[Title]			[Instructor]				
	A	Advanced Organic Chemistry	Tetsuo Kuwabara				
[Code]	[Credits]	[Program]	[Semester] [Hours] [Language instructio				
GTA501	2	Applied Chemistry	1st Semester	Fri./I	English/ Japanese		
[Outline an	d purpose]						
The course g textbooks su chemistry in chemistry.	The course gives extended knowledge in the field of organic chemistry towards those who already finished to learn basic textbooks such as Jones, McMurry, Vollhardt-Schore and etc. This course mainly describes the fundamentals of organic chemistry involving syntheses, reactions, structural and physical organic chemistry, bio-organic chemistry and supramolecular chemistry. In addition, some of recently advanced subjects in the related fields are introduced.						
[Objectives]							
We will lea chemistry, bi	arn about o-organic ch	fundamentals of organic chemistry involving syntheses, emistry and supramolecular chemistry	reactions, stru	ictural and pl	hysical organic		
[Requireme	ents]						
Completion	of undergr	raduate course covering basic organic chemistry.					
[Evaluation	l]						
Participation Term paper t	in class 20% o be submitte	ed at the end of the course 80%					
[Textbooks]							
Not specified	l						
[References]						
Not specified	l						
[Schedule]							
1. Guidance	: biomimetic	chemistry					
2. Intermole	cular interac	tions					
3. Molecula	r recognition	is and supramolecular chemistry					
5. Preparati	 Precursor and preparation of supramolecules Preparation of self-assemblies 						
6. Preparati	6. Preparation of molecular assemblies						
7. Synthesis	7. Synthesis and functions of rotaxanes						
8. Synthesis and functions of catenanes							
 Synthesis and functions of molecular machines 							
11. Nanostr	11. Nanostructure						
12. Nanoser	nsing						
13. Applica	tion of Nanc	ostructure					
14. Future of 15. Summar	y and compr	rehensive evaluation					

[Title]			[Instructor]			
	Ad	lvanced Inorganic Chemistry I	Hideto Sa	lkane/ Naoya	a Miyajima	
[Code]	[Credits]	[Program]	[Semester] [Hours] [Language instruction			
GTA502	2	Applied Chemistry	1st Semester	Mon. / II	English /Japanese	
Image: Contester Definition [Outline and purpose] This program is a lecture on basic and structural characteristics, theory, nomenclature, and spectroscopic properties of metal complexes, in which molecules and ions coordinate to central metal ion(s). Students also learn the basic and application of surface/interface science of materials. They can deeply understand the field of surface adsorption technology for evaluating the surface/pore of materials such as carbons. [Objectives] Students are expected to be able to account the structure, bonding, and spectrochemical properties of transition metal complexes and to name inorganic compounds. Students are also expected to be able to explain the fundamental principle and application of solid-surface modification and its evaluation. [Requirements] Expertise of general inorganic, physical, and quantum chemistry. Basic knowledge of physical chemistry and electrochemistry. [Evaluation] Homework/Reports 90% (Reports on the questions given in several hours.) Class participation 10% [Textbooks] 1. 日本化学会 命名法専門委員会 編, 化合物命名法 - IUPAC 勧告に準拠 - 第 2 版, 東京化学同人,						
2. 平尾 (in Japa	之、四中 勝 anese).	べ、 ヤ 平	1、宋尔16子问	八, ISBN: 97	84807908240	
[References] 1. 三吉 克前 2. 上村 洸、 3. 近藤 精- 4. 炭素材料	5] 彦, 金属錯体 一, 石川 達 学会編, 新	*の構造と性質, 岩波書店, ISBN: 9784000110426 (in 田辺 行人, 配位子場理論とその応用, 裳華房, ISBN: 雄, 安倍 郁夫, 吸着の科学, 丸善, ISBN:461048430 ・炭素材料入門, リアライズ, ISBN:4947655925 (in a	Japanese). 97847853240 (in Japanese). Japanese).)49 (in Japar	nese).	
 [Schedule] Coordir Represe Interprese Interprese Structure Structure Structure Structure Structure Surface Surface Surface Fundant Fundant Fundant Applicat Adsorpt Summation 	ation bond entative str etations of and ligand re of compl y and react clature of in and interf e modification nental stud tions of sun tions of ads tion and sep tive assess	and complex puctures of complex and their isomerism electronic states by valence bond theory l field theories ex cion of complex horganic compounds ace on and surface/pore control y of adsorption theory y of adsorption measurement method rface modification and adsorption theory sorption measurement method paration technology ment for total score				

