), Funda se Separ	ame ratio	ntal Flu n Engin	id Mec eering	hanics, Tran , Fine Particle	sport Phenomena, e Technology, Process			
[Evaluatio	n met	hods and polic	;y]									
Attendance,	perfor	mance in experim	ents, repor	ts will b	e ev	aluated.						
[Textbook	s]											
Textbook ed	lited by	teaching staff in	departmen	t of chei	mica	al engino	eering					
[Referenc	es, et	c.]										
(Reference books) Bird, Stewart, Lightfoot, Transport Phenomena, 2nd Ed. (Wiley) isbn{}{9780470115398} Hashimoto and Ogino, Gendai Kagaku Kogaku (Sangyo Tosyo) isbn{}{4782826095} Hashimoto, Hanno Kogaku (Baifukan)isbn{}{45454517} Smith, Van Ness, Abbott, Introduction to Chemical Engineering Thermodynamics, 7th Ed.(McGraw Hill) isbn{}{071247084}												
							C	ontinue to 化学プロ	セス工学実験Ⅱ(化学工学)(2)↓↓↓			

化学プロセス工学実験II(化学工学)(2)	
[Study outside of class (preparation and review)]	
(Other information (office hours, etc.))	
*Please visit KULASIS to find out about office hours.	

[Course requireme	ents]
Basic knowledge on the Physical Chemistry I (ermodynamics lectured in Physical Chemistry: Fundamentals and Exercises, and Chemical Engineering) is required.
[Evaluation metho	ds and policy]
Evaluation will be bas	ed on exercises at class, assignments, and an examination.
[Textbooks]	
Masao Sudo ed. 『Kis	o Kagakukogaku』(Kyoritsu Shuppan)ISBN:9784320088702
[References, etc.]	
(Reference book Some handouts are giv	: s) ven at class.
[Study outside of a	class (preparation and review)]
As many exercises as scientific calculator to	possible will be imposed at class. Assignments will be imposed every week. Bring a the class.
*Diana sinit VIII A SI	n (onice nours, etc.)
	S to find out about office hours
Prease visit KULASI	S to find out about office hours.
[Courses delivered	S to find out about office hours.
[Courses delivered (1) Category A course with practica	S to find out about office hours. I by instructors with practical work experience] I content delivered by instructors with practical work experience
[Courses delivered (1) Category A course with practica (2) Details of instructo	S to find out about office hours. d by instructors with practical work experience] l content delivered by instructors with practical work experience wrs' practical work experience related to the course
ICourses delivered (1) Category A course with practica (2) Details of instructo (3) Details of practical	S to find out about office hours. d by instructors with practical work experience] l content delivered by instructors with practical work experience rs' practical work experience related to the course classes delivered based on instructors' practical work experience
ICourses delivered (1) Category A course with practica (2) Details of instructo (3) Details of practical	S to find out about office hours. d by instructors with practical work experience] d content delivered by instructors with practical work experience rs' practical work experience related to the course classes delivered based on instructors' practical work experience
[Courses delivered (1) Category A course with practica (2) Details of instructo (3) Details of practical	S to find out about office hours. d by instructors with practical work experience] d content delivered by instructors with practical work experience wrs' practical work experience related to the course classes delivered based on instructors' practical work experience
[Courses delivered (1) Category A course with practica (2) Details of instructo (3) Details of practical	S to find out about office hours. d by instructors with practical work experience d content delivered by instructors with practical work experience ors' practical work experience related to the course classes delivered based on instructors' practical work experience

Course number	U-ENG27	27406 LJ60									
Course title (and course 化学工 title in Materia English)	rrse title d course in glish) Material and energy balances					Graduate School of Engineering Professor, MAE KAZUHIRO Graduate School of Engineering Professor, KAWASE MOTOAKI Graduate School of Engineering Associate Professor, MAKI TAISUK Graduate School of Engineering Associate Professor, TANABE KAT SUAR					
Target year 2nd	year students or abov	Number	of cred	its 2	Year/	semesters	2020/Second semester				
Days and periods Wed	.1 Clas	ss style	Lecture	e		Language of instruction	Japanese				
[Overview and p	urpose of the	e course]									
Balances of mass, vo fundamental of chen material and energy component (element	Balances of mass, volume, mole amount, and elements of substances as well as balance of energy is a fundamental of chemical engineering. Physical and chemical principles which are required for taking material and energy balance in problems about chemical processes are lectured. How to calculate the mass, component (element), and energy balance as for application processes is explained and practiced.										
[Course objectiv	es]										
To acquire capability well as to cope with	y to analyze co design and ope	mplicated cl eration of ch	nemical emical p	industrial processes qu	ocesse antitati	s from balan vely.	ce point of view as				
[Course schedul	e and conter	nts]									
Week 1: Dimensions measurement, and in	s and units H nportance of di	low to expre imensions ar	ess dime nd units	nsions and u is lectured.	inits, w	hich are basi	c concept of				
Weeks 24: Fundan operations, expressio exercises.	nentals of mate on of composit	rial balance- ion of mixtu	Flow re, mate	system (clo rial balance	sed and over a	l open), stead single appar	dy and unsteady atus, and their				
Weeks 56: Fundan energy balance with	nentals of energ no chemical re	gy balance eactions, and	- Forms their ex	of energy, o tercises.	alculat	ion of appare	ent and latent heats,				
Weeks 78: Process processes, and proce	s flow diagram ess flow diagram	and unit ope m are lecture	erations- ed.	Various u	nit ope	rations, prind	ciples of separation				
Weeks 910: Mater including chemical r case of many appara	Weeks 910: Material and energy balance of complicated processes Calculation of balance of processes including chemical reactions or phase changes is lectured. As well, how to understand material balance in case of many apparatus connected, merging, splitting, and recycling included is explained.										
Weeks 1113: Pract in complicated chem	tice of taking b nical processes	alance in cho is exercised	emical p	rocesses	Calcula	ation of mate	rial and energy balance				
Weeks 14: Scale-up. kinetics required for	. Methodology design is lectu	of scaling u red.	p appara	tus is gener	ally exp	plained as we	ell as introduction to				
Week 15: Learning a	achievement ev	aluation.									
					c	ontinue to	化学工学量論(2)↓↓↓				

