An	an	College			e of Cl eering	hemical	Year	2024		
De	par	tment Goals								
Cor e Cat ory	eq	Course Title	Cours e Code	Credit Type	Credit s	Class Hours per Week 1st Year	1st 2nd 1	Sth Year Sth Year	Instru ctor	Divisio n in Learni ng
Sp eci ali ze d	Co m pu so ry	Fundamental Organic Chemistry	1412A 10	School Credit	1				Sugiya ma Yuuki	
Sp eci ali ze d	Co m pu so ry	Fundamental Inorganic Chemistry	1412B 10	School Credit	1				Zheng Tao	
Sp eci ali ze d	Compusory	Fundamental Chemical Engineering	1412E 01	School Credit	1				Ezure Ryosu ke	
Sp eci ali ze d	Cerps ps ry	Fundamental Biology	1412F 03	School Credit	1				Ota Naoto mo	
Sp eci ali ze d	pu	Fundamental Experiments in Materials Chemistry 1	1412T 11	School Credit	2	4			Sugiya ma Yuuki, Zheng Tao	
Sp eci ali ze d	Co m pu so ry	Fundamental Experiments in Materials Chemistry 2	1412T 21	School Credit	2				Sugiya ma Yuuki, Otani Takas hi	
Sp eci ali ze d	Compussy Sy	Fundamental Physics 1	14133 01	School Credit	2		2 2		Naka mura Atsun obu	
Sp eci ali ze d		Advanced Chemistry Seminar	14139 02	School Credit	1		2		Naka mura Atsun obu,K onishi Tomoy a,Ota Naoto mo,Ot ani Takas hi,Zhe ng Tao,U eda Kohei, Sugiya ma Yuuki, Exyosu ke	
Sp eci ali ze d	Co m pu so ry	Organic Chemistry 1	1413A 01	School Credit	2		2 2		Sugiya ma Yuuki, Otani Takas hi	
Sp eci ali ze d	Co m pu so ry	Inorganic Chemistry 1	1413B 01	School Credit	2		2 2		Zheng Tao	
Sp eci ali ze d	Co m pu lso ry	Analytical Chemistry	1413C 01	School Credit	2		2 2		Ueda Kohei, Ezure Ryosu ke	

Sp eci ali ze d	Co m pu lso ry	Physical Chemistry 1	1413D 04	School Credit	2	Konish i Tomoy a
Sp eci ali ze d	Co m pu Iso ry	Chemical Engineering 1	1413E 03	School Credit	1	Ueda Kohei
Sp eci ali ze d	Co m pu Iso ry	Biology	1413G 01	School Credit	2	Ota Naoto mo,Ot ani Takas hi
Sp eci ali ze d	pu	Experiments in Materials Chemistry and Exercises 1	1413T 05	School Credit	2	Ueda Kohei, Konish i Tomoy a,Nak amura Atsun obu,Z heng Tao,Ez ure Ryosu ke
Sp eci ali ze d	рu	Experiments in Materials Chemistry and Exercises 2	1413T 06	School Credit	2	Ezure Ryosu ke,Zhe ng Tao,U eda Kohei, Ota Naoto mo,Ot ani Takas hi
Sp eci ali ze d	Co m pu lso ry	Fundamental Physics 2	14143 01	Acade mic Credit	2	Yoshid a Takehi to
Sp eci ali ze d	Co m pu lso ry	Organic Chemistry 2	1414A 10	Acade mic Credit	2	Sugiya ma Yuuki
Sp eci ali ze d	Co m pu lso ry	Advanced Organic Chemistry	1414A 11	Acade mic Credit	2	Sugiya ma Yuuki
Sp eci ali ze d	Co m pu lso ry	Inorganic Chemistry 2	1414B 10	Acade mic Credit	2	Zheng Tao
Sp eci ali ze d	Co m pu lso ry	Advanced Inorganic Chemistry	1414B 11	Acade mic Credit	2	Zheng Tao
Sp eci ali ze d	Co m pu lso ry	Physical Chemistry 2	1414D 04	Acade mic Credit	2	Yoshid a Takehi to
Sp eci ali ze d	Co m	Physical Chemistry 3	1414D 11	Acade mic Credit	2	Naka mura Atsun obu
Sp eci ali ze d	Co m	Biochemistry 2	1414G 02	Acade mic Credit	2	Otani Takas hi
Sp eci ali ze d	Co m	Biochemistry1	1414G 03	Acade mic Credit	2	Otani Takas hi

Sp eci ali ze d	pu Iso ry	Experiments in Advanced Chemistry Laboratory	1414T 07	Acade mic Credit	2	Naka mura Atsun obu,Ot a Naoto mo,Ko nishi Tomoy a,Zhe ng Tao,Ot ani Takas hi,Ued a Kohei, Ezure Ryosu ke,Sug iyama Yuuki
Sp eci ali ze d	Co m pu lso ry	Chemical Engineering 2	1414T 09	Acade mic Credit	2	Ezure Ryosu ke
Sp eci ali ze d	Co m pu	Experiments and Exercises in Materials Chemistry 3	1414T 12	Acade mic Credit	2	Naka mura Atsun obu,K onishi Tomoy a,Ota Naoto mo,Ot ani Takas hi,Zhe ng Tao,U eda Kohei, Sugiya ma Yuuki, Ezure Ryosu ke
Sp eci ali ze d	El ec tiv e	Information Processing	14940 01	Acade mic Credit	2	Naka mura Atsun obu
Sp eci ali ze d	El ec tiv e	Instrumental Analysis	1494C 01	Acade mic Credit	2	 Naka mura Atsun obu,K onishi Tomoy a,Ota Naoto mo,Ot ani Takas hi,Zhe ng Tao,U eda Kohei, Sugiya ma Yuuki, Ezure Ryosu ke,Yos hida Takehi to
Sp eci ali ze d	El ec tiv e	Environmental Engineering	1494F 03	Acade mic Credit	2	Ota Naoto mo
Sp eci ali ze d	El ec tiv e	Internship	1494R 11	School Credit	1	Ueda Kohei

Sp eci ali ze d	Co m pu lso ry	Probability and Statistics	1514A 01	Acade mic Credit	2	Sugino Ryuza buro
Sp eci ali ze d	El ec tiv e	Minor	15542 00	Acade mic Credit	2	Ueda Kohei
Sp eci ali ze d	Co m pu Iso ry	Research for Graduation Thesis	14150 00	School Credit	10	Naka mura Atsun obu,Y oshida Takehi to,Ota Naoto mo,Zh eng Tao,Ot ani Takas hi,Sugi yama Yuuki, Konish i Tomoy a,Ued a Kohei, Ezure Ryosu ke
Sp eci ali ze d	Co m pu lso ry	Biotechnology	1415H 01	Acade mic Credit	2	Ota Naoto mo
Sp eci ali ze d	El ec tiv e	Materials Engineering	14952 02	Acade mic Credit	2	Konish i Tomoy a
Sp eci ali ze d	El ec tiv e	Engineering for Semiconductors	14958 02	Acade mic Credit	2	Naka mura Atsun obu
Sp eci ali ze d	El ec tiv e	QuantumChemistry2	14958 06	Acade mic Credit	2	Yoshid a Takehi to
Sp eci ali ze d	El ec tiv e	QuantumChemistry3	14958 07	Acade mic Credit	2	Yoshid a Takehi to
Sp eci ali ze d	El ec tiv e	Polymer Chemistry	1495A 01	Acade mic Credit	2	Otani Takas hi

,	Anan Co	llege	Year	2024				Fundamental Organic Chemistry		
Course	Informa	tion								
Course Co	ode	1412A10			Course Categor	ry	Specialize	d / Compulsory		
Class Forr		Lecture			Credits		School Cre	edit: 1		
Departme	ent		Chemical Engine	eering	Student Grade		2nd			
Term		Second Se	mester		Classes per We	eek	後期:2			
Textbook Teaching			(Daiichi Gakush	u-sha)						
Instructor	<u> </u>	Sugiyama	Yuuki							
Course	Objectiv	es								
 The students will learn the characteristics of organic compounds in general and master classification methods and types of functional groups. The students will learn the nomenclature of aliphatic hydrocarbons, the properties of individual substances, and the concept of organic compounds based on molecular structures such as single, double, and triple bonds. The students will learn the characteristic properties of alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, etc., as representatives of organic compounds containing oxygen. The students will learn that aromatic compounds are a unique group of atoms and will learn about significant reactions such as nitration, and halogenation and the properties of typical compounds formed by these reactions. The students will learn the characteristics of polymers in general and master classification methods and the properties of typical polymers. 										
Rubric										
			Ideal Level		Standard Level			Minimum Level		
Objective	1		Explain all orga and polymer's within a chemis	nic compounds nomenclature stry textbook.	Explain about 70% compounds and p nomenclature with chemistry textbook		ner's	Explain about 50% of organic compounds and polymer's nomenclature within a chemistry textbook.		
Objective	2		Explain all strue organic compo polymers within textbook.	nin a chemistry and polymers wit chemistry textbo			npounds 1	Explain about 50% of structure related to organic compounds and polymers within a chemistry textbook.		
Objective	3		Explain all char related to orga and polymers v chemistry textl	nic compounds vithin a	Explain about 7 characteristics organic compound polymers within textbook.	related unds ar	to nd	Explain about 50% of characteristics related to organic compounds and polymers within a chemistry textbook.		
Objective	4		Explain all reac organic compo polymers within textbook.	tions related to unds and n a chemistry	Explain about 7 related to orga and polymers vectors the comments of the comme	nic con within a	npounds	Explain about 50% of reactions related to organic compounds and polymers within a chemistry textbook.		
Assigne	d Depar	tment Obje	ectives							
学習・教育	到達度目標	票 D-1								
Teachin	g Metho	d								
Outline		school. This cours	e is a bridging c ll. It is designed	ourse for organic of to provide studer	, chemistry in the ots with a solid f	e univer oundat	, ,	s based on chemistry in high e, including organic chemistry in nistry in the second year, with an		
Style		The class v	s that it is the "basis" for those studying chemistry. will follow the order of the lesson plan for the most part. In addition, students will be requirveral reports on theirs.							
Notice		Sabilit 36	2. a. 1 cports on							
	eristics i	of Class / F	Division in Le	arning						
		oi Ciuss / L			□ Applicable ±	o Dom	ato Class	☑ Instructor Professionally		
Active	Learning		☑ Aided by IC	1	☑ Applicable to	o kemo	ne Class	Experienced		
Course	Plan									
234.50		Т	neme			Goals				
			cohols and ethe	rs		Explair	n the types shols and e	s, nomenclature, and properties		
		2nd Al	dehydes and ke	tones				s, nomenclature, and properties ketones.		
		3rd Ca	arboxylic acids a	and esters		Explair	n the types and esters,	and nomenclature of carboxylic their properties, and		
2nd	3rd Quarter	4th A	romatic compou	nds		compo	ounds nom	and nomenclature of aromatic enclature, properties, and to aromatics.		
Semeste r		5th Ph	nenols			Explair of phe		s, nomenclature, and properties		
		6th Ai	omatic carboxy	lic acids, aromatic	amines	Explair	n aromatic	carboxylic acids and aromatic omenclature, and properties.		
		7th Se	eparation of org	anic compounds		Explair	n that it ca	n separate organic compounds perties of their functional groups.		
		8th M	id-term examina	ation		, 2011				
	4th Quarter	9th O	ls (triacylglycer	ol)		Explair	n oils (triad	cylglycerol).		