[Title]			[Instructor]			
	Ad	vanced Inorganic Chemistry II	Satoshi Wada / Hiroshi Yanagi/Katsuyoshi Kakinuma			
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA503	2	Applied Chemistry	2nd Semester	Thu.∕I	English/ Japanese	
[Outline an	d purpose]					
Students le	arn the bas	sics and application of electron behavior in solids				
[Objectives]]					
To understa	and fundam	nental principle of electronic and optical properties	of solids			
[Requireme	ents]					
A good grou	anding in P	hysical Chemistry, Inorganic Chemistry, and Quan	tum Chemistr	у.		
[Evaluation	n]					
1 Midterm	examinatio	n 30%				
2 homewor	k 30%					
3 class part	ticipation	40%				
[Textbooks]						
[References	5]					
[Schedule]						
1. Introduction	on					
2. Crystal Str	ructure					
3. Chemical	bonding and	band structure				
5. Other eval	uation metho	od				
6. The essence	e of electron	ic structure				
7. Material d	7. Material design based on electronic structure					
8. Midterm e	8. Midterm examination					
9. Mechanist	9. Mechanism of electric polarization 10. Complex dielectric constant and dielectric relaxation					
11. Evaluatio	11. Evaluation of dielectric properties					
12. Ferroelec	12. Ferroelectrics and ferroelectric domain configuration					
13. Piezoelec	13. Piezoelectricity					
14. Applicati	14. Application of dielectrics and ferroelectrics					
	ve assessmer					

[Title]			[Instructor]			
	Ad	lvanced Analytical Chemistry	Junji Int	ıkai, Toshihi Ikuo Ueta,	iro Miyao	
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA504	2	Applied Chemistry	1st Semester	Thu.∕I	English / Japanese	
[Outline an	d purpose]					
The lecture chromatogr checked and	covers the aphy. By the d evaluated	e principles, instrumentations and applications of whe midterm examinations and short presentations l.	various analyt , your levels o	ical techniq of understan	ues including dings will be	
[Objectives]						
 Introduct Understa Understa 	tion to Surf anding of A anding of C	Cace Crystallography. dsorption Phenomena; principles and applications hromatography; principles, instrumentations and a	pplications			
[Requireme	ents]					
Students n attending t Home work	Students need basic understandings (undergraduate levels) of physical, analytical and organic chemistry for attending this lecture. Home works are given.					
[Evaluation	1]					
By reports a By reading	and midter an present	m examination: 80% ation: 20%				
[Textbooks]						
Prints						
[References	5]					
塚田捷, 表面	面物理入門,	東京大学出版会(ISBN:4130621203)				
近藤精一、	石川達雄、第	安部郁夫, 吸着の科学, 丸善出版 (ISBN: 4621048430))			
田中誠之、的	飯田芳男, 碁	基礎化学選書 7 機器分析, 裳華房 (ISBN:978478533	31337)			
[Schedule]						
1. Introduc 2. Basal pl 3. Beginrod	ction to sur lanes and a	face and interface sciences: surface structure/comp dlayer. Surface lattice	osition, single	-crystal surf	ace	
4. Surface 5. Test on	5. Reciprocal space 4. Surface structural analysis by low energy electron diffraction 5. Test on single-crystal surfaces					
6. Adsorpt 7. Interpre	ion phenon etation of a	iena at a gas/solid interface dsorption isotherms				
8. Adsorpt	ion on poro	us solids				
9. Charact	erization for	or solids using adsorption phenomena				
11. Principl	e and kev f	actors of chromatographic separation				
12. Retentio	on factors i	n high performance liquid chromatography				
13. Retentio	on factors i	n gas chromatography	_			
14. Detector	4. Detectors in gas chromatography, and recent gas chromatographic analysis					