Course title (and course title in English)	語(化学工学) ic English		Ins nar and of a	Instructor's name, job title, and department of affiliation		Graduate School of Engineering Professor,MATSUSAKA SHIYUUJ Part-time Lecturer,John Pryce					
Farget year Brd y	ear students or above	Number o	of credits	2	Year	/semesters 2020/Second ser					
Days and periods Mon.	.3 Class	s style	Lecture			Language of instruction	English				
[Overview and purpose of the course]											
Scientific context, sp English, the course for International Commu	This course aims to give students an opportunity to use and expand on their current English skills in a scientific context, specifically within the field of Chemical Engineering. In addition, since all instruction is ir finglish, the course focuses on creating an environment where students can develop their overall skills in international Communication in both oral and written formats.										
[Course objective	es]										
operations, process d	operations, process design and technical descriptions in English. 4. To develop student#039s overall ability in speaking, listening, reading and writing, as well as, critical thinking skills with regards to Chemical Engineering topics. 5. To develop and contribute to the student#039s confidence and knowledge to be able to attend international conferences, conduct presentations and publish papers in English.										
operations, process d speaking, listening, r Engineering topics. 5 attend international c	lesign and techn reading and writ 5. To develop ar conferences, cor	ing, as well ad contribut aduct preser	e to the stunt atations and	thinking dent#039 publish	g skills 9s con paper	s with regards fidence and k in English.	choose overall ability s to Chemical cnowledge to be able				

科学英語(化学工学)(2)
describe sequencing instructions for plant operations. Unit 15 Oral Assessment - Troubleshooting and explaining solutions, Itime, The student will be able use critical thinking skills to troubleshoot a Process and instrumentation diagram and explain their solution.
[Course requirements]
Students enrolled in the Chemical Process Engineering Course of the School of Industrial Chemistry.
[Evaluation methods and policy]
Assessment 1 (week 12) - 20% Assessment 2 (week 15) - 20% Final Written exam - 60%
[Textbooks]
Handouts will be given each lesson.
[References, etc.]
(Reference books) Nothing specified.
(Related URLs)
(Nothing specified.)
[Study outside of class (preparation and review)]
All instruction will be in English, so students are advised to work on improving listening skills both before and during the course.
(Other information (office hours, etc.))
Nothing specified.
*Please visit KULASIS to find out about office hours.

科学英語(化学工学)(2)

[References, etc.] (Reference books) Nothing specified.

(Related URLs)

(Nothing specified.)

[Study outside of class (preparation and review)] All instruction will be in English, so students are advised to work on improving listening skills both before and during the course.

(Other information (office hours, etc.)) Nothing specified.

*Please visit KULASIS to find out about office hours.