		10th	Polyme	ers and their classi	fication		Understand explain their	the characteristics classification met	of polymers and nods.		
		11th	Synthe	etic fibers			Explain the omethods of	Explain the characteristics, types, and synthesis methods of synthetic fibers.			
		12th	Synthe	ridiede (esii)				Explain the characteristics, types, and synthesis methods of synthetic resin.			
		13th Rubber					Explain the omethods of	Explain the characteristics, types, and synthesis methods of rubber.			
				onal polymers			Explain func	tional polymers.			
	15th Treatment of polym				mpounds		Explain the t	reatment and recy	cling of polymers.		
		16th	Return	and explanation of	of final examination						
Evaluatio	n Met	hod and	Weigh	t (%)							
		Examinatio	on	Quiz	Portfolio	Prese	entation and ude	Other	Total		
Subtotal		70		0	0	0		30	100		
Basic Profic	ciency	60		0	0	0		20	80		
Specialized Proficiency	Specialized 10		0	0 0			10	20			
Cross Area Proficiency		0		0	0	0		0	0		

particles in cryst 2. To master the 3. To master class	or als ctives e type cals. e prop	1412B10 Lecture Course of Cl Second Sem High School Zheng Tao Set of crystal services of variation of elemeracteristics of the country of the	Advanced C structures and ious solutions, ents and their feach group of the solutions are all calculations density of the active, etc. Thist of the most of crystals that the program. Be able to expended and the solutions of solutions, etc.	the characteristic. To learn how sulty properties. If elements and the constituent rranged in a element able to perform related to the gas crystal e following is a tommon types to can be used in all the f dissolution and olutions, and be nall calculations	Course Category Credits Student Grade Classes per Wee Gakushusha Corp es of their properti estances dissolve the properties of the Standard Level The student sho explain how che constituent parti arranged in a cr able to perform calculations rela density of the ga lattice, etc. The student is a the mechanism and the properti	Specialize School Ci 2nd k 後期:2 Dration) es. To master to solvents and eir compounds. uld be able to mical bonds ancles are vistal, and be 70% of eed to the is crystal.	the arrangement of constituent their solubility Unacceptable Level		
Course Code Class Format Department Term Textbook and/o Teaching Materia Instructor Course Object 1. To master the particles in cryst 2. To master the 3. To master clat 4. To acquire the Rubric Achievement 1 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice	or als ctives e type cals. e prop	1412B10 Lecture Course of Cl Second Sem High School Zheng Tao Set of crystal services of variation of elemeracteristics of the country of the	Advanced Constructures and ious solutions, ents and their feach group conds and how particles are all calculations density of the attice, etc. Thist of the most of crystals that the program. Be able to expended and the program. Be able to expended and the constructions of special to perform related to the colutions, etc.	the characteristic. To learn how sulty properties. If elements and the constituent rranged in a element able to perform related to the gas crystal e following is a tommon types to can be used in all the f dissolution and olutions, and be nall calculations	Credits Student Grade Classes per Wee Gakushusha Corp Is of their properti Distances dissolve The student sho explain how che constituent parti arranged in a cr able to perform calculations relai density of the ga lattice, etc. The student is a the mechanism	School Crick	the arrangement of constituent their solubility Unacceptable Level Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Department Term Textbook and/o Teaching Materia Instructor Course Object 1. To master the particles in cryst 2. To master the 3. To master the 3. To acquire the Rubric Achievement 1 Achievement 2 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice	als ctives e type cals. e prop	Lecture Course of Cl Second Sem High School Zheng Tao Ses of crystal separation of elemeracteristics of Cl I E E E E E E E E E E E E E E E E E E	Advanced Constructures and ious solutions, ents and their feach group conds and how particles are all calculations density of the attice, etc. Thist of the most of crystals that the program. Be able to expended and the program. Be able to expended and the constructions of special to perform related to the colutions, etc.	the characteristic. To learn how sulty properties. If elements and the constituent rranged in a element able to perform related to the gas crystal e following is a tommon types to can be used in all the f dissolution and olutions, and be nall calculations	Credits Student Grade Classes per Wee Gakushusha Corp Is of their properti Distances dissolve The student sho explain how che constituent parti arranged in a cr able to perform calculations relai density of the ga lattice, etc. The student is a the mechanism	School Crick	the arrangement of constituent their solubility Unacceptable Level Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Term Textbook and/o Teaching Materia Instructor Course Objec 1. To master the particles in cryst 2. To master tha 3. To master cla 4. To acquire the Rubric Achievement 1 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice	als ctives e type cals. e prop	Second Sem High School Zheng Tao Ses of crystal ses	Advanced Constructures and ious solutions, ents and their feach group conds and how particles are all calculations density of the attice, etc. Thist of the most of crystals that the program. Be able to expended and the program. Be able to expended and the constructions of special to perform related to the colutions, etc.	the characteristic. To learn how sulty properties. If elements and the constituent rranged in a element able to perform related to the gas crystal e following is a tommon types to can be used in all the f dissolution and olutions, and be nall calculations	Classes per Wee Gakushusha Corp s of their properti bstances dissolve ne properties of the Standard Level The student sho explain how che constituent parti arranged in a cr able to perform calculations rela density of the ga lattice, etc. The student is a the mechanism	k 後期:2 pration) es. To master to solvents and eir compounds uld be able to mical bonds and less are stal, and be solvents and be solvents are stal, and be solvents are stal, and be solvents are solvents and be solvents are solvents and be solvents an	Unacceptable Level Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Textbook and/o Teaching Materia Instructor Course Object 1. To master the particles in cryste 3. To master cla 4. To acquire the Rubric Achievement 1 Achievement 2 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice	als ctives e type cals. e prop	High School Zheng Tao Siss of crystal sistem of elementation	Advanced C structures and ious solutions, ents and their feach group of the solutions are all calculations density of the active, etc. Thist of the most of crystals that the program. Be able to expended and the solutions of solutions, etc.	the characteristic. To learn how sulf properties. If elements and the constituent rranged in a cable to perform related to the gas crystal e following is a tommon types to can be used in lain all the f dissolution and olutions, and be n all calculations	Gakushusha Corp as of their properticular stances dissolve the properties of the student shoe explain how che constituent partiarranged in a crable to perform calculations related density of the galattice, etc. The student is a the mechanism	es. To master to solvents and eir compounds and less are yetal, and be 70% of eed to the is crystal	Unacceptable Level Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Teaching Materia Instructor Course Object 1. To master the particles in cryst. 2. To master the 3. To master cla: 4. To acquire the Rubric Achievement 1 Achievement 2 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice	als ctives e type cals. e prop	Zheng Tao Siss of crystal sis of crystal siss of crystal siss of crystal siss of crystal sist	structures and tous solutions. ents and their feach group of the deal Level. Be able to exponds and how particles are all calculations density of the most of the most of crystals that the program. Be able to expendentisms of the properties of sable to perform related to the colutions, etc.	the characteristic. To learn how sulf properties. If elements and the constituent rranged in a cable to perform related to the gas crystal e following is a tommon types to can be used in lain all the f dissolution and olutions, and be n all calculations	Standard Level The student sho explain how che constituent partial arranged in a crable to perform calculations relaidensity of the galattice, etc.	es. To master to solvents and eir compounds. Ild be able to mical bonds ancles are stal, and be 70% of eed to the is crystal.	Unacceptable Level Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Course Object 1. To master the particles in cryst. 2. To master the 3. To master the 3. To master the 4. To acquire the Rubric Achievement 1 Achievement 2 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice	e type als. e prop	s of crystal s perties of variation of elem- racteristics of I E C C C C C C C C C C C C	ious solutions. Ideal Level Be able to exponds and hovorticles are alcrystal, and be all calculations density of the most of crystals that the program. Be able to expondensity of the program of the program.	lain all chemical to the gas crystal e following is a tomorous at the constituent related to the gas crystal e following is a tomorous at the common types to can be used in the foliosolutions, and be n all calculations	Standard Level The student sho explain how che constituent partiarranged in a crable to perform calculations reladensity of the galattice, etc. The student is a the mechanism	ald be able to mical bonds and be sare stal, and be so the se crystal	Unacceptable Level Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
1. To master the particles in cryst. 2. To master the 3. To master the 3. To master the 4. To acquire the Rubric Achievement 1 Achievement 2 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice	e type als. e prop	s of crystal s perties of variation of elemiracteristics of I E E E E E E E E E E E E E E E E E E	ious solutions. Ideal Level Be able to exponds and hovorticles are alcrystal, and be all calculations density of the most of crystals that the program. Be able to expondensity of the program of the program.	lain all chemical to the gas crystal e following is a tomorous at the constituent related to the gas crystal e following is a tomorous at the common types to can be used in the foliosolutions, and be n all calculations	Standard Level The student sho explain how che constituent partiarranged in a crable to perform calculations reladensity of the galattice, etc. The student is a the mechanism	ald be able to mical bonds and be sare stal, and be so the se crystal	Unacceptable Level Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Achievement 1 Achievement 2 Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice		E E E E E E E E E E E E E E E E E E E	Be able to exponds and how particles are all calculations all calculations density of the attice, etc. Thist of the most for crystals that the program. Be able to exponde able to performelated to the colutions, etc.	v the constituent rranged in a e able to perform related to the gas crystal e following is a t common types t can be used in lain all the f dissolution and olutions, and be n all calculations	The student sho explain how che constituent partial arranged in a crable to perform calculations reladensity of the galattice, etc. The student is a the mechanism	mical bonds and cles are stall, and be 70% of sed to the s crystal ble to explain	d Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Achievement 2 Achievement 3 Assigned Dep学習・教育到達度 Teaching Met Outline Style Notice		E E E E E E E E E E E E E E E E E E E	Be able to exponds and how particles are all calculations all calculations density of the attice, etc. Thist of the most for crystals that the program. Be able to exponde able to performelated to the colutions, etc.	v the constituent rranged in a e able to perform related to the gas crystal e following is a t common types t can be used in lain all the f dissolution and olutions, and be n all calculations	The student sho explain how che constituent partial arranged in a crable to perform calculations reladensity of the galattice, etc. The student is a the mechanism	mical bonds and cles are stall, and be 70% of sed to the s crystal ble to explain	d Unable to explain chemical bonding and how the constituent particles are arranged in a crystal. Cannot perform calculations related to the density of the gas crystal lattice, etc.		
Achievement 3 Assigned Dep 学習・教育到達度 Teaching Met Outline Style Notice		r p a r s	mechanisms of some properties of some some some some some some some some	f dissolution and olutions, and be n all calculations	the mechanism	ole to explain	Cannot explain the mechanism		
Assigned Dep 学習·教育到達度 Teaching Met Outline Style Notice		l b		concentration of	and is able to pe the calculations concentration of	es of solutions, rform 70% of related to the	of dissolution and properties of solutions. Cannot perform calculations related to the concentration of solutions, etc.		
学習・教育到達度 Teaching Met Outline Style Notice		t s a	he periodic ta	osition and each element in ble and the each element	70% understand correlation betwoof each element table and its prosignificance of eindustrial applications.	een the position in the periodic perties and the ach element in	element in the periodic table		
Outline Style Notice			ctives						
Style Notice	thod								
Notice		This lecture students wil	is positioned in Il acquire a sol	as a bridging subi	ect to the univers hemistry in the se	tv'course inclu	ed on chemistry in high school. ding high school courses, and ng aware that it is the "basis" and		
		The class wi understandi the class pe	ng, students v	ed almost accordir will be required to	ng to the order of submit reports or	the lesson plan exercises and	. In order to deepen take quizzes several times during		
Characteristic									
	cs of	Class / Di	vision in Le	earning					
☐ Active Learni	ng		☑ Aided by IC	T .	☑ Applicable to	Remote Class	☐ Instructor Professionally Experienced		
Course Plan		1			1				
	\perp		eme			Goals			
	1	st Che	emical Bonding	g and Crystal Typ			bes and characteristics of crystals.		
	2	and Stru	ucture of meta	al crystals	0	o be able to ca ensity of lattice attice.	lculate the characteristics and es such as face-centered cubic		
	3	rd Stru	ucture of ionic	and covalent cry	stals E		cture of ionic crystals and covalent		
2nd 3rd	4	th Diss	solution and s	olution	a		v substances dissolve in solvents, calculate solubility of solids and r.		
Semeste Quarte	er 5	ith Cor	ncentration of	solution		o be able to cal olutions.	culate concentrations of various		
		th Clas	ssification and	Properties of Ele	ments e	ach element or roperties.	elation between the position of n the periodic table and its		
	6		drogen, Group	18, and Group 1	7 Elements	o be able to ex ydrogen, Grou lone and in cor	plain the properties and uses of p 18, and Group 17 elements appounds.		
		'th Hyd		mid-term examir		alone and in compounds.			