15. Sample preparation in gas chromatography

[Title]			[Instructor]			
	А	dvanced Physical Chemistry	Masami Sh	iibata/ Naok Shintaro Uer	i Yoneyama/ 10	
[Code]	[Credits]	[Program]	[Semester] [Hours] [Language instructio			
GTA505	2	Applied Chemistry	2nd Semester	Tue.∕I	English/ Japanese	
[Outline an	d purposel					
We first ex physical ch corroding p	plain the s emistry, wh rocesses of	shape of molecule in view of symmetry and the o tich is indispensable to research functional materia metals on the basis of the surface physics and chem	chemical bond ls. Second, we nistry.	ls to deepen e describe th	e expertise in e coating and	
Students w structure, a metallic sur	ill obtain f and band s rface based	urther understanding of the solid state physical of structure. Furthermore, the students will learn on basic knowledge of electrochemistry.	hemistry suc the chemical	h as space g reaction pr	group, crystal ocess on the	
Boguiromo	mtal					
All the cont	anta comoo	mod with physical charging in the up dependence	00111120			
An the cont	ents concer	med with physical chemistry in the undergraduate	course.			
[Evaluation	1]					
Exam: 40%	-					
Exam [inter	rmediate]:	40%				
Attitude: 20)%					
[Textbooks]						
P Atkins ar	nd J. de Par	1/2 Atkins' Physical Chemistry				
1.710Killiö al	10 9. 00 1 av	ana, nokino i nysicar chemistry				
[References	5]					
今野豊彦"	物質の対称	生と群論" (Japanese text)				
春山志郎"美	表面技術者(Dための電気化学" (Japanese text)				
[Schedule]						
1. Guidance	9					
2. Symmetr	ry of molecu	lles I character table (Sec. 12)				
3. Symmetr	y of molecu	les II: molecular vibration of water (Sec. 12, 13)	loculos (Soc	10 19)		
4. Symmetr	4. Symmetry of molecules III: molecular vibration of more complicated molecules (Sec. 12, 13)					
6 Chemica	6. Chemical bond II: jonic crystals (Sec. 20)					
7. Chemica	7 Chemical bond III: van der Waals interaction (Sec. 18)					
8. Interim	summarv					
9. Growth a	and structu	res of solid surfaces (Sec. 25.1)				
10. Catalys	10. Catalysis at surfaces (Sec. 25.6-7)					
11. Basic el	11. Basic electrochemistry (Sec. $7.5 \sim 7.9$, Sec. $25.8 \cdot 9$)					
12. Electrol	ysis (Sec. 2	5.1)				
13. Electroo	deposition					
14. Corrosio	on and elect	troless plating (Sec. 25.13)				
15. Summa	ry					

[Title]			[Instructor]			
	Adv	vanced Polymer Chemistry	Hidenor	ri Okuzaki /	Makoto Obata	
[Code]	[Credits]	[Program]	[Semester] [Hours] [Language of instruction]			
GTA506	2	Applied Chemistry	2nd Semester	Thu./II	English/Japanese	
[Outline ar	nd purpose		•			
Polymer m this lecture	aterials are e, you learn	e used in aviation, space, electronics, commun synthesis, characterization, and application o	ication, transj f various func	portation, ai tional polyn	nd medical care. In ners.	
[Objectives						
To understa	and basic k	nowledge of synthesis, structure, and function	of polymer m	aterials.		
[Requireme	entsl					
A groundin	g in organi	c chemistry, physical chemistry, and fundamen	ntal polymer c	hemistry.		
[Evaluation	าไ					
Attendance	e and repor on: 50 %	t: 50 %				
[Textbooks]]					
[References	s]					
[Schedule]						
 Chain pe Chain pe Chain pe Stepwise Precise p Precise p Precise p Molecula Evaluat Evaluat Evaluat Crystall Oynam Charac Optical Prescri Mechar Final e 	olymerizati olymerizati e polymeriza polymeriza ar weight a ion of polyr ion of mole ine structu ic viscoelas teristics of plastics (o bed proper nism of adh xamination	ion 1 (radical polymerizations, copolymerization ion 2 (ionic polymerizations and ring-opening p zation 1 (condensation polymerizations and kin tion 1 (basics of living polymerizations and des tion 2 (reversible activation mechanism and co and distributions, stereospecificity, and propert ner conformation by wide-angle X-ray diffraction cular orientation of polymer materials re and crystallization kinetics of polymer mate- stic properties of polymer materials optical plastics ptical lens, optical fibers, and optical disks) ties of adhesives. mesion (epoxy adhesives and superglues) a (presentation)	ons, and kinet polymerization netics) sign of specific ontrolled polyne ties of polymen tion erials	ics) ns) e-structure p merizations) rs	oolymers)	