Course number U-ENG29 29125 EJ10 U-ENG29 29125 EJ5 Course title (and course English) 科学英語((ビ学工学) Scientific English Instructor's name, job title, or difficient Graduate School of Engineering Professor,MATSUSAKA SHIYUU Part-time Lecturer, John Pryce Target year Ind year students or abov Number of credits 2 Year/semesters 2020/Second semestr Days and periods Mon.4 Class style Lecture upgaption English Ibis course aims to give students an opportunity to use and expand on their current English skills in a Scientific course, specifically within the field of Chemical Engineering. In addition, since all instruction is i English, the course focuses on creating an environment where students can develop their overall skills in International Communication in both oral and written formats. ICourse objectives] The goals of this course are: 1. To enable students to become conversant in English within various aspects of Chemical Engineering. 2. To improve and expand student#039s specialized vocabulary and pronunciation skills. 3. To give students confidence in oral and written communication skills regarding technical data, unit operations, process design and technical descriptions in English. 4. To develop student#039s overall ability i speaking, listening, reading and writing, as well as, critical thinking skills with regards to Chemical Engineering topics. 5. To develop and contribute to the student#039s confidence and knowledge to be able to attend international conferences, conduct presentations and publish papers in English.										未更新	
Course title (and course) title in Brgilish) 科学英語(化学工学) Scientific English Instructor's name, job title, and department of affiliation Graduate School of Engineering Professor,MATSUSAKA SHIYUU Part-time Lecturer,John Pryce Target year Fid year students or above Number of credits 2 Year/semesters 2020/Second semester Days and periods Mon.4 Class style Lecture Laguate issue English IOVerview and purpose of the course] Lecture Laguate issue English, the course focuses on creating an environment where students can develop their overall skills in International Communication in both oral and written formats. In addition, since all instruction is i English, the course focuses on creating an environment where students can develop their overall skills in International Communication in both oral and written formats. [Course objectives] The goals of this course are: 1. To enable students to become conversant in English within various aspects of Chemical Engineering. 2. To improve and expand studen#039s specialized vocabulary and pronunciation skills. 3. To give students confidence in oral and written communication skills regarding technical data, unit operation, process design and technical descriptions in English. ICourse schedule and contents] Guidance, Zhines, Guidance on how this class is operated, and how to use corputing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intr	Course nu	ımber	U-ENO	G29 29125 EJ10	U-EN	G29	29125	EJ55			
Target year Bid year students or above Number of credits 2 Year/semesters 2020/Second semestre Days and periods Mon.4 Class style Lecture angust filtatude English Every event and purpose of the course] This course aims to give students an opportunity to use and expand on their current English skills in a Scientific context, specifically within the field of Chemical Engineering. In addition, since all instruction is i English, the course focuses on creating an environment where students can develop their overall skills in International Communication in both oral and written formats. [Course objectives] The goals of this course are: 1. To enable students to become conversant in English within various aspects of Chemical Engineering. 2. To improve and expand student#039s specialized vocabulary and pronunciation skills. 3. To give students confidence in oral and written communication skills regarding technical data, unit operations, process design and technical descriptions in English. 4. To develop student#039s overall ability in speaking, listening, reading and writing, as well as, critical thinking skills with regards to Chemical Engineering topics. 5. To develop and contribute to the student#039s confidence and knowledge to be able to attend international conferences, conduct presentations and publish papers in English. [Course schedule and contents] Guidance.2times,Guidance on how this class is operated, and how to use computing facility for this class.) [Baic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection by Signature-Based IDS by stu	Course title (and course title in English)	arse title d course p in glish) A学英語(化学工学) Scientific English				Ins nar and of a	tructor's ne, job ti I departn affiliation	tle, nent	Graduate School of Engineering Professor,MATSUSAKA SHIYUUJI Part-time Lecturer,John Pryce		
Days and periods Mon.4 Class style Lecture Impage filtering English IOverview and purpose of the course] This course aims to give students an opportunity to use and expand on their current English skills in a Scientific context, specifically within the field of Chemical Engineering. In addition, since all instruction is in English, the course focuese on creating an environment where students can develop their overall skills in International Communication in both oral and written formats. IDecarse objectives] The goals of this course are: 1. To enable students to become conversant in English within various aspects of Chemical Engineering. 2. To improve and expand student#039s specialized vocabulary and pronunciation skills. Streading in the chinical descriptions in English. 4. To develop student#039s overall ability is speaking, listening, reading and writing, as well as, critical thinking skills with regards to Chemical Engineering topics. 5. To develop and corribute to the student#039s confidence and knowledge to be able to attend international conferences, conduct presentations and publish papers in English. ICourse schedule and contents To the student#039s overall ability is goal. To this class. Io and attacks, such as correspondence between alarms issued from IDS in network security and how machine learning can help the intrusion detection by Signature-Based IDS, fitnes, Learn the method of classifying normal and malicious traffic by machine learning and bublic dataset for benchmarking intrusion detection by signatures issued from IDS and discuss it with other students and instructors. Intrusion Detection by Machine Learning. Thimes, Learn the method of classifying normal and malicious traffic by machine learn	Target yea	et year Brd year students or above Number of cred						Yea	r/semesters	2020/Second semester	
[Overview and purpose of the course] This course aims to give students an opportunity to use and expand on their current English skills in a Scientific courset, specifically within the field of Chemical Engineering. In addition, since all instruction is i English, the course focuses on creating an environment where students can develop their overall skills in International Communication in both oral and written formats. [Course objectives] The goals of this course are: 1. To enable students to become conversant in English within various aspects of Chemical Engineering. 2. To improve and expand student#039s specialized vocabulary and pronunciation skills. 3. To give students confidence in oral and written communication skills regarding technical data, unit operations, process design and technical descriptions in English. 4. To develop student#039s overall ability is speaking, listening, reading and writing, as well as, critical thinking skills with regards to Chemical Engineering topics. 5. To develop and contribute to the student#039s confidence and knowledge to be able to attend international conferences, conduct presentations and publish papers in English. [Course schedule and contents] Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature- based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and m	Days and perio	ays and periods Mon.4 Class style Lectur							Language of instruction	English	
[Course objectives] The goals of this course are: 1. To enable students to become conversant in English within various aspects of Chemical Engineering. 2. To improve and expand student#039s specialized vocabulary and pronunciation skills. 7. To give students confidence in oral and written communication skills regarding technical data, unit operations, process design and technical descriptions in English. 4. To develop student#039s overall ability i speaking, listening, reading and writing, as well as, critical thinking skills with regards to Chemical Engineering topics. 5. To develop and contribute to the student#039s confidence and knowledge to be able to attend international conferences, conduct presentations and publish papers in English. [Course schedule and contents] Guidance, Ztimes, Guidance on how this class is operated, and how to use computing facility for this class.) Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, Stimes, Learn the mechanism of intrusion detection by signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, Times, Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection using machine learning, and discuss it with other students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] Students enrolled in the Chemical Process Engineering Course of the School of Industrial Che	This course a Scientific co English, the International	aims t ntext, cours l Com	o give stude specifically e focuses on munication	ents an opportuni within the field creating an envi in both oral and	ty to use of Chen ronment written f	and nical wh orm	l expand Engine ere stud ats.	l on th ering. ents ca	eir current En In addition, s an develop the	glish skills in a ince all instruction is in eir overall skills in	
[Course schedule and contents] Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning, algorithms and public dataset for benchmarking intrusion detection performance. Presentation, Itime,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] Students enrolled in the Chemical Process Engineering Course of the School of Industrial Chemistry. [Evaluation methods and policy] Assessment 1 (week 12) - 20% Assessment 2 (week 15) - 20% Final Written exam - 60% [Textbooks] Handouts will be given each lesson.	The goals of this course are: 1. To enable students to become conversant in English within various aspects of Chemical Engineering. 2. To improve and expand student#039s specialized vocabulary and pronunciation skills. 3. To give students confidence in oral and written communication skills regarding technical data, unit operations, process design and technical descriptions in English. 4. To develop student#039s overall ability in speaking, listening, reading and writing, as well as, critical thinking skills with regards to Chemical Engineering topics. 5. To develop and contribute to the student#039s confidence and knowledge to be able to attend international conferences, conduct presentations and publish papers in English.										
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.) Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection using machine learning, and discuss it with other students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors. [Course requirements] Students enrolled in the Chemical Process Engineering Course of the School of Industrial Chemistry. [Evaluation methods and policy] Assessment 1 (week 12) - 20% Assessment 2 (week 15) - 20% Final Written exam - 60% [Textbooks] Handouts will be given each lesson.	[Course se	ched	ule and co	ntents]							
[Course requirements] Students enrolled in the Chemical Process Engineering Course of the School of Industrial Chemistry. [Evaluation methods and policy] Assessment 1 (week 12) - 20% Assessment 2 (week 15) - 20% Final Written exam - 60% [Textbooks] Handouts will be given each lesson.	Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature- based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.										
Students enrolled in the Chemical Process Engineering Course of the School of Industrial Chemistry. [Evaluation methods and policy] Assessment 1 (week 12) - 20% Assessment 2 (week 15) - 20% Final Written exam - 60% [Textbooks] Handouts will be given each lesson.	[Course re	equir	ements]								
[Evaluation methods and policy] Assessment 1 (week 12) - 20% Assessment 2 (week 15) - 20% Final Written exam - 60% [Textbooks] Handouts will be given each lesson.	Students enr	olled	in the Chem	ical Process Eng	ineering	Co	urse of t	ne Sch	1001 of Indust	rial Chemistry.	
[Textbooks] Handouts will be given each lesson.	[Evaluatio Assessment	n me 1 (we	thods and ek 12) - 20%	6 Assessment 2 (week 15) - 2	20% Fin	al Wri	tten exam - 6	0%	
Handouts will be given each lesson.	[Textbook	s]									
Continue to 科字央語(12字上字)(2)↓↓	Handouts wi	ill be g	given each le	esson.				,	Continue to 科学	₽英語(化学工学)(2)↓↓↓	