		9th	Group 16, 15, and	d 14 elements		To be able to ex group 16, 15, ar compounds.	plain the proper nd 14 elements a	ies and uses of and their		
		10th	Inorganic Chemic	al Industry		To be able to explain industrial manufacturing processes of sulfuric acid, ammonia, and nitric acid.				
		11th	Group 1 and 2 ele	ements		To be able to explain the properties and uses of group 1 and 2 elements and their compounds.				
	4th Quarter	12th	Typical elements	showing amphot	teric properties	To be able to explain the properties and uses of individual elements and compounds of typical elements showing amphoteric properties.				
		13th	Transition elemer	nts (1)		Explain the characteristics and applications of Fe and Cu elements.				
		14th	Transition elemer	nts (2)		To explain the cl	naracteristics an Ti	d applications of		
		15th	Summary of elem	nents						
		16th	Final Examination Return of Answer							
Evaluati	ion Met	hod and	Weight (%)							
	E	xamination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total		
Subtotal	7	0	0	0	0	0	30	100		
Basic Proficienc	60 60		0	0	0	0	20	80		
Specialize Proficienc	ed 10		0	0	0	0	10	20		
Cross Are Proficienc			0	0	0	0	0	0		

,	Anan Co	llege	Year	2024		Course Title	Fundame Engineeri	ental Chemical
Course	Informa	tion	•				<u> </u>	
Course Co		1412E01			Course Category	Specializ	ed / Compul	sory
Class For	mat	Lecture			Credits	School C	redit: 1	,
Departme	ent		Chemical Engine	eering	Student Grade	2nd		
Term		First Seme	ster		Classes per Wee	k 前期:2		
Textbook Teaching		ベーシック	化学工学(化学局	引人)橋本健治著		,		
Instructor	r	Ezure Ryos	suke					
Course	Objectiv	es						
2. Unders	stand quan stand and	itities and uni apply materia	ts in chemical e I and energy ba	ngineering. lance in processe	S.			
Rubric					1			
			Ideal Level		Standard Level		Minimum	Level
Achievem	ent 1		Understand qu in chemical end Calculate to co units.	antities and units gineering. nvert between	Understand quar in chemical engil Calculate to conv commonly used	neering. vert between	Understar	nd quantities and units al engineering.
Achievem	ent 2		Understand an balance to prod without chemic	d apply material cesses with and cal reactions.	Understand and balance to proce		Understar	nd material balance.
Achievem	ent 3		Understand an balance in proc without chemic	cesses with and	Understand and balance to proce	apply energy sses.	Understar	nd energy balance.
	d Depar 到達度目標	tment Obje	ectives					
	g Metho							
Outline		Chemical e	engineering is a e introduces (1) ngineering.	field of engineering quantity and unit	ng that deals with as and (2) materia	the operation al and energy b	and design o alance, as i	of chemical plants. mportant concepts in
Style		Assignmen	ts will be given	for each lecture. n during the class.	The assignments	will help you re	eview and pr	repare for the lecture.
Notice Charact	eristics (Be sure to If you have Attitude is No questio	master the min any questions also a factor in	ted during the ex	orinciples to solve in class.	problems rath	er than men	norizing answers.
☐ Active	Learning		☑ Aided by IC	T	☑ Applicable to	Remote Class	Experienc	
Course	Plan							
		Th	neme		G	Goals		
		1st W	hat is chemical	engineering?	E	xplain how the	chemical in	dustry works.
		2nd Ou	uantities and un	nits		xplain quantiti	es and units	in chemical
						ngineering.		
			units, Unit Con aterial balance	iversion	E			chemical equipment
	1st Quarter		aterial balance	equation	E	nd processes. Explain the con-	cept of mate	erial balance and how
	Quarter			for physical proces	A A	is calculated. Apply material less evaporation	palance to pl	hysical processes such
		7th Ma	aterial balance f	for physical proces	sses 2			omplex physical
1st Semeste		8th Ma	aterial balances	with chemical rea	octions 1		palance to pi	rocesses with chemical
ļ'		9th Mi	dterm exam					
		10th Ma	aterial balances	with chemical rea		apply material leactions.	palance to pi	rocesses with chemical
		11th Er	nergy balance of	f physical process			/ changes in	physical processes.
				f physical process				in physical processes.
	2nd Quarter		eat of reaction,		E		t of reaction	. Calculate the heat of
		14th Er	nergy balances v	with chemical read	rtions C		py changes	in processes involving
		15th Re	eview		R	Review		
			nal exam					
<u>Evalua</u> ti	<u>ion Met</u> h	od and We	eight (%)					
		Examination	on Qui	Z	Portfolio	Other		Total

Subtotal	70	0	25	5	100
Basic Proficiency	30	0	10	5	45
Specialized Proficiency	20	0	10	0	30
Cross Area Proficiency	20	0	5	0	25

,	Anan Co	llege	Year	2024		Cou		Fundamental Biology
Course	Informa	tion				110	ic	
Course Co		1412F0	 3		Course Category	/ Sp	ecialize	d / Compulsory
Class For	mat	Lecture			Credits	Sch	hool Cre	edit: 1
Departme	ent	Course	of Chemical Engi	neering	Student Grade	2n	d	
Term		Second	Semester		Classes per Wee	k 後期	朝:2	
	Matérials	_	kiso, tokyoshosek	(i				
Instructo		Ota Nac	otomo					
1. To be a	on. ·	olain the co		ristics of living orga intain homeostasis	•		netaboli	sm, and expression of genetic
Rubric								
			Ideal Level		Standard Level			Unacceptable Level
Achievem	ent 1		about the con characteristic organisms: c metabolism,	To be able to explain in detail about the common characteristics of living organisms: cells, energy and metabolism, and expression of genetic information.		To be able to explain the common characteristics of living organisms: cells, energy and metabolism, and expression of genetic information.		To be able to understand the common characteristics of living organisms: cells, energy and metabolism, and expression of genetic information.
Achievem	ient 2		about the concharacteristic organisms: c	es of living ells, energy and and expression of	To be able to ex mechanism to n homeostasis of l organisms.	haintain		To be able to understand the common characteristics of living organisms: cells, energy and metabolism, and expression of genetic information.
			bjectives	D 1				
	<u>育到達度日際</u> ig Metho		・教育到達度目標	<i>⊔</i> -1				
	ig Metric		octive of this cou	irco is to acquiro ba	scic knowledge of	the struc	turo an	d function of organisms. The
Outline		content	is "Basic Biology	of high school.	isic knowledge of	tile struc	ture an	d function of organisms. The
Style		Student	s will be evaluat	ed by quizzes to co	nfirm their prepar	ation, as	signme	nts, and periodic examinations
Notice								
Charact	eristics	of Class ,	/ Division in L	<u>earning</u>	T			_
☐ Active	Learning		☐ Aided by	ICT	☐ Applicable to	Remote	Class	☐ Instructor Professionally Experienced
Course	Plan		1					
			Theme		(Goals		
		1st	Diversity and co	ommonality of orga	nisms c	orokaryot and functi chloroplas zacuole.	tes and it ion of the standing is to see the standing it is to expense the standing it is to expense the standing it is to expense it is expense it is expense.	plain the difference between eukaryotes, and the structure he nucleus, mitochondria, ma membrane, cell wall, and plain the theory of intracellular
		2nd	Organisms and	energy	[5]	To be able to explain metabolism, catabolism, anabolism and the role of ATP. To be able to explain what enzymes are and the role of enzymes in metabolism.		
		3rd	Photosynthesis	and respiration				plain the general processes of nd respiration.
	3rd Quarter	4th	Genetic informa	ation and DNA	7	Γο be able genetic in	e to exp iformati	plain the structure of DNA and ion.
2nd		5th	Genetic informa	ation and DNA		To be able genetic in		plain the structure of DNA and ion.
Semeste r		6th	Genetic informa	ition and protein	G	genetic in	ıformati mes an	plain the relationship between on and proteins, structure of distribution of genetic
		7th	Genetic informa	ition and protein	G	genetic in	ıformati mes an	plain the relationship between ion and proteins, structure of ad distribution of genetic
	8th Mid-term Examination 9th Internal environment and signal tran							
							plain the body environment.	
		10th	Internal enviror	nment and signal tr	t	he nervo	us syst	
	4th Quarter	11th	Internal enviror	nment and signal tr	ansuuction	normones	5	plain signal transduction by
		12th	Internal enviror			To be able to explain the regulation of blood glucose concentration		
			internal crivilor	nment and signal tr	ansduction g	glucose co	oncentr	ation

	14th	Function of immu	nity		To be able to	explain immune	memory		
	15th Function of immunity					To be able to explain the relationship between immunity and various diseases			
	16th	Final examination							
Evaluation N	Method and V	Veight (%)							
	Examination	Presentation	Mutual Evaluations between students	Attitude	Quiz	Other	Total		
Subtotal	40	0	0	30	30	0	100		
Basic Proficiency	40	0	0	30	30	0	100		
Specialized Proficiency	0	0	0	0	0	0	0		
Cross Area Proficiency	0	0	0	0	0	0	0		