[Title]			[Instructor]			
Ad	lvanced Qu	antum Chemistry for Energy Conversion	Hiroshi Irie/ToshihiroTakashima			
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA507	2	Applied Chemistry	1st Semester	Thu./II	English/ Japanese	
[Outline and purpose] This class discusses the principles of quantum mechanics first and then uses these ideas in the molecular approach to science. In every class, the attendances have a lecture, and then solve some problems to deepen their knowledge. [Objectives] 1. To understand the basic quantum mechanics. 2. To understand the hydrogen atom, multi-electron atoms and approximation methods. 3. To understand the chemical bond: Diatomic molecules and polyatomic molecules. 4. To understand the molecular spectroscopy.						
Knowledge	on the qua	ntum chemistry learned in the Faculty				
[Evaluation Attitude to Final exam [Textbooks] [References 大岩正芳: 7	a] ward the cl ination : 4 。] 初等量子化:	ass and practice:60% 0% 学 第 2 版、化学同人、2006 年(in Japanese)				
[Schedule] 1. The dawn 2. The class 3. The Schr 4. Some pos 5. The harn 6. The hydr 7. Approxin 8. Approxin 9. Multi-ele 10. The che 11. Bonding 13. Group t 14. Molecul 15. Final es	n of the qua sical wave f odinger eq stulates and nonic oscill ogen atom nation meth nation meth mical bond g in polyato heory: The ar spectros camination	antum chemistry Function uation and a particle in a box d general principles of quantum mechanics ator and the rigid rotator nods 1 nods 2 s : Diatomic molecules mic molecules exploitation of symmetry copy				

		[Title]	[Instructor]			
А	dvanced C	ourse of Materials Design for Fuel Cells	Hiroyuki U	chida / Kenj Shinji Nohar	i Miyatake / 'a	
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA508	2	Applied Chemistry	2nd Semester	Tue./II	English/ Japanese	
[Outline and purpose] Fuel cells are electric power supply devices, which convert chemical energy to electric energy directly and reciprocally. Among them, polymer electrolyte fuel cells (PEFCs) for electric vehicles, portable devices, and residential power supply and solid oxide fuel cells (SOFCs) as on-site power generation have attracted a considerable attention. In this class, principle, design and evaluation of these fuel cells and their component materials will be discussed. [Objectives]						
io unucrote	unu princip					
[Requireme Basic know	ents] ledge on ele	ectrochemistry and physical chemistry				
[Evaluation	.]					
Report and Mark given	examination for class p	on: 50% articipation: 50%				
[Textbooks]						
None						
[References]					
Denkikagal	xugairon (c	o-authored by Matsuda and Iwakura), Maruzen, IS	BN: 46210399	962		
[Schedule]						
 Electro Princip Princip Princip Design Design Design Design Besign Methat Methat Design Methat Design Methat Design Methat Design Methat Design Methat 	ochemistry ble and rese of fuel cell of fuel cell of fuel cell of fuel cell nol oxidation of highly co of highly co of function	of fuel cells 2 earch trend of fuel cells 1 earch trend of fuel cells 2 electrocatalysts: cathode catalysts 1 electrocatalysts: anode catalysts 2 electrocatalysts: anode catalysts 1 electrocatalysts: anode catalysts 2 on catalysts 1 on catalysts 2 lispersed catalysts 2 elal materials 1 eal materials 2				
15. Summ	ary					