Course n	umber	U-EN	G27 2	7401 LJ61	U-EN	G27	27401	LJ76			
Course title (and course title in English)	化学プ1 Chemic	学プロセス工学[W202(創成)] hemical Process Engineering						tle, nent	Graduate School of Engineering Professor, MATSUSAKA SHIYUUII Graduate School of Engineering Professor, SANO NORIAKI Graduate School of Engineering Professor, SOTOWA KENICHIRO Graduate School of Engineering Associate Professor, MAKI TAISUKE Graduate School of Engineering Associate Professor, WATANABE SATOSHI		
Target yea	r 2nd	year students o	or above	Number	of cred	lits	2	Year	/semesters	2020/Second semester	
Days and peri	ods Wed	.1	Class	s style	Lectur	e			Language of instruction	Japanese	
[Overview	and p	urpose o	f the	course]							
Chemical pr will discuss purifying su particulate r together wit will also lea	Chemical processes are comprised of a combination of various operations (unit operations), and this course will discuss distillation, gas-absorption, and other fluid-based mass transfer unit operations for separating and purifying substances, as well as mechanical unit operations related to the production and processing of particulate matter (powders), beginning from an overview of their basic phenomena and operating principles together with the study of the related kinetic phenomena and their quantitative expression methods. Students will also learn methods for the safe operation and control of chemical processes.										
[Course o	bjectiv	es]									
Cultivate an control by s process cont chemical pro	Cultivate an understanding of the concepts of mass balance, mass transfer, equilibrium relationship, and control by studying examples of typical separation operations, particle-based separation operations, and process control in chemical processes. In addition, students will develop the ability to quantitatively analyze chemical processes.										
[Course s	chedul	e and co	ntent	s]							
1. Basics of These session in chemical 2. Gas absord Students will equilibrium	[Course schedule and contents] I. Basics of substance separation and purification, 2 sessions These sessions will explain the principles and methods of separation and purification of important substances in chemical processes, as well as the fundamentals of molecular diffusion and mass transfer. 2. Gas absorption, 2 sessions Students will learn the concept of the "differential contact method", through lectures discussing										
and design r	nethods	for gas ab	sorpti	on devices.	rusion	JICI	omenoi	1 111 1116	e iiquiu piiase	, gas absorption rates,	
3. Distillation, 3 sessions These sessions will describe the correlation method of vapor-liquid equilibria, explain the basic principles of various distillation operation methods for mixed liquid purification procedures, and explain the design method for a continuous rectification stage column, which is the simplest "multi-stage contact operation."											
4. Overview These session particle chai	4. Overview of particle system operation, 2 sessions These sessions will describe the role of particle-based unit operations in chemical processes, the evaluation of particle characteristics, their methods of expression, and the behavior of particles.										
								_c	Continue to 化学プロも	え工学 [W 2 0 2 (創成)] (2)↓↓↓	

化学プロセス工学[W 2 0 2 (創成)](2)	化学プロセス工学[NS(工基礎)](2)
5. Gas-solid separation, 2 sessions These sessions will describe the concept of partial separation efficiency, in addition to discussion of the principle of solid-gas separation and the methods for evaluating separation performance applicable under various conditions	5. Gas-solid separation, 2 sessions These sessions will describe the concept of partial separation efficiency, in addition to discussion of the principle of solid-gas separation and the methods for evaluating separation performance applicable under various conditions
6. Process control, 3 sessions These sessions will promote an understanding of the characteristics of systems characterized by dynamic input and parameter values and also briefly describe the control methods for compensating fluctuations by taking distillation column and reactors as examples.	6. Process control, 3 sessions These sessions will promote an understanding of the characteristics of systems characterized by dynamic input and parameter values and also briefly describe the control methods for compensating fluctuations by taking distillation column and reactors as examples.
 Feedback, 1 session Supplementary classes or exercises are conducted outside of the regular course schedule to confirm the achievement of learning objectives related to diffusion, gas absorption, and distillation. 	 Feedback, 1 session Supplementary classes or exercises are conducted outside of the regular course schedule to confirm the achievement of learning objectives related to diffusion, gas absorption, and distillation.
[Course requirements]	[Course requirements]
Introduction to Industrial Chemistry (stoichiometry for chemical engineering), Foundations of Chemical Process Engineering	Introduction to Industrial Chemistry (stoichiometry for chemical engineering), Foundations of Chemical Process Engineering
[Evaluation methods and policy]	[Evaluation methods and policy]
Course grades will be based on the results of regular examinations and reports assigned as needed to improve understanding.	Course grades will be based on the results of regular examinations and reports assigned as needed to improve understanding.
[Textbooks]	[Textbooks]
橋本, 荻野 『現代化学工学』 (産業図書) ISBN:4782826095	橋本, 荻野 『現代化学工学』 (産業図書) ISBN:4782826095
[References, etc.]	[References, etc.]
(Reference books) 亀井編 『化学機械の理論と計算』 (産業図書)) ISBN:4782825099, 水科, 桐榮 『化学工学概論』 (産 業図書) ISBN:4782825102	(Reference books) 亀井編 『化学機械の理論と計算』 (産業図書)) ISBN:4782825099, 水科, 桐榮 『化学工学概論』 (産 業図書) ISBN:4782825102
[Study outside of class (preparation and review)]	[Study outside of class (preparation and review)]
Lectures will be conducted mainly using textbooks, and exercises will be assigned based on the pace of the lectures. Students should make efforts to acquire lecture content.	Lectures will be conducted mainly using textbooks, and exercises will be assigned based on the pace of the lectures. Students should make efforts to acquire lecture content.
(Other information (office hours, etc.))	(Other information (office hours, etc.))
Please visit KULASIS to find out about office hours.	Please visit KULASIS to find out about office hours.
*Please visit KULASIS to find out about office hours.	*Please visit KULASIS to find out about office hours.