2. The students 3. The students	cctive s will s will	1412T11 Experimer Course of First Seme Handout (sha), Che Sugiyama es observe che learn how to learn qualita learn quanti	Fundamental Exmistry (Daiichi Camistry (Daiichi	eering Experiments in Materian Materia	der the phenomo	School C 2nd 2nd 前期:4 1), Fundamenta ena. cion, chelatome cal reactions. I prepare a sing the ata. cill carry out systematic	tric titration). Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Course Code Class Format Department Term Textbook and/of Teaching Materi Instructor Course Object 1. The students 2. The students 3. The students 4. The students 4. The students 4. The students Cobjective 1 Cobjective 2 Cobjective 3 Cobjective 4 Assigned Dep 学習・教育到達度 Teaching Me Coutline Course Cobjective 4 Assigned Dep 学習・教育到達度 Coutline	cctive s will s will	1412T11 Experimer Course of First Seme Handout (sha), Che Sugiyama es observe che learn how to learn qualita learn quanti	Chemical Enginester Fundamental Exmistry (Daiichi Caristry (Daiich	eering Experiments in Material Sakushu-sha) and logically consists using experiment cations. Ineutralization titral sill logically and consider chemical consider chemical sill prepare a propriate reporterimental data. Will understand of cations and be set experiments qualitative thly. Will understand	Credits Student Grade Classes per Wererials Chemistry der the phenomental data. Standard Level The student will consider chemical described report us experimental described and the students will logical report us experimental described and the students will logical report us experimental described and the students we experiments for	School C 2nd 2nd 前期:4 1), Fundamenta ena. cion, chelatome cal reactions. I prepare a sing the ata. cill carry out systematic	tric titration). Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Department Term Textbook and/of Teaching Materi Instructor Course Object 1. The students 2. The students 3. The students 4. The students Rubric Objective 1 Objective 2 Objective 3 Objective 4 Assigned Det 学習・教育到達度 Teaching Me Outline Style	ective s will s will	Course of First Seme Handout (sha), Cher Sugiyama SS Observe che learn how to learn qualita learn quanti	Chemical Enginester Fundamental Exmistry (Daiichi Caristry (Daiich	eering Experiments in Material Sakushu-sha) and logically consists using experiment cations. Ineutralization titral sill logically and consider chemical consider chemical sill prepare a propriate reporterimental data. Will understand of cations and be set experiments qualitative thly. Will understand	Student Grade Classes per Wederials Chemistry der the phenomental data. Standard Level The student will consider chemic The student will logical report us experimental data. The students we experiments for	2nd ek 前期:4 1), Fundamenta ena. ion, chelatome I logically cal reactions. I prepare a sing the ata. ill carry out systematic	tric titration). Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Term Textbook and/of Teaching Materi Instructor Course Object 1. The students 2. The students 3. The students 4. The students Cobjective 1 Cobjective 2 Cobjective 3 Cobjective 4 Cobjecti	ective s will s will	First Seme Handout (sha), Chel Sugiyama	Ester Fundamental Exmistry (Daiichi of Yuuki, Zheng Ta Yuuki, Zheng The Student Wilogical and appusing the expe The students Weach reaction of able to carry of of systematic analysis smoot The students with the similarities between neutred ox titration, chelatometry in the similarities of the students with the similarities between neutred ox titration, chelatometry in the similarities of the students with the students with the similarities of the students with the students with the similarities of the students with the s	and logically consics using experiment cations. (neutralization titralization report erimental data.) will understand of cations and be out experiments qualitative thly.	Classes per Wederials Chemistry Ider the phenomental data. Standard Level The student will consider chemical described report us experimental described at the students will logical report us experimental described at the students we experiments for	ek 前期:4 1), Fundamenta ena. cion, chelatome I logically cal reactions. I prepare a sing the ata. ill carry out	tric titration). Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Textbook and/or Teaching Materi Instructor Course Objective 1. The students 2. The students 3. The students 4. The students 4. The students 4. The students 7. The students 8. The students 9. The students 1. The students 1	ective s will s will	Handout (sha), Chei Sugiyama es observe che learn how to learn qualita learn quanti	Fundamental Exmistry (Daiichi Camistry (Daiichi	and logically consice using experiment cations. Ineutralization titration dependent of the consider chemical cations and beout experiments qualitative thly.	standard Level The student wil consider chemic logical report us experimental detaction.	ena. l logically cal reactions. I prepare a sing the ata. ill carry out systematic	tric titration). Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Teaching Materi Instructor Course Object 1. The students 2. The students 3. The students 4. The students Cobjective 1 Cobjective 2 Cobjective 3 Cobjective 4 Assigned Del 学習・教育到達度 Teaching Me Coutline Style	ective s will s will	sha), Chei Sugiyama es observe che learn qualita learn quanti	mistry (Daiichi G Yuuki,Zheng Ta mical reactions o prepare report ative analysis of tative analysis of tative analysis (Ideal Level The student wi appropriately of reactions. The student wi logical and appusing the expe The students we each reaction of able to carry of for systematic analysis smoot The students we the similarities between neutr redox titration, chelatometry in	and logically consice using experiment cations. Ineutralization titration dependent of the consider chemical cations and beout experiments qualitative thly.	Standard Level The student wil consider chemic logical report us experimental data.	ena. I logically cal reactions. I prepare a sing the sta. ill carry out systematic	tric titration). Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Instructor Course Object 1. The students 2. The students 3. The students 4. The students Rubric Objective 1 Objective 2 Objective 3 Objective 4 Assigned Dey学習・教育到達度 Teaching Me Outline Style	ective s will s will s will	Sugiyama es observe che learn how to learn qualita learn quanti	mical reactions of prepare report ative analysis of tative analysis of tative analysis (Ideal Level The student will appropriately or reactions. The student will logical and appusing the expension of the students where the similarities between neutried ox titration, chelatometry is proported to the students of the	and logically consics using experimental cations. Ineutralization titralization titralization titralization consider chemical and consider chemical consider chemical will understand of cations and be out experiments qualitative thly.	Standard Level The student wil consider chemic The student wil logical report us experimental data	l logically cal reactions. I prepare a sing the ata. Il carry out	Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
1. The students 2. The students 3. The students 4. The students 4. The students Rubric Objective 1 Objective 2 Objective 3 Objective 4 Assigned Dep学習・教育到達度 Teaching Me Outline Style	s will s will s will s will	observe che learn how to learn qualita learn quanti	mical reactions of prepare report ative analysis of tative analysis (Ideal Level The student will appropriately creactions. The student will logical and appusing the expension of the students weach reaction of able to carry of for systematic analysis smoot the similarities between neutriced ox titration, chelatometry is surported.	and logically consists using experiment cations. Ineutralization titral ill logically and consider chemical ill prepare a propriate reporterimental data. Ineutralization titral ill prepare a propriate reporterimental data. Ineutralization ill understand of cations and be pout experiments qualitative thly. Ineutralization ill understand ill understan	Standard Level The student wil consider chemic The student wil logical report us experimental data	l logically cal reactions. I prepare a sing the ata. Il carry out	Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
1. The students 2. The students 3. The students 4. The students 4. The students Rubric Objective 1 Objective 2 Objective 3 Objective 4 Assigned Dep学習・教育到達度 Teaching Me Outline Style	s will s will s will s will	observe che learn how to learn qualita learn quanti	Ideal Level The student will appropriately creactions. The student will logical and appusing the expe The students will each reaction cable to carry of of respective to carry of the students will be	ill logically and consider chemical ill prepare a propriate reporterimental data. will understand of cations and be put experiments qualitative thly.	Standard Level The student wil consider chemic The student wil logical report us experimental data	l logically cal reactions. I prepare a sing the ata. Il carry out	Minimum Level The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Objective 1 Objective 2 Objective 3 Objective 4 Assigned Deg学習・教育到達度Teaching Me Outline	•		The student wi appropriately of reactions. The student wi logical and appropriately of using the expetance of the students we each reaction of able to carry of for systematic analysis smoot. The students we the similarities between neutring of redox titration, chelatometry is	ill prepare a propriate report erimental data. will understand of cations and be put experiments qualitative thly. will understand	The student will consider chemical The student will logical report us experimental data. The students we experiments for	I prepare a sing the state.	The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Objective 2 Objective 3 Objective 4 Assigned Dep学習・教育到達度Teaching Me Outline	•		The student wi appropriately of reactions. The student wi logical and appropriately of using the expetance of the students we each reaction of able to carry of for systematic analysis smoot. The students we the similarities between neutring of redox titration, chelatometry is	ill prepare a propriate report erimental data. will understand of cations and be put experiments qualitative thly. will understand	The student will consider chemical The student will logical report us experimental data. The students we experiments for	I prepare a sing the state.	The student will consider chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Objective 2 Objective 3 Objective 4 Assigned Dep学習・教育到達度Teaching Me Outline	•		appropriately of reactions. The student will logical and appusing the expet The students weach reaction of able to carry of for systematic analysis smoot The students with the similarities between neutriedox titration, chelatometry is reactions.	ill prepare a propriate report erimental data. will understand of cations and be put experiments qualitative thly. will understand	The student will logical report us experimental da The students we experiments for	I prepare a sing the state.	chemical reactions. The student will prepare a report using the experimental data. The students will carry out		
Objective 3 Objective 4 Assigned Deg学習・教育到達度Teaching Me Outline	•		logical and appusing the expe The students veach reaction of able to carry of for systematic analysis smoot The students verthe similarities between neutried redox titration, chelatometry is similarities.	propriate report erimental data. will understand of cations and be out experiments qualitative thly. will understand	logical report us experimental da The students w experiments for	sing the ata. ill carry out systematic	report using the experimental data. The students will carry out		
Objective 4 Assigned Dep学習・教育到達度 Teaching Me Outline Style	•		each reaction of able to carry of for systematic analysis smoot. The students with the similarities between neutring redox titration, chelatometry is able to carry of the similarities.	of cations and be out experiments qualitative thly. will understand	experiments for	systematic			
Assigned Dej 学習・教育到達度 Teaching Me Outline	•		the similarities between neutr redox titration, chelatometry in		. — — — — —	rsis smoothly.	experiments for systematic qualitative analysis.		
学習・教育到達度 Teaching Me Outline Style	•		lanalysis and be	ralization titration, , and	The students w neutralization ti titration, and ch quantitative and able to proceed the experiments	tration, redox nelatometry in alysis and be smoothly with	The students will use neutralization titration, redox titration, and chelatometry in quantitative analysis and be able to proceed with the experiments.		
学習・教育到達度 Teaching Me Outline Style	•			спе ехреппенен					
Teaching Me Outline Style		D-2 学習・)-4					
Outline	etho	 d							
,		specialized students a experimer how to dis This cours	d subject and co after they are as nts (experiment scuss experimen se focuses on an	onduct experiments ssigned to the Cher al techniques, rule tal results, etc.).	s in chemistry. T mistry Course. It s of chemistry la tion of chemistry	his course is the aims to provid boratories, how experiments, a	ial to take classes in each e first experimental course for le basic knowledge of chemistry v to prepare laboratory notebooks, and aims to provide students with		
Notice		consider t and then of chemistry measuren students v and reviev experimer and exper	he purpose of the confirm them in . After the expenents and compivill learn the expenents Stude to begins. At the imental data to	ne experiment, lea the experiment to riments, students ile them into a rep periment in depth ents must complete e end of the experi the instructor in c	irn experimental of experience and analyze the experience for this report by repeating the experiment ment, students reage to complet	methods and condessed the condessed to the condessed the c			
		1. Eating a 2. Student long hair n 3. Before 4. Student 5. Reports 6. In case reports th	and drinking are ts must wear the must tie it back. starting expering ts must promptly s must be subming of absence, not at have vet to ba	nents, students muly follow any instruitted by the due datify the teacher imp	d in the laborator e lab coat and jac ust wear safety g uctions given by t ate. mediately. No cr	y. ket when enter llasses and glov the teacher. edit will be give	ring the laboratory. Students with		
Characteristi	ics c		Division in Le						
☐ Active Learn			☐ Aided by IC		☐ Applicable to	Remote Class	☑ Instructor Professionally Experienced		
Course Plan		1							
		Т	heme			Goals			
			iuidance						
1		1st G	/riting notes and	d reports for stude	ent experiments	nts Write notes and reports.			
1st Semeste 1st			ala suat- · · ·	basic procedures			sic procedures and prepare		
r Quart	tor	2nd W	aporatory rules.	<u>'</u>		reagents. Separate and c	onfirm cations (genus I)		
	1	2nd W 3rd L	· , ,	•			Separate and confirm cations (genus I). Separate and confirm cations (genus III).		

		6th	Qualita	tive Analysis 3			Separate and	d confirm cations (genus V).		
		7th	Qualita analys	tive analysis of cat is)	ions (unknown sar	nple	Analyze unkı	nown samples for	cations.		
		8th	Quanti	tative analysis			Explain the basics of quantitative analysis and write neutralization and redox reaction equations.				
		9th	Neutra	lization titration 1			Carry out neutralization titrations and calculate the concentrations of acids and bases.				
		10th	Neutra	lization titration 2		Carry out neutralization titration and calculate concentrations of acids and bases.					
		11th	Redox	titration			Carry out redox titration and calculate concentrations of oxidants or reductants.				
	2nd	12th	Chelate	ometric titration			Carry out chelatometry and calculate the concentration and hardness of complexes.				
	Quarter 13		Buffer	solution			Learn the pr calculate the	inciples of buffer s pH of buffer solut	olutions and can ions.		
		14th	Water	quality examine			Carry out the COD, an org quality.	e properties of wat anic pollution indic	ter and analyze cator of water		
		15th	Instrur notes,	Instrument Check, examination, submission of notes, and summary of experiments							
		16th	Prelimi	nary Experiment D	ay/Instrument Che	eck					
Evaluat	ion Metl	nod and	Weigh	t (%)							
		Examinatio		Quiz	Portfolio	Prese	entation and ude	Other	Total		
Subtotal		0		0	0	0		100	100		
Basic Prof	ficiency	0		0	0	0		60	60		
Specialize Proficienc		,		0	0	0		40	40		
Cross Are Proficienc	oss Area			0	0 0			0	0		