[Title]			[Instructor]			
	Sei	ninar in Applied Chemistry IA	all ac	all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA602	1	Applied Chemistry	1st English/ Semester Japanese			
[Outline and purpose] Students assigned to each laboratory acquire experimental and analysis methods to accomplish their master's thesis with skills in literature search, data collection, and utilization of international journals. Furthermore, the students obtain communication and presentation skills by studying how to approach the wide field and subject from the international viewpoints to cultivate the problem-solving ability and creative mind. [Objectives] To acquire analysis method required for professional engineers with advanced expertise. To obtain communication and presentation skills by studying how to approach the wide field and subject from the international viewpoints. [Requirements] This seminar requires basic knowledge of each courses obtained in your undergraduate program.						
[Evaluation] Your academic supervisors evaluate your degree of attainment.						
[Textbooks]						
[References Textbooks,] reference b	ooks, and articles related to your master's thesis pr	rescribed by ye	our supervis	ors.	
[Schedule]1.Selectic2.Selectic3.Literatu4.Previou5.Previou6.Previou7.Acquisi8.Acquisi9.Acquisi10.Reading11.Reading12.Reading13.Reading14.Reading15.Reading	on of resear on of resear ure search as research tion of rele tion of rele tion of rele g of interna g of interna g of interna g of interna g of interna g of interna g of interna	ch subject 1 ch subject 2 investigation 1 investigation 2 investigation 3 vant information and knowledge 1 vant information and knowledge 2 vant information and knowledge 3 tional journals to obtain the relevant information a tional journals to obtain the relevant information a	und knowledge und knowledge und knowledge und knowledge und knowledge	e 1 e 2 e 3 e 4 e 5 e 6		

[Title]			[Instructor]			
	Ser	ninar in Applied Chemistry IB	all aca	all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA603	1	Applied Chemistry	2nd Semester		English/ Japanese	
[Outline and purpose] Students assigned to each laboratory propose experimental design and conduct preliminary research study under the guidance of their supervisors. Furthermore, the students obtain communication and presentation skills by studying how to approach the wide field and subject from the international viewpoints to cultivate the problem-solving ability and creative mind. [Objectives] To carry out a novel research based on the study of Seminar in Applied Chemistry IA.						
	. 1					
This semin	ar requires	basic knowledge of each courses obtained in your u	ndergraduate	e program.		
[Evaluation Your acade:	[Evaluation] Your academic supervisors evaluate your degree of attainment.					
[Textbooks]						
[References	3]					
Textbooks,	reference b	ooks, and articles related to your master's thesis pr	escribed by yo	our supervis	ors.	
[Schedule]						
 Previou Previou Previou Previou Experin Experin Experin Experin Prepara Prepara Prepara Prelimi Prelimi Prepara 	as research as research nental desi nental desi nental desi ation of pre ation of pre ation of pre nary resear nary resear ation of inte ation of inte ation of inte	investigation 1 investigation 2 investigation 3 gn 1 gn 2 gn 3 liminary research 1 liminary research 2 liminary research 3 rch study 1 rch study 2 rch study 3 erim presentation 1 erim presentation 2 erim presentation 3				

[Title]			[Instructor]			
	Sen	ninar in Applied Chemistry IIA	all academic supervisors			
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA604	1	Applied Chemistry	1st Semester		English/ Japanese	
[Outline an Students as	d purpose] ssigned to	each laboratory acquire experimental and analysis	s methods to a	accomplish t	heir master's	
thesis with study of Se skills by st problem-sol	skills in l minar in A udying how lving ability	iterature search, data collection, and utilization of pplied Chemistry IB. Furthermore, the students of to approach the wide field and subject from the in y and creative mind.	of internation btain commu aternational v	al journals nication and iewpoints to	based on the presentation cultivate the	
[Objectives]						
To acquire a To obtain of from the in	analysis me communica ternational	ethod required for professional engineers with adva tion and presentation skills by studying how to viewpoints.	nced expertise approach th	e. e wide field	and subject	
[Requireme	ents]					
This semina	ar requires	basic knowledge of each courses obtained in your u	Indergraduate	e program.		
[Evaluation	l]					
Your acade	mic supervi	isors evaluate your degree of attainment.				
[Textbooks]						
[References]					
Textbooks,	reference b	ooks, and articles related to your master's thesis pr	escribed by yo	our supervis	ors.	
[Schedule]						
 Examination of preliminary results and review of research plan 1 Examination of preliminary results and review of research plan 2 Examination of preliminary results and review of research plan 3 Research and investigation 1 						
 Research Research Research Research Research 	 Research and investigation 2 Research and investigation 4 Research and investigation 5 Research and investigation 6 					
10. Researce 11. Researce 12. Researce	 A. Research and investigation 6 10. Research and investigation 7 11. Research and investigation 8 12. Research and investigation 9 					
13. Researce 14. Researce 15. Researce	n and inve h and inve h and inve	stigation 10 stigation 11 stigation 12				