プロヤスT学「NS(工基礎)](2)

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U-ENG27 27402 LJ61 U-ENG27 27402 LJ76 Course number 基礎流体力学 name, job title, and department of affiliation Fundamental Fluid Mechanics

Graduate School of Engineering Professor,MATSUSAKA SHIYUUJ Graduate School of Engineering Professor, SANO NORIAKI Course title nstructor's 化学プロセス工学 [NS(工基礎)] name, job title, and department of affiliation Graduate School of Engineering Professor,SOTOWA KENICHIRO Graduate School of Engineering Associate Professor,MAKI TAISUKE (and course title in Chemical Process Engineering English) Graduate School of Engineering Associate Professor, WATANABE SATOSH 2nd year students or above Number of credits Year/semesters 2020/Second semester Target year Days and periods Wed.1 Class style Lecture arguage of instruction Japanese [Overview and purpose of the course] Chemical processes are comprised of a combination of various operations (unit operations), and this course will discuss distillation, gas-absorption, and other fluid-based mass transfer unit operations for separating and purifying substances, as well as mechanical unit operations related to the production and processing of particulate matter (powders), beginning from an overview of their basic phenomena and operating principles together with the study of the related kinetic phenomena and their quantitative expression methods. Students will also learn methods for the safe operation and control of chemical processes. [Course objectives] Cultivate an understanding of the concepts of mass balance, mass transfer, equilibrium relationship, and control by studying examples of typical separation operations, particle-based separation operations, and rocess control in chemical processes. In addition, students will develop the ability to quantitatively analyze chemical processes [Course schedule and contents] Basics of substance separation and purification, 2 sessions
 These sessions will explain the principles and methods of separation and purification of important substances in chemical processes, as well as the fundamentals of molecular diffusion and mass transfer. 2. Gas absorption, 2 sessions 2. Ous absorption, 2 sessions Students will learn the concept of the "differential contact method", through lectures discussing equilibrium of gas dissolution in liquids, the diffusion phenomenon in the liquid phase, gas absorption rates, and design methods for gas absorption devices. . Distillation, 3 sessions These sessions will describe the correlation method of vapor-liquid equilibria, explain the basic principles of various distillation operation methods for mixed liquid purification procedures, and explain the design method for a continuous rectification stage column, which is the simplest "multi-stage contact operation."

U-ENG27 27401 LJ61 U-ENG27 27401 LJ76

Course number

Overview of particle system operation, 2 sessions

These sessions will describe the role of particle-based unit operations in chemical processes, the evaluation of article characteristics, their methods of expression, and the behavior of particles

Continue to 化学プロセス工学 [NS (工基礎)](2)↓↓

Course tit (and course Graduate School of Engineering title in Associate Professor, TANIGUCHI TAKASHI English) 2nd year students or above Number of credits 2 Year/semesters Target year 2020/Second semester Days and periods Tue.2 Class style nguage of instruc Japanese Lecture [Overview and purpose of the course] Lecture on fundamentals of fluid dynamics needed for Chemical Engineering [Course objectives] Goal of this class is to understand the fundamental pricipals in fluid dynamics. [Course schedule and contents] Introduction to fluid dynamics, (3-times) Example of flows flow of ideal fluid 0-2. Laminar flow 0-3. Stability of flow 0-4. Turbulent 0-5. Computational fluid dynamics Properties of fluid 1-1. Viscosity 1-2. Compressibility
 1-3. Laminar and turbulent flows Quiescent fluid 2-1. Pressure -2. Buoyancy Dynamics of Ideal Fluid, (6-times) . Fundamentals on flows -1. Particles and continuum body 3-2. One dimensional flow 3-3. Three-dimensional flow (Preparation of Mathematics)4-1. Mechanics in the ideal fluid 4-2. Equation of continuity 4-3. Euler's equation of motion4-4. Bernoulli's theorem 4-5. Examples4-6. Streaming function and potential flow 5. Dynamics of viscous fluid, (5 5-1. Viscosity Dynamics of viscous fluid, (5-times) 1. Viscosity 5-2. Stress tensor 5-3. Exact soluble problems described by Navier-Stokes equation Continue to 基礎流体力学(2)↓↓↓

基礎流体力字(2)
Confirmation of the level of attainment, (1-time)
Confirmation of the level of attainment
Comments on the term-end Exam
[Course requirements]
It is highly recommended for students to take the class:
"Mathematics for Chemical Engineers I".
[Evaluation methods and policy]
Grade will be determined by (i) the examination at the end of semester and (ii) homeworks during semester.
[Textbooks]
日野乾雄 『流休力学』(胡合圭店)ISBN:4254200668
[References, etc.]
(Reference books)
Bird, Stewart, Lightfoot Transport Phenomena 2nd Ed. (Wiley) ISBN:9780470115398
(Related URLs)
(http://www-tph.cheme.kyoto-u.ac.jp/p/taniguch/class.html)
[Study outside of class (preparation and review)]
Because the content of the class basically follows the textbook raised above,
it is recommended that the students look through before the class.
In addition, because the students need a fundamental knowledge of vector analysis as prerequisite knowledge,
it is highly recommended for the students to parallelly take a class of "vector analysis".
(Other information (office hours, etc.))
*Please visit KULASIS to find out about office hours.