	Anan Coll	lege	Year	2024		Course Title	Fundamental Experiments in Materials Chemistry 2
Course	Informat	ion					
Course Co	ode	1412T21			Course Category	/ Specialize	ed / Compulsory
Class Forr	mat	Experimen	t / Practical tra	ining	Credits	School Cr	edit: 2
Departme	ent	Course of 0	Chemical Engin	eering	Student Grade	2nd	
Term		Second Se	mester		Classes per Wee	k 後期:4	
Textbook		Handout (F	Fundamental E	xperiments in Mate	erials Chemistry 1), Fundamenta	s of Chemistry (Daiichi Gakushu
Teaching Instructor		1 1	nistry (Daiichi (Yuuki,Otani Ta				
	Objective		raaki,otaiii ra	Rusili			
1. The stu 2. The stu and mixin 3. The stu	udents will udents will ng of reager	learn how to use experiments, adjustme	ent of reaction	ts using experimer to synthesize orga conditions, post-re entify) products of	eaction treatment	i, isolation and p	erimental apparatus, weighing ourification of products).
Rubric			Ideal Level		Ctandard Laval		Minimouma Loval
					Standard Level		Minimum Level
Objective 1			logical and app	prepare a propriate report erimental data.	The student will logical report us experimental da	ing the	The student will prepare a report using the experimental data.
Objective 2			The student w perform synth on organic cor	etic experiments	The student will synthetic experii organic compou	ments on	The student will conduct synthetic experiments of organic compounds with instructions.
Objective 3				will adequately oducts of organic	The students will products of orga	ll identify the inic compounds	The students identify the products of organic compound with instructions.
Assigne	d Depart	ment Obje					
			放育到達度目標[)-4			
	g Method						
		mixing of r of products the meaning of experim	eagents, adjus s) and method ng of experime ental results.	stment of reaction of the state	conditions, post-t s by performing t	reatment of rea	rimental apparatus, weighing an ictions, isolation, and purification nemistry reactions. Understand be able to prepare logical reports
		Experimen	te are the foun				
Style		consider the and then consider the chemistry. The measurem students wand review experimen	ne purpose of to confirm them in After the expense and composite and the expenses. Student begins. At the topins. At the confirmation of the pagins. At the confirmation of the purposes of the pagins of the confirmation of the purposes of the purposes of the purposes of the purpose of the pu	he experiment, lea the experiment to riments, students ille them into a rep periment in depth ents must complete e end of the experi	rn experimental roperimental roperimental roperimental roperiments. If this report by repeating the ethe experiments ment, students ments roperiments roperimental roperi	methods and co deepen their ur rimental data ol writing phase i chemistry expe al plan in the ex nust submit the	ncepts in the preliminary study, derstanding of the laws of stained through accurate s considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the results
Notice		consider thand then consider thand then considered the constant of the constant of the considered the considered the considered the considered the constant of	ne purpose of tonfirm them in After the expents and comprill learn the expents. Stude to begins. At the mental data to ng precautions and drinking ares must wear thoust tie it back starting experings must prompt must be submof absence, nout have yet to be will be based of after the experiments.	he experiment, leat the experiment to the experiment to the experiment to the experiment in the experiment in depthents must complete the instructor in the prescribed white the instructor in t	rn experimental ro experience and analyze the experior. If this report by repeating the eathe experiments ment, students ment, students mange to complete ensure the experiment in the laboratory lab coat and jack ust wear safety glactions given by tate, mediately. No create analyze the experimental coats and the exper	methods and codeepen their ur rimental data of writing phase i chemistry expeal plan in the ex nust submit the this experime riment is carried ket when enteri lasses and glove he teacher.	otained through accurate s considered a review, the riment's preparation, experimen perimental notebook before the notebook and report the results nt. Out safely. In out laboratory. Students with
Notice	eristics o	consider thand then consider thand then considered the constant of the constant of the considered the considered the considered the considered the constant of	ne purpose of tonfirm them in After the expents and composed in the expents and composed in the expents and the expents. At the mental data to make the expents of absence, not thave yet to it tonfirm the expents of absence, not the expents the expents of absence, not the expents of the expents of absence, no the expents of th	he experiment, leat the experiment to the experiment to the experiment to the experiment in the experiment in depthents must complete the instructor in the prescribed white the instructor in t	rn experimental ro experience and analyze the experior. If this report by repeating the eathe experiments ment, students ment, students mange to complete ensure the experiment in the laboratory lab coat and jack ust wear safety glactions given by tate, mediately. No create analyze the experimental coats and the exper	methods and codeepen their ur rimental data of writing phase i chemistry expeal plan in the ex nust submit the this experime riment is carried ket when enteri lasses and glove he teacher.	ncepts in the preliminary study, derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the results out safely. I out safely. In the laboratory. Students with the ses. In for any unexperienced work or
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Notice Charact Active	Learning	consider thand then consider thand then considered the constant of the constant of the considered the considered the considered the considered the constant of	ne purpose of tonfirm them in After the expents and compell learn the expents and compell learn the expents. Stude to begins. At the mental data to a precautions and drinking are smust wear thoust tie it back tarting experins must be submof absence, not thave yet to by will be based of provision in Learn and the expering the expering and the expering must be submof absence, not the expering the expering the expering the expering must be submof absence, not the expering the expering the expering the expering the expering the expering the experiment of a province the experiment of a province the experiment of a province the experiment of the experiment o	he experiment, leat the experiment to the experiment to the experiment to the experiment in depth ents must complete e end of the experiment in the instructor in complete the instruction of the in	rn experimental ro experience and analyze the experience and analyze the experiort. If this report by repeating the experiments ment, students ment, students ment, experiments ensure the experiments of the laboratory laboratory and contact was a safety gluctions given by the examinations, and	methods and codeepen their ur rimental data of writing phase i chemistry expeal plan in the ex nust submit the ethis experime riment is carried whether enterial lasses and glove he teacher.	ncepts in the preliminary study, derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experiment perimental notebook before the notebook and report the results out safely. I out safely. Ing the laboratory. Students with es. In for any unexperienced work or
Notice Charact Active	Learning	consider thand then chemistry, measurem students wand review experimen and experi The followi 1. Eating a 2. Student long hair n 3. Before \$4. Student 5. Reports 6. In case reports tha 7. Grades for Class / Class	ne purpose of tonfirm them in After the expents and compents and compill learn the expents and compill learn the expents. Stude the begins. At the mental data tong precautions and drinking are smust wear thoust tie it back tracting experins must prompt must be submof absence, not have yet to be will be based of Division in Learn and the properties and the based of Division in Learn and the purpose and the based of Division in Learn and the purpose and the pu	he experiment, leat the experiment to the experiment to the experiment to the experiment in depth ents must complete e end of the experiment in the instructor in complete the instruction of the in	rn experimental ro experience and analyze the experience and analyze the experiort. If this report by repeating the experiments ment, students ment, students ment, students of the experiment of the experiment of the laboratory laboratory and the experiment of the laboratory laboratory experiments given by the experimental process of the	methods and codeepen their ur rimental data of writing phase is chemistry expeal plan in the experiment is carried with the experiment is carried when the experiment is carried asses and glove the teacher. The edit will be given attitude. Remote Class	ncepts in the preliminary study, derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimen perimental notebook before the notebook and report the results int. Out safely. Ing the laboratory. Students with es. In for any unexperienced work or
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Notice Charact Active	Plan	consider thand then chemistry, measurem students wand review experimen and experi. The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D	ne purpose of tonfirm them in After the expents and compents and compill learn the expenses. Stude the phases. Stude the phases of the phase of	he experiment, leat the experiment to the experiment to the experiment to the experiment in depth ents must complete e end of the experiment in the instructor in complete the instruction of the in	rn experimental ro experience and analyze the experience and analyze the experiort. If this report by repeating the experiments the experiments are to complete ensure the experiment in the laboratory experiments and in the laboratory experiments given by the experiments of the e	methods and codeepen their ur rimental data of writing phase is chemistry expeal plan in the experiment is carried with the experiment is carried when the experiment is carried asses and glove the teacher. The edit will be given attitude. Remote Class	ncepts in the preliminary study, derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the results out safely. In out safely. In for any unexperienced work or in the results of the laboratory. Students with the second structure of the laboratory of the laboratory of the laboratory. Students with the second structure of the laboratory of the laborat
Notice Charact Active	Plan	consider thand then chemistry, measurem students wand review experimen and experi. The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The followida control of the following from the following hair n section of the following from the follo	ne purpose of tonfirm them in After the expents and compile learn the expents and compile learn the expents. Stude the begins. At the mental data tong precautions and drinking are smust wear thouse the it back that the smust prompt must be submored absence, not have yet to be will be based on the learn and provided and the learn and the l	he experiment, leather the experiment to the experiment to the experiment to the experiment in depthents must complete the instructor in complete the instru	rn experimental ro experience and analyze the experience and analyze the experiort. If this report by repeating the experiment, students ment, students ment, students ment, experiments are to complete ensure the experiments are the laboratory experiments and jack the control of the control	methods and codeepen their un rimental data of writing phase i chemistry expeal plan in the expust submit the ethis experimeriment is carried when enterillasses and glove he teacher. The edit will be given attitude. Remote Class Goals Purify by recryst	ncepts in the preliminary study, derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the results out safely. I out safely. Ing the laboratory. Students with the ses. In for any unexperienced work of Experienced I Instructor Professionally Experienced
Notice Charact Active Course	Plan	consider thand then chemistry, measurem students wand review experimen and experi. The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The following for the followin	ne purpose of tonfirm them in After the experiments and compill learn the experiments and compill learn the experiments. At the mental data tong precautions and drinking are smust wear thrust tie it back starting experiments must prompt must be submof absence, no will be based of Division in Learn and prompt meme suidance exparation and prompt memory m	he experiment, leat the experiment to the experiment to triments, students ille them into a repperiment in depthents must complete end of the experiment the instructor in complete end of the experiment be taken to experiment be taken to experiment be taken to experiment be taken to experiment be students must be taken to be submitted by the due do tify the teacher im the submitted. In reports, notes, experiments, students must be submitted. The proof of the experiment because t	rn experimental ro experience and analyze the experience and analyze the experiort. If this report by repeating the experiment, students ment, students ment, students of the experiment and the experiment of the	methods and codeepen their un rimental data of writing phase i chemistry expeal plan in the experiment is carried with the experiment is carried when enterilasses and glove he teacher. Redit will be given attitude. Remote Class Goals Purify by recryst Synthesize cross	ncepts in the preliminary study, derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the results out safely. I out safely. In give laboratory. Students with the ses. In for any unexperienced work of Experienced I instructor Professionally Experienced Callization S-linkable polymer.
Notice Charact Active Course	Plan	consider thand then chemistry, measurem students wand review experimen and experi. The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The following for the followin	ne purpose of tonfirm them in After the experiments and compill learn the experiments and compill learn the experiments. At the mental data tong precautions and drinking are smust wear thrust tie it back starting experiments must prompt must be submof absence, no will be based of Division in Learn and prompt meme suidance exparation and prompt memory m	he experiment, leather the experiment to the experiment to the experiment to the experiment in depthents must complete the instructor in complete the instru	rn experimental ro experience and perperience and analyze the experience the experience the experiment of the experiment	methods and codeepen their un rimental data of writing phase i chemistry expeal plan in the experiment is carried with the experiment is carried when enterilasses and glove he teacher. Redit will be given attitude. Remote Class Goals Purify by recryst Synthesize cross	ncepts in the preliminary study, derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the results out safely. I out safely. Ing the laboratory. Students with the ses. In for any unexperienced work of Experienced I Instructor Professionally Experienced
Notice Charact Active Course	Plan 3rd Quarter	consider thand then chemistry, measurem students wand review experimen and experi. The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The followid for the following	ne purpose of tonfirm them in After the experiments and compill learn the experiments and compill learn the experiments. At the mental data tong precautions and drinking are smust wear thrust tie it back starting experiments must prompt must be submof absence, no will be based of Division in Learn and prompt meme suidance exparation and prompt memory m	he experiment, leat the experiment to the experiment to triments, students ille them into a repperiment in depthents must complete end of the experiment in the instructor in community prohibited in the instructor in community follow any instructed by the due do the submitted by the due do the submitted. In reports, notes, experiments, students must submitted. In reports, notes, experiments, reports, notes, experiments.	rn experimental ro experience and analyze the experience and analyze the experiort. If this report by repeating the experiments ment, students ment, students ment, students ment arge to complete ensure the experiments of the laboratory experiments are the experiments of the laboratory experiments are the experiments of the laboratory experiments of the laboratory experiments of the laboratory experiments of the laboratory	methods and codeepen their un rimental data of writing phase i chemistry expeal plan in the expust submit the ethis experiment is carried when the experiment is carried lasses and glove he teacher. The edit will be given attitude. Remote Class Goals Purify by recrysters Evaluate the was	ncepts in the preliminary study derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the resulting. Out safely. In out safely. In for any unexperienced work of the context of th
Notice Charact Active Course	Plan 3rd Quarter	consider thand then chemistry, measurem students wand review experimen and experi. The followi 1. Eating a 2. Student long hair n 3. Before s 4. Student 5. Reports 6. In case reports tha 7. Grades of Class / D The followida for the following hair n 3. Before s 4. Student s 5. Reports 6. In case reports tha 7. Grades of Class / D The followida for the following hair n 3. Before s 4. Student s 6. In case reports tha 7. Grades of Class / D The followida for the following hair n The followida for the following hair n State of the following hair n The followida for the following hair n The follo	ne purpose of tonfirm them in After the experiments and compill learn the experiments. At the mental data to a precautions and drinking are smust wear thouse tie it back that ting experiments must prompt must be submof absence, no at have yet to be will be based on the properiments. Added by Italian and properiments. Added by Italian and properiments of superiments.	he experiment, leat the experiment to the experiment to triments, students ille them into a repperiment in depthents must complete end of the experiment the instructor in complete end of the experiment in the instructor in complete end of the experiment in the instructor in complete end of the experiments, students must be taken to the experiments, students must be follow any instruited by the due do the experiments, students must be submitted. In reports, notes, experiments, notes, experiments of organization organization organization of organization organization organization organization organization organization organization organization organization organiza	rn experimental ro experience and perperience and analyze the experience the experiment of the experim	methods and codeepen their un rimental data of writing phase i chemistry expeal plan in the experiment is carried with the experiment is carried when enterillasses and glove he teacher. The edit will be given attitude. Remote Class Fooals Fourify by recryst Synthesize cross Evaluate the wap onlymers. Everform fraction	ncepts in the preliminary study derstanding of the laws of obtained through accurate is considered a review, the riment's preparation, experimer perimental notebook before the notebook and report the resulting. Out safely. In out safely. In for any unexperienced work of the context of th