	[Title]			[Instructor]		
Sen	ninar in Applied Chemistry IIB	all aca	ademic supe	rvisors		
[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]		
1	Applied Chemistry	2nd Semester		English/ Japanese		
d purpose]						
ssigned to emistry IIA	each laboratory summarize and publish the resolution of their supervisors.	earch results	provided by	v Seminar in		
]						
t a novel re	search based on the study of Seminar in Applied Ch	nemistry IIA.				
entsl						
ar requires	basic knowledge of each courses obtained in your u	ndergraduate	program.			
าไ						
mic supervi	sors evaluate your degree of attainment.					
I I I						
5]						
reference b	ooks, and articles related to your master's thesis pr	escribed by yo	our supervis	ors.		
tion of resea tion of resea nal study a nal study a nal study a ts of Mastea ts of Mastea ts of Mastea g of Mastea g of Mastea g of Mastea s of Mastea g of Mastea g of Mastea	arch and investigation, examination of additional st arch and investigation, examination of additional st arch and investigation, examination of additional st and investigation 1 and investigation 2 and investigation 3 r's thesis 1 r's thesis 2 r's thesis 3 s thesis 1 s thesis 2 s thesis 3 1 2	cudy and inve cudy and inve cudy and inve	stigation 1 stigation 2 stigation 3			
	Sen [Credits] 1 ad purpose] ssigned to emistry IIA] t a novel re ents] ar requires al] mic supervi s] reference b tion of reseation of reseation of reseation of reseation of reseation of reseation of master's of Master	Seminar in Applied Chemistry IIB [Credits] [Program] 1 Applied Chemistry id purpose] signed to each laboratory summarize and publish the resemistry IIA under the guidance of their supervisors.] t a novel research based on the study of Seminar in Applied Chemistry ents] ar requires basic knowledge of each courses obtained in your u n]	Seminar in Applied Chemistry IIB all acc [Credits] [Program] [Semester] 1 Applied Chemistry 2nd semistry Image: Semistry 2nd assigned to each laboratory summarize and publish the research results emistry IIA under the guidance of their supervisors. I	Seminar in Applied Chemistry IIB all academic supe [Credits] [Program] [Semester] [Hours] 1 Applied Chemistry 2nd Semester 2nd id purpose] ssigned to each laboratory summarize and publish the research results provided by emistry IIA under the guidance of their supervisors. I t a novel research based on the study of Seminar in Applied Chemistry IIA. Imits] Imits] ar requires basic knowledge of each courses obtained in your undergraduate program. Imits] Imit supervisors evaluate your degree of attainment. Imits] Imit sup and investigation, examination of additional study and investigation 1 Imits] Imit sup and investigation, examination of additional study and investigation 2 Imits] Imit sup and investigation 2 Imits] Imits] Imits] Imits] Imits] Imits] Imits] Imits] Imits] Im		

[Title]			[Instructor]			
Research Work in Applied Chemistry IA			all academic supervisors			
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA606	2	Applied Chemistry	1st Semester		English/ Japanese	
[Outline and purpose] Students assigned to each laboratory acquire experimental and analysis methods to accomplish their master's thesis with skills in literature search, data collection, and utilization of international journals. Furthermore, the students obtain communication and presentation skills by studying how to approach the wide field and subject from the international viewpoints to cultivate the problem-solving ability and creative mind. [Objectives] To acquire analysis method required for professional engineers with advanced expertise.						
To obtain of from the in	communica ternational	tion and presentation skills by studying how to viewpoints.	approach th	e wide field	and subject	
[Requirements] This seminar requires basic knowledge of each courses obtained in your undergraduate program.						
[Evaluation	ı]					
Your academic supervisors evaluate your degree of attainment.						
[Textbooks]						
[References] Textbooks, reference books, and articles related to your master's thesis prescribed by your supervisors.						
[Schedule] 1. Selection of research subject 1 2. Selection of research subject 2 3. Literature search 4. Previous research investigation 1 5. Previous research investigation 2 6. Previous research investigation 3 7. Acquisition of relevant information and knowledge 1 8. Acquisition of relevant information and knowledge 2 9. Acquisition of relevant information and knowledge 3 10. Reading of international journals to obtain the relevant information and knowledge 2 12. Reading of international journals to obtain the relevant information and knowledge 3 13. Reading of international journals to obtain the relevant information and knowledge 4 14. Reading of international journals to obtain the relevant information and knowledge 5 15. Reading of international journals to obtain the relevant information and knowledge 6						