Course requi	romonte]
None	ienienis]
[Evaluation m	ethods and policy]
Absolute evaluat quizzes, and exa	ion based on the assignments with taking into account participation in practice classes, nination.
[Textbooks]	
Ken'ichi Harada	Fortran 77 Programming』 (Saiensu (Science)) ISBN:9784781904610
[Deferences /	etc.]
[References, e	
(Reference	books)
(Reference)	books)
(Reference	books)
(Reference	books) e of class (preparation and review)]
(Reference [Study outside Practice of progr	books) e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a
(Reference) (Reference) [Study outside Practice of progr at classes.	books) e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a
(Reference) (Reference) [Study outside Practice of progr at classes. (Other inform	books) e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a nation (office hours. etc.))
(Reference) (Reference) [Study outside Practice of progr at classes. (Other inform *Please visit KU	books) e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a hation (office hours, etc.)) LASIS to find out about office hours.
(Reference) (Reference) [Study outside Practice of progr at classes. (Other inform *Please visit KU	e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a hation (office hours, etc.)) LASIS to find out about office hours.
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[Study outsid (Reference) [Study outsid Practice of progr at classes. (Other inform *Please visit KU	books) e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a hation (office hours, etc.)) LASIS to find out about office hours.
(Reference) (Reference) [Study outside Practice of progr at classes. (Other inform *Please visit KU	e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a nation (office hours, etc.)) LASIS to find out about office hours.
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(Reference) (Reference) IStudy outside Practice of progr at classes. (Other inform *Please visit KU	books) e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a nation (office hours, etc.)) LASIS to find out about office hours.
(Reference) (Reference) [Study outside Practice of progr at classes. (Other inform *Please visit KU	books) a of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a nation (office hours, etc.)) LASIS to find out about office hours.
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(Reference) (Reference) [Study outside Practice of progr at classes. (Other inform *Please visit KU	e of class (preparation and review)] amming and calculations are to be carried out by BYOD. Train yourself at home as well a nation (office hours, etc.)) LASIS to find out about office hours.

Course n	ourse number U-ENG27 27403 LJ76 U-ENG27 27403 LJ61									
Course title (and course title in English)	化学工学計算機演習 Computer Programming in Chemical Engineering of affiliation									
Target yea	get year 2nd year students or above Number of credits 2 Year/semesters 2020/Second semest									
Days and periods Tue.4 Class style Lecture Languaged instruction Japanese										
[Uverview and purpose of the course] Lectures and practices of fundamentals of computer algorithms and programming using FORTRAN 77 and Visual Basic for Applications (VBA) for learning basic knowledge and skills of computation required for chemical engineers. FORTRAN 77 has been often employed for numerical calculation and VBA is practical on PCs.										
[Course o	bjectiv	es]								
To learn syr solving basi	taxes of c chemic	FORTRA cal engine	N 77 ering	and VBA, I problems.	how to v	write	e progra	ms, ar	nd how to ex	ecute program for
[Course s	chedul	e and co	nten	ts]						
Weeks 13: 1) Introduct programs, 2 assignments	Compu ion to di) Logica	ter algorit gital comp l IF staten	hms a outers nent a	nd program and program nd GO TO :	ming I mming l statemer	lang nt, d	uages a ata type	s well s, 3) A	as inputs, ou Array and DO	tputs, and simple 0 loop, 4) Description of
Weeks 45: To write and the trapezoi	Practice d execute dal rule,	e of comp e 2 or 3 pr Newton	uter al ogran metho	gorithms ar ns solving fu od, bisection	nd progr undame n metho	amr ntal d	ning I problen	ns. e.g	g. Simple cal	culations, integration b
Weeks 68: Computer algorithms and programming II 1) Built-in functions, function and subroutine subprograms, 2) Data format, input from and output to file, 3) Interpolation, numerical integration, 4) Description of assignments										
Weeks 911: Practice of computer algorithms and programming II To write and execute 2 or 3 programs solving fundamental chemical engineering problems. e.g. Statistics, linear least square										
Week 12: V Fundamenta	BA prog lls of Vis	ramming sual Basic	for A	pplications	and son	ne e:	xamples	of VI	BA codes	
Weeks 13 To write and practice	14: Pract 1 execute	ice of VB some VI	A pro 3A pro	gramming ograms solv	ing pro	blen	ıs, some	e of wl	hich are shar	ed with FORTRAN
Week 15: Q	ualificat	ion								
								(Continue to 1	公字工字計算機演習(2)↓↓

Course nu	umber	U-ENG27 4	7997 GJ61								
Course title (and course title in English)	反応工: Chemic	学 I al Reaction Eng	ineering I		Instructor's name, job title, and department of affiliation			School of Engineering fessor,NAKAGAWA HIROYUKI ichool of Engineering KAWASE MOTOAKI			
Target yea	r 2nd y	year students or above Number of credits 2 Year/semesters 2020/Second									
Days and perio	Days and periods Fri.1 Class style Lecture Language distruction Japanese										
[Overview and purpose of the course]											
Homogeneous chemical reaction engineering including kinetic analysis, design and operation of reactors, complex reactions, recycle reactors, semibatch operation, and nonisothermal reactors.											
[Course o	bjectiv	es]									
To understar operation, ar acquainted v	To understand stored and the store of the st										
[Course se	chedul	e and content	s]								
Complex rea Kinetic analy Nonisotherm ,1time, [Course realized for the second s	equiren	times, eactions and des ors,4.5times, nents]	ign and op	eration (of reactors,2	2.5time	es,	c knowledge of			
ordinary diff	ferential	equations and n	natrix.	ai i i ioce.	ss Engineer	ing an	d to nave basi	e knowledge of			
[Evaluatio	n meth	ods and polic	;y]								
Absolute eva	aluation	based on the ex	amination,	assignn	ents, and q	uizzes					
[Textbook	s]										
Kenji Hashir	Kenji Hashimoto 『Han'no Kogaku (revised and augmented)』 (Baifukan) ISBN:9784563046347										
[Reference	es, etc.]									
(Referer	(Reference books)										
[Study out	tside of	í class (prepa	ration and	d revie	w)]						
Take home a	assignme	ents almost ever	y week.								
(Other inf	formati	on (office hou	ırs, etc.))								
*Please visit	KULA	SIS to find out a	bout office	hours.							