		8th	Separa (2)	ation and purification	n of organic compo	unds	Extraction is	performed using a	separatory funnel.	
		9th	Synthe	esis of acetanilide (1	.)		Synthesize amide.			
		10th	Synthe	esis of acetanilide (2		IR, NMR, and melting point measurements are performed to identify acetanilide.				
		11th	Report	coaching and lectu	res					
	4th	12th	Interfa	cial polycondensation reaction			Synthesize 6	Synthesize 66 nylon.		
	Quarter	13th	Synthe	esis of azo dyes (1)			Synthesize a	zo compound by a	zo coupling.	
		14th	Synthe	esis of azo dyes (2)			Identify compounds by TLC.			
		15th	Instrur notes,	ment Check, examir and summary of ex	nation, submission operiments	of				
		16th	Prelimi	inary Experiment Da	ay/Instrument Che	ck				
Evaluati	on Met	hod and \	Weigh	t (%)						
		Examinatio	n -	Quiz	Portfolio	Prese	entation and ude	Other	Total	
Subtotal		0		0	0	0		100	100	
Basic Prof	iciency	0		0	0	0		60	60	
Specialize Proficiency	d y	1 0		0	0	0		40	40	
Cross Area Proficiency		0		0	0	0		0	0	

,	Anan Co	llege	Year	2024		Course Title	Fundamental Physics 1		
Course	Informa	tion		·			·		
Course Co	ode	1413301			Course Category	Speciali	zed / Compulsory		
Class Forr	mat	Lecture			Credits		Credit: 2		
Departme	ent		Chemical Engine	eering	Student Grade	3rd	(/ titl		
Term Textbook	and/or	Year-round			Classes per Wee				
Teaching		Syohokara	manabukisobut	urigaku (Rikigaku	I) , Rikigaku I Mo	ndaisyu (Dair	ihontosyo)		
Instructor		Nakamura	Atsunobu						
1. Able to 2. Able to	solve the	and solve ed problem usin	g the conservat	ion for problems. tion laws of energy rmonic motion pro	y, momentum, etoblems.	C.			
Rubric									
			Ideal Level		Standard Level		Unacceptable Level		
Achievem	ent 1		Able to solve the objects using y calculus.	he motion of your knowledge of	Able to solve the objects for syste internal and extensing formulae.	ms with	Able to solve the motion of objects for a simple system with only internal forces.		
Achievem	ent 2		express conser	the meaning of	Able to formulate express conservations the problem	ation laws and			
Achievem	ent 3		Able to formula solve the probl equations of m conservation la	otion and	Able to formulate according to the solve the probler	procedure, ar	Able to solve the problem by substituting in the formulae.		
		tment Obje	ectives						
	到達度目標								
Teachin	g Metho					1			
Outline		as vectors,	, differentiation,	, and integration is	s required. In this	course, first,	t, knowledge of mathematics such we review these. After that, we nd simple harmonic oscillation.		
Style		After the n	mathematics u nidterm exams, on plan. Do fred	we study the med	exams. After learn chanics content. E	ing the conte Explanations a	nts of each lesson, we practice. re given using textbooks according		
Notice		In addition have used	to the textbook so far. Quizzes	ks specified for thi are given frequen	s course, study us tly, so be sure to	sing the math prepare for a	ematics and physics textbooks you nd review what you have learned.		
Charact	eristics	of Class / D	<u> Division in Le</u>	arning	ī				
☐ Active	Learning		☐ Aided by IC	CT	☐ Applicable to	Remote Class	☐ Instructor Professionally Experienced		
Course	Dlan								
Course	riaii	T _l	neme			Goals			
							te sums, differences, and inner		
			ector calculation		р	roducts of ve	ctors.		
			alculations on ex nctions.	xponential and log	arithmic A	lble to calcula unctions.	te exponential and logarithmic		
		3rd Ca	alculation of der	ivatives 1	a	nd quotients			
	1st Quarter	4th Ca	alculation of der	rivatives 2	fı	unctions, and	ntiate exponential and logarithmic composite functions.		
		5th Ca	alculation of inte	egrals 1			te integer expressions, products of functions.		
			alculation of inte		ir	ntegrals.	te substitution integrals and partial te the maximum and minimum of		
1st Samasta		7th Ma	aximum and mi	nimum of function		unctions.	te the maximum and minimum of		
Semeste r		†	idterm exam						
		9th Ve	elocity and acce	leration			te velocity and acceleration.		
		10th Ve	elocity-addition	formula and relati		ble to calcula elocity.	te velocity-addition and relative		
			otion in a gravit				ulations about parabolic motion.		
12th Composition and dec			decomposition of			site forces and decompose a force.			
	2nd Quarter	13th Ba	alance of forces		fo	orces, action a	ulations about the balance of and reaction of forces.		
		14th Ex	camples of force	es	fr	Able to do calculations about elastic forces and frictional forces.			
15th Law of inerti				d law of motion		Able to do calculations about law of inertia and law of motion.			
		16th Ar	nswer						

		1st	Equation	ons of motion for	two bodies		Able to deriv		ne equations of motion	
		2nd	Slope,	frictional force, in	nertial force		Able to do ca frictional for	alculations above	out objects on slope,	
		3rd	Impuls	se and momentur	n		Able to solve between imp	problems usi oulse and mor	ing the relationship nentum.	
	3rd Quarter	4th	Momer	ntum conservatio	n law		Able to solve problems by using the momentum conservation law.			
		5th	Coeffic	ient of restitution	ı		Able to solve problems involving coefficients of restitution.			
		6th	Work a	and power			Able to calculate work and power.			
		7th	Mecha	nical energy 1			Able to calculate kinetic energy and potential energy.			
2nd		8th	Midter	m exam						
Semeste r	9th	Mecha	nical energy 2			Able to solve the problem by using the law of conservation of mechanical energy.				
		10th	Mecha	nical energy 3			Able to do calculations about conservative force and energy loss.			
		11th	Unifor	m circular motion	l		Able to do ca motion.	alculations abo	out uniform circular	
	4th	12th	Simple	harmonic motion	n 1		Able to calculobject in sim	late velocity a	and acceleration of an motion.	
	Quarter	13th	Simple	harmonic motion	n 2		Able to do calculations about spring pendulum and simple pendulum.			
		14th	Univer	sal gravitation 1			Able to do calculations about law of universal gravitation.			
		15th	Univer	sal gravitation 2			Able to do calculations about gravitational potential energy.			
		16th	Answe	r						
<u>Evalu</u> at	ion Met	hod and	l Weigh	t (%)						
	_	Examinat	ion	Quiz	Portfolio	Prese ude	entation/Attit	Other	Total	
Subtotal		60		10	30	0		0	100	
Basic Pro	ficiency	30		5	15	0		0	50	
Specialize Proficienc		20		5	15	0		0	40	
Cross Area Proficiency				0	0	0		0	10	

/	Anan College Year 2024 urse Information			2024				Advanced Chemistry Seminar		
Course	Informa	tion								
Course Co	ode	1413902			Course Catego	ry	Specialize	ed / Compulsory		
Class Forr	mat	Lecture			Credits	•	School Cr	edit: 1		
Departme	ent		hemical Engine	eering	Student Grade		3rd			
Term		First Semes		.	Classes per We	Veek 前期:2				
Textbook Teaching										
Instructor	-	Nakamura <i>A</i> Yuuki,Ezure	Atsunobu,Konis Ryosuke	shi Tomoya,Ota N	aotomo,Otani Ta	akashi,	Zheng Tac	,Ueda Kohei,Sugiyama		
Course	Objectiv	es								
				on in the field of oness activities into		report.				
Rubric										
]	ideal Level		Standard Level			Unacceptable Level		
Achievement 1				nd summarize it uding your own	Able to underst information, ar contents in a re	nd sumi		Able to understand the basics of technical information, and summarize them in a report.		
Achievem	ent 2	i	activities, and s	and corporate summarize them uding your own	Able to understactivities, and scontents in a re	summa	rporate rize those	Able to understand the basics of corporate activities, and summarize them in a report.		
		tment Obje	ctives							
学習・教育	到達度目標	₹ D-3								
Teachin	g Metho	<u>d</u>								
Outline		companies. lectures on	Specifically, yo corporate active	ou receive lectures vities from lecture	s on specialized rs who work for	fields fi chemic	rom teach cal compai	ities of current chemical ers in the chemistry course, and nies. Furthermore, based on the cooperation with different		
Style		You acquire lectures give	en by faculty n	owledge in the fiel nembers of the ch you are divided in	emistry course	and out	tside lectu	pout corporate activities through rers (industries, universities, s facilitators.		
Notice		The score w	ill be reduced	as you miss repor	t deadlines by a	week.	If you mi	ss a class, you must submit your		
			itively at Mana							
Charact	eristics (DI Class / DI	vision in Le	arning	I			Transmission Durchassis wells		
☐ Active	Learning	[☐ Aided by IC	Т	☐ Applicable t	o Remo	ote Class	☐ Instructor Professionally Experienced		
Course	Plan									
Course	lan	The	eme			Goals				
		1st Gui	dance, Lecture	by a chemistry c cturer, group wor		Able to Able to proble	o understa ms of the	nd the purpose of this lesson. Ind the background and current lecturer's field of expertise. Able rer and think about your career		
		2nd Lec	ture by a cher ernal lecturer,	nistry course teac group work2	her andan	Able to	ms of the	nd the background and current lecturer's field of expertise.Able rer and think about your career		
		3rd Lec	ture by a cher ernal lecturer,	nistry course teac group work3	her andan	proble	ms of the	nd the background and current lecturer's field of expertise.Able rer and think about your career		
1st Semeste	1st	4th Lec	ture by a cher ernal lecturer,	nistry course teac group work4	her andan	proble	ms of the	nd the background and current lecturer's field of expertise.Able rer and think about your career		
r	Quarter	5th Lec	ture by a cher ernal lecturer,	nistry course teac group work5	her andan	proble	ms of the	nd the background and current lecturer's field of expertise. Able rer and think about your career		
			ture by a cher ernal lecturer,	nistry course teac group work6	her andan	proble	ms of the	nd the background and current lecturer's field of expertise.Able rer and think about your career		
	7th Lecture by a chemistry course tead external lecturer, group work7		her andan	proble	ms of the	nd the background and current lecturer's field of expertise.Able rer and think about your career				
		nistry course teac group work8	her andan	proble	ms of the	nd the background and current lecturer's field of expertise.Able rer and think about your career				