[Title]			[Instructor]			
Research Work in Applied Chemistry IB			all academic supervisors			
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA607	2	Applied Chemistry	2nd Semester		English/ Japanese	
[Outline and purpose] Students assigned to each laboratory propose experimental design and conduct preliminary research study under the guidance of their supervisors. Furthermore, the students obtain communication and presentation skills by studying how to approach the wide field and subject from the international viewpoints to cultivate the problem-solving ability and creative mind. [Objectives] To carry out a novel research based on the study of Research Work in Applied Chemistry IA.						
[Requirements] This seminar requires basic knowledge of each courses obtained in your undergraduate program.						
[Evaluation] Your academic supervisors evaluate your degree of attainment.						
[Textbooks]						
[References] Textbooks, reference books, and articles related to your master's thesis prescribed by your supervisors.						
[Schedule] 1. Previous research investigation 1 2. Previous research investigation 2 3. Previous research investigation 3 4. Experimental design 1 5. Experimental design 2 6. Experimental design 3 7. Preparation of preliminary research 1 8. Preparation of preliminary research 2 9. Preparation of preliminary research 3 10. Preliminary research study 1 11. Preliminary research study 2 12. Preliminary research study 3 13. Preparation of interim presentation 1 14. Preparation of interim presentation 2 15. Preparation of interim presentation 3						

[Title]			[Instructor]			
Research Work in Applied Chemistry IIA			all academic supervisors			
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA608	2	Applied Chemistry	1st Semester		English/ Japanese	
[Outline an	d purpose]					
Students assigned to each laboratory acquire experimental and analysis methods to accomplish their master's thesis with skills in literature search, data collection, and utilization of international journals based on the study of Research Work in Applied Chemistry IB. Furthermore, the students obtain communication and presentation skills by studying how to approach the wide field and subject from the international viewpoints to cultivate the problem-solving ability and creative mind.						
[Objectives]	1 .		1			
To acquire analysis method required for professional engineers with advanced expertise. To obtain communication and presentation skills by studying how to approach the wide field and subject from the international viewpoints.						
[Requireme	ents]					
This seminar requires basic knowledge of each courses obtained in your undergraduate program.						
[Evaluation]						
Your academic supervisors evaluate your degree of attainment.						
[Textbooks]						
[References]						
Textbooks, reference books, and articles related to your master's thesis prescribed by your supervisors.						
[Schedule]						
 Examination of preliminary results and review of research plan 1 Examination of preliminary results and review of research plan 2 Examination of preliminary results and review of research plan 3 Research and investigation 1 Research and investigation 2 Research and investigation 3 Research and investigation 5 Research and investigation 7 Research and investigation 8 Research and investigation 9 Research and investigation 10 						
14. Research and investigation 1115. Research and investigation 12						

[Title]			[Instructor]			
Research Work in Applied Chemistry IIB			all academic supervisors			
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]	
GTA609	2	Applied Chemistry	2nd Semester		English/ Japanese	
[Outline an	d purposel					
Students assigned to each laboratory summarize and publish the research results provided by Research Work in Applied Chemistry IIA under the guidance of their supervisors.						
[Objectives]						
To carry ou	t a novel re	search based on the study of Research Work in App	lied Chemistr	ry IIA.		
Requireme	ntsl					
This seminar requires basic knowledge of each courses obtained in your undergraduate program.						
[Evaluation	l					
Your acade	mic sunervi	sors evaluate your degree of attainment				
Tour academic supervisors evaluate your degree of attainment.						
[Textbooks]						
References	s]					
Textbooks	reference h	ooks and articles related to your master's thesis pr	rescribed by vo	our supervis	ors	
reactions, reference books, and articles related to your master's thesis prescribed by your supervisors.						
[Schedule]						
 Evaluation of research and investigation, examination of additional study and investigation 1 Evaluation of research and investigation, examination of additional study and investigation 2 Evaluation of research and investigation, examination of additional study and investigation 3 Additional study and investigation 1 Additional study and investigation 2 Additional study and investigation 3 Contents of Master's thesis 1 Contents of Master's thesis 3 Writing of Master's thesis 1 Writing of Master's thesis 2 						
13. Oral presentation 1						
14. Oral pr 15. Oral pr	15. Oral presentation 3					