									未更新	
Course numb	Der U-	-ENG26 46	5997 GB72	2						
Course title (and course title in English)										
arget year Brd year students or above Number of credits 2 Year/semesters 2020/Second semester										
Days and periods	Mon.2	Class	style	Lecture				Language of instruction	Japanese	
[Overview ar	nd purpos	se of the	course]							
[Course obje	ctives]									
[Course sche	edule and	d content	s]							
,1time,										
,2times,										
,4times,										
,4times,										
,1time,										
,2times,										
,Itime,										
[Course requ	irements	5]								
None		-								
I Fuction a	weth e de				_	_	_			
[Evaluation r	nethods	and polic	y]							
[lextbooks]										
[References,	etc.]									
Reference	books)									
[Study outcid		e (propa	ration and	d roviou	v)1					
Locard Outsid		ss (prepa		u leviev	v)]					
(Other infor	mation (o	office hou	rs, etc.))							
*Please visit KU	JLASIS to	o find out a	bout office	hours.						
L										

Course nu	IIIDei	0 LIN	527 57	125 1510		329 39123	LJ57			
Course title (and course title in English) 工業化学概論 [工化2] Instructor's name, job title, and department of affiliation of affiliation of affiliation										
arget year Ist year students or above Number of credits 2 Year/semesters 2020/First semester										
Days and perio	ds Wed.	.1	Class	style	Lecture			Language of instruction	Japanese	
[Course ob	ojectivo	es]								
•	•	-								
[Course so	chedule	e and co	ntents	5]						
detection.	edge on	the role of	f IDS i	n network	security	and how n	nachine	e learning can	help the intrusion	
detection. Intrusion Det based IDS by issued from I Intrusion Det traffic by ma Presentation, machine lear	edge on tection by studyin DS and tection by chine le 1 time,B ning, an	the role of by Signatu ng open so communi by Machin arning alg ased on the d discuss	f IDS i nre-Bas purce s ication ne Lear gorithm he exer it with	n network ed IDS,5ti ignature-b s, and addi ning,7time as and pub rcise, stude	security imes,Lea ased IDS ing signa es,Learn lic datas ents press lents and	and how n arn the mecl S and attack atures to det the method et for bench ents their m l instructors	hanism s, such ect atta of clas markin ethods	 c) learning can c) of intrusion c) as correspondences c) as correspon	help the intrusion detection by signature dence between alarm: hal and malicious letection performance. detection using	
detection. Intrusion Det based IDS by issued from I Intrusion Det traffic by ma Presentation, machine lear [Course re	edge on tection by studyin DS and tection b chine le ltime,B ning, an quiren	the role of by Signatung open so communi by Machin arning alg based on the d discuss	f IDS i rre-Bas purce s ication he Lear gorithm he exer it with	n network aed IDS,5ti ignature-b s, and addi ning,7time is and pub ccise, stude other stud	security imes,Lea ased IDS ing signa es,Learn lic datas ents prese lents and	and how n arn the mecl S and attack atures to det the method et for bench ents their m l instructors	hanism s, such ect atta of clas markin ethods	 elearning can of intrusion as correspondences ssifying norm g intrusion d of intrusion d 	h help the intrusion detection by signature adence between alarm: hal and malicious letection performance. detection using	
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Course title (and course title in English)	工業 Intro	duct	ど概話 tion to	〕 [工] D Indus	'[_1] strial (Chemist	ry	Inst nan and of a	tructor's ne, job ti I departr Iffiliatior	tle, nent	Graduate Sc Professor,M	nool of Ei YAHAR	ngineering A MINO	g RU
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Days and peri	ods W	/ed.1	l	Cla	ass s	tyle	Lectur	e			Language of instruction	Japanese	e	
[Overview	/ and	l pu	rpos	e of th	ne co	ourse]								
[Course o	bjec	tive	s]											
[Course s	chec	dule	and	conte	ents]									
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[Course re	equi	rem	ents]										
None														
[Evaluatio	n m	etho	ods a	ind po	olicy]									
[Textbook	s]													
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[Study ou	tside	e of	clas	s (prei	para	tion an	d revie	w)]				_		
(Other in	form	atio	on (o	ffice h	ours	, etc.))					_			
*Please visi	t KUl	LAS	IS to	find ou	ıt abo	ut office	e hours.							

工業化学概論 [工化2] (2) [References, etc.] (Reference books) [Study outside of class (preparation and review)] (Other information (office hours, etc.)) *Please visit KULASIS to find out about office hours.

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Course nu	umbe	r	U-EN	G29 3	9123 LJ10	U-EN	G29	39123	LJ57				
Course title (and course title in English)	工業 Intro	duc	学概論[tion to In	工化3 dustri] al Chemistr	У	Inst nan and of a	tructor's ne, job ti I departn Iffiliation	tle, nent	Graduate School of Engineering Professor,MIYAHARA MINOR			
Target yea	r	lst ye	ar students (or above	Number	of cred	its	2	Year	/semesters	2020/First semester		
Days and perio	ods V	Ved.	1	Clas	s style	Lecture	e			Language of instruction	Japanese		
[Overview	[Overview and purpose of the course]												

[Course objectives]

[Course schedule and contents]

Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class. Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection

detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.

[Course requirements] None

[Evaluation methods and policy]

[Textbooks]

_____Continue to 工業化学概論 [工化3] (2)↓↓

Course nur	nber	U-EN	G29 39123 LJ10) U-ENO	329	39123	LJ57		
Course title (and course title in English)	工業化 ntrodu	学概論 [ction to In	工化4] dustrial Chemis	itry	Insti nam and of at	ructor's ne, job ti departn ffiliation	tle, nent	Graduate Scl Professor,M	hool of Engineering IYAHARA MINORU
Target year	lst y	/ear students o	or above Numbe i	of credi	ts	2	Year	/semesters	2020/First semester
Days and period	is Wed	.1	Class style	Lecture				Language of instruction	Japanese
[Overview a	and p	urpose o	of the course]						
[Course ob	jectiv	es]							
-	-				_				
[Course sc	hedul	e and co	ntents]						
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None									
[Evaluation	n meth	nods and	policy]						
Textbooks	1				_				
LIENDOOKS	1								
	_	_	_			_	C	Continue to 工業	《化学概論 [工化4] (2)↓↓

⊥果1℃字 做論 〔⊥1℃3〕(2)	
[References, etc.]	
(Reference books)	
[Study outside of class (preparation and review)]	
(Other information (office hours, etc.))	
*Please visit KULASIS to find out about office hours.	

工業化学概論 [工化4] (2)

[References, etc.] (Reference books)

[Study outside of class (preparation and review)]

(Other information (office hours, etc.))

*Please visit KULASIS to find out about office hours.