		9th	Lecture	e by a chemistry co al lecturer, group w	ourse teacher andan	l	I problems of	erstand the backgrother lecturer's field ecturer and think a	of expertise. Able		
			extern	ar lecturer, group w	701 K 9		path.		-		
	2nd Quarter	10th	Lecture	e by a chemistry co al lecturer, group w	urse teacher andan ork10	ı	Able to understand the background and current problems of the lecturer's field of expertise. Able to listen to lecturer and think about your career path.				
		11th	Lecture	e by a chemistry co al lecturer, group w	urse teacher andan ork11	l	Able to understand the background and current problems of the lecturer's field of expertise. Able to listen to lecturer and think about your career path.				
		12th	Lecture	Able to understand the background a problems of the lecturer's field of external lecturer, group work12 Able to understand the background a problems of the lecturer's field of extended to listen to lecturer and think about path.							
		13th	Lecture	e by a chemistry co al lecturer, group w	urse teacher andan ork13	l	I problems of	erstand the backgro the lecturer's field ecturer and think a	of expertise. Able		
		14th	Lecture	e by a chemistry co al lecturer, group w	nemistry course teacher andan er, group work14			Able to understand the background and current problems of the lecturer's field of expertise. Able to listen to lecturer and think about your career path.			
		15th	Lecture	e by a chemistry co al lecturer, group w	rse teacher andan problems		problems of to listen to le	erstand the backgrother lecturer's field ecturer and think a	of expertise. Able		
		16th									
Evaluati	ion Met	nod and	Weigh	t (%)	_			1			
		assignmer	nt						Total		
Subtotal		100		0	0	0		0	100		
Basic Prof	,	30		0	0	0		0	30		
Specialize Proficience	ed Y	30		0	0	0		0	30		
Cross Are Proficienc		40	0		0	0		0	40		

,	Anan Co	llege		Year	2024		С	Course Title	Organic Chemistry 1
Course	Informa	tion							
Course Co	ode	1413A01	L			Course Catego	ry	Specializ	ed / Compulsory
Class For	mat	Lecture				Credits		School C	redit: 2
Departme	ent	Course o	of Cher	mical Engine	eering	Student Grade		3rd	
Term		Year-rou	ınd			Classes per We	ek	前期:2 後	期:2
Textbook Teaching		Fundame	entals	of ORGANIO	C CHEMISTRY sev	enth edition			
Instructor	-	Sugiyam	a Yuul	ki,Otani Tak	ashi				
1. The stu 2. The stu 3. The stu	ıdents will ıdents will	learn the clearn basic learn the n	: know nechai	ledge of no nisms of sul	al bonding and ba menclature. ostitution, elimina basic knowledge o	tion, and additio	n reac	ctions.	
Rubric									
			Ide	al Level		Standard Level			Minimum Level
Objective 1			and and med	I the mecha	mic structure nisms of covalent ing, and the acid/base	Explain the ato and the mecha and ionic bondi 70% of the me acid/base react	nism o ing and chanis	of covalent d about	Explain the atomic structure and the mechanism of covalent and ionic bonding and about 50% of the mechanism of acid/base reactions.
Objective	2			te the struc nenclature (tures and of compounds.	Write about 70 structures and compounds.			Write about 50% of the structures and nomenclature of compounds.
Objective	3		med elim read	chanisms of nination, an ctions of co	e the reaction f substitution, d addition mpounds functional group.	tion on, addition reactions of substitution, elimination, and addition reactions of compounds categorized by the functional group is induced by			The reaction mechanism of substitution, elimination, and addition reactions of compounds categorized by the functional group is induced by about 50 %.
Objective	4		aro des sub	Explain the properties of aromatic compounds and describe electrophilic substitution reactions and their reactions and their reactions and their reactions are substitution reactions.				Explain the properties of aromatic compounds and electrophilic substitution reactions and their reaction mechanisms by about 50%.	
Assigne	d Depar	tment Ob	jecti	ves					
学習・教育	到達度目標	票 D-1							
Outline	g Metho	Organic ovast num as comporganic of This lectional level.	nber o ounds compo ure air al grou	f organic co that exhibit unds to me ns to learn ip that exhi	mpounds by rote to similar physical a morize. The basics of the points common prop	memorization a and chemical pro properties, react erties, as well a	lone is opertie ions, a s the o	impossibles, it is clear and synthed differences	ving organisms. Learning about the le. However, by classifying them ar that there are few different eses characteristic of each s in functionality at the molecular
Style		memoriz This lecti	ation, ure wi	although th	nere is much to lea	arn individually. Jenomena can b	e expl	•	chemistry is not all about cally based on electronegativity,
Notice		Organic (chemi	strv is a dis	cipline in which ac	cumulation is si	anifica	nt. Studer ts should f	nts often fail to master new fields ocus on reviewing and studying.
<u>Char</u> act	eristics (of Class /	Divis	<u>sion in</u> Le	arning				
☐ Active	Learning		Z,	Aided by IC	Т	☑ Applicable to	o Rem	ote Class	☐ Instructor Professionally Experienced
Course	Plan								
			Theme	e			Goals		
		1st	Guida	nce / Chapt	er 1: structure an	d bonding 1	Explai	in the elec	tron configuration.
				•	ure and bonding 2	_	Explai		mic structure, ionic bonding, and
		3rd	Chapt	er 1: struct	ure and bonding 3	1		in the forn	nation of formal charges and
	1st	4th	Chapt	er 1: acids	and bases 1			in atomic	and hybrid orbitals (s, p, d apes).
1st Semeste	Quarter	5th	Chapt	er 1: acids	and bases 2		Explai Lowry		nitions of pKa and Broasted-
r		6th	Chapt	er 1: acids	and bases 3		Explai bases	in the defi , and Lew	nitions of organic acids, organic is.
		7th	Chapt	er 2: alkane	es 1			Alkanes a Crules.	and cycloalkanes according to
		8th	Early ı	mid-term ex	kamination				
	2nd Quarter 9th Return and explanation of early mid-te examinations Chapter 2: alkanes 2			d-term	Explain the steric conformation of the alkanes.				
	L	I	Cilupt	C. Z. UINUIT	~ <u>~</u>				

		10th	Chanto	er 2: alkanes 3			Evolain the	steric conformat	ion of cycloalkanes	
		1001			n, in totrahodral con	tore			•	
		11th	1		ry in tetrahedral cer		Explain chira	al compounds ar	nd enantiomers.	
		12th	Chapte 2	er 6: stereochemist	ry in tetrahedral cer	nters	Name enant Explain spec	iomers accordin ific rotation.	g to the R, S notation.	
		13th	Chapte 3	er 6: stereochemist	ry in tetrahedral cer	nters	Explain diast racemic mix	tereomers, meso ture and optical	o compounds, resolution.	
		14th	Chapte	er 3: alkenes and a	lkynes 1		Name Alkenes and cycloalkanes according to IUPAC rules.			
		15th	Chapte	er 3: alkenes and a	lkynes 2		Explain alkene structures and cis-trans isomers, and make E, Z notation.			
		16th	Return	and explanation of	term-end examina	tion				
		1st	Chapte	er 3: alkenes and a	lkynes 4		Name alkyne IUPAC rules.		nes according to	
		2nd	Chapte	Chapter 3: alkenes and alkynes 5			Explain elect	Explain electrophilic addition reactions of alkenes.		
		3rd	Chapte	er 3: alkenes and a	lkynes 6		Explain the a	addition of HX to	alkenes.	
		4th	Chapte	ter 4: alkenes and alkynes reactions 1			Explain the a	addition reactior en to alkenes.	ns of water, alcohols,	
	3rd Quarter	5th	Chapte	er 4: alkenes and alkynes reactions 2			Explain region reactions of	selectivity in ele alkenes.	ectrophilic addition	
	Quui to:	6th	Chapte	er 4: alkenes and al	kynes reactions 3		Explain the oxidation of alkenes. The polymers can be explained.			
		7th	Chapte	er 4: alkenes and al	kynes reactions 4		to alkynes at alkynes. The	nd the addition	n of hydrogen halides reaction of water to ydrogen bonded to ned.	
2nd Semeste		8th	Late m	nid-term examination	on			•		
r		9th	examir	and explanation of nations er 4: alkenes and al			Explain reso	nance.		
		10th	Chapter 4: alkenes and alkynes reactions 6				Explain the reaction of conjugated dienes.			
		11th		er 5: aromatic comp			Explain the structure of benzene. Name aromatic compounds according to IUPAC rules.			
	4th Quarter	12th	Chapte	er 5: aromatic comp	oounds 2		Explain aromatic electrophilic substitution reactions.			
	Quarter	13th	Chapte	er 5: aromatic comp	oounds 3		Explain the Frieden-Crafts reaction. Aromatic oxidation and reduction reactions can be explained.			
		14th	Chapte	er 5: aromatic comp	oounds 4		Explain the	effect of substitu	ients on orientation.	
		15th		er 5: aromatic comp			· ·	definition of aro		
		16th	Return	and explanation of	final examination					
Evaluati	on Met	hod and	Weigh	t (%)						
		Examination	_	Quiz		Prese	entation and ide	Other	Total	
Subtotal		70		5	0	0		25	100	
Basic Prof	iciency	40		5	0	0		20	65	
Specialize Proficienc	d	30		0	0	0		5	35	
Cross Aroa					0	0		0	0	

	Anan Co	llege	Year	2024			ourse Title	Inorganic Chemistry 1	
Course I	Informa	tion	1						
Course Co	ode	1413B01			Course Categor	У	Specializ	ed / Compulsory	
Class Forn	mat	Lecture			Credits		School C	redit: 2	
Departme	nt	Course o	f Chemical Engir	neering	Student Grade		3rd		
Term		Year-rou	nd		Classes per Wee	ek	前期:2 後	期:2	
Textbook Teaching I				1odern Approach	(Tokyo Kagaku Doujin)				
Instructor	•	Zheng Ta	30						
2. to unde 3. to unde	ble to und erstand the erstand so	erstand the	ip between chen emistry.	lectron configuration	on of atoms he structure and	l prope	rties of n	natter	
Rubric								_	
			Ideal Level		Standard Level			Unacceptable Level	
Achievement 1			Explain the street electron configure based on the quantum med	guration of atoms concepts of	Briefly explain t electron configu based on the co quantum mecha	uration oncepts	of atoms		
Achieveme	ent 2		Explain the rebetween chen the structure amatter	elationship nical bonding and and properties of	Can briefly exp relationship bet bonding and the properties of ma	ween o	chemical	Cannot explain the relationship between chemical bonding and the structure and properties of matter.	
Achieveme	ent 3		stereology of the relationsh	ne bonding and solids and explain ip between rns and crystal	Understand the stereology of so explain the rela- between bondir crystal structure	olids, a itionshi ng mod	nď briefly p	Understands the bonding and stereology of solids and cannot explain the relationship between bonding modes and crystal structure.	
Achievem	Ur Achievement 4 str			ne definitions and cids and bases, cid-base reactions	Understand the definitions and strengths of acids and bases, and briefly explain acid-base		bases,	Understand the definitions and strengths of acids and bases, and cannot explain acid-base reactions.	
Assigned	d Denar	tment Ob	iectives		1 0 0 0 1 0 1 0 1			reactions	
学習・教育			Jeen ves						
Teaching									
Outline		1. to acq 2. to sys molecula bases, ox	tematically study or orbital theory, oridation-reduction oduce the definit	y the fundamentals and the periodic ta on, and battery and	of atomic struct ble; 3. to introdu electrode reaction	ure, chuce the ons	nemical b e definitio	y, which covers all elements onding, molecular structure, ons and strengths of acids and eduction and battery/electrode	
Style		Have stu lecture.	dents solve simp	ole exercises during	the lecture, or o	give th	em home	ework to be solved in the next	
Notice		students is the for	' understanding (of organic chemistr Janic Materials, Org	v. which is offere	ed in p	arallel wi	rse is also designed to deepen th Chemistry 1 and 2. This course stry, etc., which are offered in the	
Characte	eristics o	of Class /	Division in Le	earning					
☐ Active	Learning		☑ Aided by I	СТ	☑ Applicable to	Remo	te Class	☐ Instructor Professionally Experienced	
Course F	Plan								
30 31.00 1		[-	Theme			Goals			
		1ct		eas of inorganic che units.	emistry.	Unders	stry and b	content and areas of inorganic be able to explain chemical terms, entrations.	
		2nd	Bright line specti	rum of hydrogen.				ht line spectrum of hydrogen.	
			Bohr model of at					r model of the hydrogen atom.	
		4th		and energy levels o	of hydrogen-	Unders	stand qua	antization of energy and explain flydrogen atoms.	
1st	1st Quarter		71	ers and atomic orbi	tale	To be		xplain quantum numbers and	
Semeste r		6th	Angular form of	atomic orbitals.			stand and	explain the shapes of s, p, d, and	
		7th	Electron configu	ration of multi-elect	tron atoms.	Under	stand per ectron cor	netration and shielding, and explain nfiguration of multi-electron	
		8th	Summary and R	eview		Exercis	ses and R	leview	
	2nd		Summary and Ro Mid-term exam	eview		Exercis	ses and R	eview	