									未更新		
Course nu	umber	U-EN	G20 32402 S	SE77							
Course title (and course title in English)	高分 Introd	子化学序論 luction of F	i olymer Cher	nistry	Ins nar and of a	tructor's ne, job ti I departn affiliation	tle, nent	Graduate Scl Professor,AF	aduate School of Engineering ofessor,AKIYOSHI KAZUNARI		
Farget year 2nd year students or above Number of credits 2 Year/semesters 2020/First semester											
Days and peri	ods We	ed.2	Class style	e Lectu	re			Language of instruction	Japanese		
[Overview	and	purpose (of the cours	se]							
[Course o	bjecti	ives]									
[Course s	chedu	ule and co	ontents]		_						
, 1 times, , 5 times, , 3 times, , 4 times, , 1 times,											
[Course re	equire	ements]									
[Evaluatio	on me	thods and	a policy]								
[Textbook	s]										
[Referenc (Referen	es, et nce b	c.] ooks)									
[Study ou	tside	of class (preparatio	n and revie	ew)]						
(Other in *Please visit	f orma t KUL	ation (office ASIS to fin	ce hours, e d out about c	t c.)) office hours.							

Textbook	s]			
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[Referenc	etc.]			
(Referei アトエンフ	ICE DOOKS) 『珈珊化学(上)	筆10版		
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[Study ou 感愛由にお	side of class (pre デオス	eparation and	review)]	
反未中に頂	1190			
(Other in	ormation (office I	hours, etc.)		
*Please visit	KULASIS to find o	ut about office h	ours.	

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Course nu	umber										
Course title (and course title in English) Chem-E-Car設計・実験 Chemical-E-Car Design and Experiment Instructor's English)											
Target yea	Farget year 2nd year students or above Number of credits 2 Year/semesters 2020/Second semester										
Days and peri	Days and periods Fri.4,5 Class style Practical training Lagrage distudio Japanese										
[Overview 制御された 設計開始前 したChem-1 競う。	「Overview and purpose of the course] 制御された化学反応を駆動力とする化学自動車模型(Chem-E-Car)をグループで設計、製作する。 設計開始前には電池や熱電効果等に関する実験を行い、Chem-E-Carに関する基礎を習得する。製作 したChem-E-Carが、決められた荷重を搭載して目的とする距離を走行できるかをコンテスト形式で 競う。										
[Course o	bjective	es]									
 電池におけ 電気化学、 を磨く。 目的とする 養う。 	[Lourse objectives] 電池における物理化学を理解し、その活用についての理解を深める。 電気化学、熱電効果、発熱・吸熱、ガス発生等を含む、様々な化学・物理的現象を利用する発想力 を磨く。 目的とするChem-E-Carの走行性能を実現するための化学反応の選択、制御の工夫を通して創造性を 養う。										
[Course s	chedule	e and co	ntents]								
 (1) 安全計 (2) 基礎 (3) 設計7 (4) 工作当 (5) Chem 本データの (6) 発表会 (7) コンジ る解説等 	[Course schedule and contents] (1) 安全講習 [1週]: Chem-E-Car作製、走行実験に必要な安全に関する講習 (2) 基礎実習 [5週]: 電気化学、熱電効果、等に関する講義; 一次電池、燃料電池、熱電効果 等を使用したモデルChem-E-Carの作製 (3) 設計方針討論 [1週]: グループによるChem-E-Carの設計方針の討論 (4) 工作実習 [1週]: Chem-E-Carの製作に必要な工作技術や工作機械の使用方法の説明、実習 (5) Chem-E-Carの製作、試運転 [5週]: グループによるChem-E-Carの設計、製作、走行実験、基本データの採取 (6) 発表会 [1週]: グループによるChem-E-Carに関する発表(走行・停止の原理、特徴、等) (7) コンテスト、講評会 [1週]: Chem-E-Car走行コンテスト、Chem-E-Carの走行データに関する解説等										
[Course re	equiren	nents]									
[Evaluatio Chem-E-Ca	on meth rの走行 ⁴	ods and 性能(コ	policy] ンテスト	、結果)	、成果	報告	占 会にお	3ける)	発表、レポー	- トにより評価する。	
									Continue to Che	m-E-Car設計・実験(2)↓↓↓	

Course nu	ımb	er	U-EN	VG29 2	9007 LJ10	U-EN	G29	29007	LJ72		
Course title (and course title in English)	特別研究(H18年以降入学者) Instructor's name, job title, and department of affiliation Graduate School of Engineering										
Target yea	year 4th year students or above Number of credits 12 Year/semesters 2020/Intensive, year-round										
Days and perio	Jays and periods Intensive Class style Seminar Language distriction Japanese										
[Overview	and	d pu	rpose	of the	course]						
いずれかの を作成する	研穿 。	宝に	こ配属さ	5れ、1	T業化学全	般に関	する	各自の	テー	マについて毎	「究を進め、学士論文
[Course o	bjeo	tive	s]								
研究テーマ とともに、	に関 学術	lする 所的・	る議論 ・技術的	· 討論 的内容	・実験演習 を明確に説	を通じ 明する	、研コミ	究課題 ユニケ	抽出	・問題解決な ョン能力を高	よどの研究能力を得る 弱める。
[Course s	che	dule	and c	onten	ts]						
指導教員と 例えば、週	協議2こ	後のう 1マ和	うえ決定 呈度のも	ミする。 ジミと)	周1回以上	の個別	課題	検討な	ど。		
[Course re	equi	rem	ents]								
- 特別研究を 満たし、研	開始	する	- るために 己属して	こは、) こいる。	入学年度に 必要がある	基づく 。	「研	究室配	」 属・	特別研究着手	に必要な単位数」を
[Evaluatio	n m	etho	ods an	d poli	cy]						
研究課題に 行う。	対す	-る理	 解度・	・演習(の実施状況	、学士	論文	に対す	30	頑試問に基づ	ゔ き、総合的に評価を
[Textbook	s]										
各研究室で	指示	する	á								
[Referenc	es, (etc.]									
(Refere r 各研究室で	ice 指示	boo 、する	ks) S								
[Study ou	tsid	e of	class	(prepa	ration and	d revie	w)]		_		
研究テーマ	に応	いて	て自主的	りに学る	習すること	が求め	られ	.る。			
(Other in	forn	natio	on (offi	ce ho	urs, etc.))						
*Please visit	KU	LAS	SIS to fi	nd out a	about office	hours.					