		11th	Periodicity of phys	ical properties of	f elements	To be able to experiodicity of phionization energaffinity.	ysical properti	ionship between es of elements, city of electron	
		12th	Lewis structures			- '	ıplain Lewis stı	ructure based on	
		13th	VSEPR theory and	molecular forms	5	Understand VSE molecular and i	EPR theory and onic forms usir	be able to predicting this theory.	
		14th	Bond polarity and	dipole moments		To be able to ex of molecules. Ex	plain polarity a	and dipole moment nature of bonds.	
		15th	Summary and rev	iew					
		16th	Return of final exa	am answers					
		1st	Valence bond theo	ory 1		To be able to ex hybridized orbit		bond theory and	
		2nd	Valence bond theo	ory 2		Explain valence bond theory and hybridized orbitals.			
		3rd	Molecular orbital t	heory 1		Understand bonding and antibonding orbitals and explain electron configuration of isonuclear and heteronuclear diatomic molecules.			
	3rd Quarter 5th		Molecular orbital t	heory 2		explain electron	Understand bonding and antibonding orbitals and explain electron configuration of isonuclear and heteronuclear diatomic molecules.		
			Types of crystals a	and their definition	ons.	Explain the types of crystals and their definitions. 7 types of crystal systems and 4 types of space lattices.			
		6th	Structure of metal	llic crystals		Explain the type crystals, and ca of the densest s	Iculate the fillir	es of metallic ng factor (porosity)	
2nd Semeste		7th	Structure of ionic	compounds		Understand the and give theore structures.	structures of t tical explanation	ypical ionic crystals ons of their	
		8th	Intermediate Exar	nination					
		9th	Lattice energies ar	nd Born-Haber c	ycles	Be able to calcu Haber cycles.	late lattice ene	ergies using Born-	
		10th	Calculation of latti constant.	ce energies and	Mardelung's	To be able to explain the Mardelung constant and the relationship between lattice energy and melting point, etc.			
	411	11th	Definition of acids	and bases.		To be able to explain the definitions of acids and bases.			
	4th Quarter	12th	Strengths of Brons	sted acids and ba	ases.	To be able to exacids and Brons	plain the strer ted bases.	ngth of Bronsted	
		13th	Lewis acids and Le	ewis bases		To be able to exand Lewis bases	plain the defines and their stre	nitions of Lewis acids engths	
		14th	Strengths of Lewis	acids and Lewis	bases.	To be able to ex	plain the conc	ept of HSAB	
		15th	Review						
		16th	Return final exam	answer sheets					
Evaluati	ion Metl	nod and \	Neight (%)	1					
	Ex	amination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total	
Subtotal	70)	0	30	0	0	0	100	
Basic Proficienc	y 25	,	0	15	0	0	0	40	
Specialize Proficienc		;	0	15	0	0	0	40	
Cross Are Proficienc)	0	0	0	0	0	20	

Anan Colle	ege	Year	2024		Course Title	Analytical Chemistry		
Course Information								
Course Code	1413C01			Course Category	Specializ	ed / Compulsory		
Class Format	Lecture			Credits	School C	School Credit: 2		
Department	Course of Ch	emical Engin	eering	Student Grade	3rd	3rd		
Term	Year-round			Classes per Week	前期:2 後	前期:2 後期:2		
Textbook and/or Teaching Materials	Kisobunsekikagaku -ionheikoukarakikibunnsekimade (Sankyo syuppan)							
Instructor	Ueda Kohei,	Ueda Kohei,Ezure Ryosuke						

Course Objectives

- 1. Understand the solution equilibrium and be able to calculate solubility due to changes in solution composition using the concept of solution equilibrium. Be able to explain the reactions involved in the qualitative analysis of cations and anions.

 2. Understand complex formation equilibrium and be able to perform quantitative calculations for chelatometric titration.

 3. Understand redox reactions and be able to perform calculations for the redox titration.

 4. Understand acid-base equilibrium and be able to perform calculations related to neutralization titration, including pH. Able to

Rubric Achievement 1	Ideal Level Understand and be able to explain solution equilibrium. Be able to calculate solubility due to changes in solution composition using the concept of solution equilibrium. Be able to explain the reactions involved in the qualitative analysis of cations and anions. Understand and be able to	Understand and be able to explain solution equilibrium. Be able to explain the reactions involved in the qualitative analysis of cations and anions.	Minimum Level Be able to explain the reactions involved in the qualitative analysis of cations and anions.
Achievement 1	explain solution equilibrium. Be able to calculate solubility due to changes in solution composition using the concept of solution equilibrium. Be able to explain the reactions involved in the qualitative analysis of cations and anions. Understand and be able to	explain solution equilibrium. Be able to explain the reactions involved in the qualitative	involved in the qualitative
Achievement 2	explain complex formation equilibrium. Be able to perform quantitative calculations for chelatometric titration. Be able to explain the outline of the titration curve and of the indicator.	Understand and be able to explain complex formation equilibrium. Be able to perform quantitative calculations for chelatometric titration.	Understand and be able to explain complex formation equilibrium.
Achievement 3	Understand redox reactions and be able to perform calculations using Faraday's law and Nernst's equation. Be able to perform quantitative calculations for the redox titration. Be able to explain the outline of a titration curve and the method of endpoint determination.	Understand redox reactions and be able to perform calculations using Faraday's law and Nernst's equation. Be able to perform quantitative calculations for the redox titration.	Understand and be able to explain redox reactions.
Achievement 4	Understand and explain acid- base equilibrium. To understand and explain neutralization titration. To be able to explain about buffer solution. To be able to calculate pH of strong acid, strong base, weak base, weak acid, salt of weak acid, and salt of strong base. Can explain the outline of titration curve and necessary indicator settings.	Understand and explain acid- base equilibrium. To understand and explain neutralization titration. To be able to explain about buffer solution. To be able to calculate pH of strong acid, strong base, weak base, weak acid, salt of weak acid, and salt of strong base.	Understand and explain acid- base equilibrium. To understand and explain neutralization titration. To be able to explain about buffer solution.
Achievement 5	Understand and explain separation methods using ion exchange. Understand and explain analytical methods using solvent extraction. Understand, explain, and calculate distribution coefficients, distribution ratios, and extraction rates.	Understand and explain ion exchange separation methods. Understand and explain distribution equilibrium. Understand and explain distribution coefficient, distribution ratio, and extraction ratio.	Understand and explain ion exchange separation methods. Understand and explain distribution equilibrium.
Assigned Departme	ent Objectives		
学習・教育到達度目標 D-	1		
Teaching Method			
Outline c	nalytical chemistry is the study of examini nemical structures and states of existence oncepts of analytical chemistry are used in nvironment. In this lecture, the objective in nemistry, as well as theories related to cha quilibrium, precipitation equilibrium, and p	 Älthough we are not usually awan a wide range of fields in society, is to master the statistical concept emical equilibrium in solution (acion) 	re of it, the techniques and including medicine, food, and the sthat form the basis of analytical
Style T	he course will proceed through lectures ar	nd exercises.	
Notice A	function calculator will be used in the lect	ture.	

□ Active	Learning		□ Aided by ICT			☐ Instructor Professionally Experienced	
Course	Plan						
Course	i idii	-	Theme		Goals		
			Atomic weight, molecular weight, n concentration	noles,	Be able to calculate the formula weight amount of a substance from periodic tables. Be able to calculate and convert between concentrations in solution, such as molar concentration, molar fraction, and mass percent concentration.		
		2nd (Chemical equilibrium and activity		Understand and bequilibrium and a	pe able to explain chemical ctivity	
		3rd S	Solubility equilibrium		Understand soluble able to perform changes in solubi	illity and solubility product and n calculations relating to lity.	
	1st Quarter	4th	Qualitative inorganic analysis		and anions and b calculations in so	nical reactions involving cations e able to carry out quantitative lution. Be able to the qualitative l cations and anions.	
		5th	Gravimetric analysis		precipitation and	eparation of substances by be able to calculate the amount ased on stoichiometry.	
		6th F	Formation of complexes		Be able to explain	the formation of complexes.	
1st Semeste r		7th	Chelatometric titration		Understand the p and be able to ca metal ions.	rinciple of chelatometric titration lculate the concentration of	
		8th	exercises				
			midterm exam.				
		10th	Redox reaction		<u>'</u>	the oxidation numbers.	
		11th [Batteries and electromotive force		Be able to explain the redox reactions at the cathode and anode of batteries and to perform calculations using Faraday's law.		
	2nd	12th	The equilibrium constant for a redo	x reaction	determine the eq	lernst equation and be able to uilibrium constant from the the battery reaction.	
	Quarter	13th	Factors affecting electrode potentia	I	Be able to explain potential	n factors affecting electrode	
		14th	Redox titration		Understand the pable to calculate agents	rinciple of redox titration and be the concentrations of redox	
		15th 6	exercises				
		16th t	term-end exam.				
		1st /	Acid and Base Concepts		Able to explain the Able to explain at	ne definitions of acid and base. Boout acid-base equilibrium.	
			Neutral solution and strong acid or strong base solution		Able to explain the definition of pH. Able to calculate strong acids and bases.		
		3rd	Aqueous solution of weak acid		Able to calculate dissociation constants and pH of weak acids.		
	3rd	4th	Aqueous solution of weak base		Able to calculate weak bases.	dissociation constants and pH of	
	Quarter	5th l	ouffer solution		Able to explain the definition of buffer solutions. Able to calculate dissociation constants and pH o buffer solutions.		
		6th	Solution of conjugated acid-base pa	nirs	Able to calculate of a mixture of co	the dissociation constant and pH o-acid-base pairs.	
		7th	Polybasic acid and polyacid-base so	lutions	Able to calculate polybasic acid and	dissociation constants and pH for dissociation constants and pH for dissociations.	
2nd		8th				, ,	
Semeste r		9th	Neutralization titration 1		Able to explain the titration. Able to of strong acids w	e principle of neutralization perform calculations for titration ith strong bases.	
		10th	Neutralization titration 2		Able to perform of acids with strong of weak base with	alculations for titration of weak bases. Able to calculate titration n strong acid.	
		11th	Neutralization titration 3			acid-base indicators Able to	
	4th Quarter	12th 9	Solvent extraction method 1		Able to explain distribution equilibrium. Able to calculate distribution equilibrium, distribution		
		13th 9	Solvent extraction method 2		coefficient, and extraction ratio. Able to explain analytical methods using solvent extraction methods.		
		14th]	Ion exchange method			ne principles of the ion exchange	
		15th I	Handling of Analysis Data		Able to handle data appropriately.		
		16th					
Evaluati	on Meth	od and W	/eight (%)				

	Examination	Portfolio	Total	
Subtotal	70	30	100	
Basic Proficiency	20	0	20	
Specialized Proficiency	50	30	80	

Anan Colleg	je	Year	2024		Course Title	Physical Chemistry 1	
Course Information	 1			'	•		
Course Code 1	.413D04			Course Category	Specialize	ed / Compulsory	
Class Format L	.ecture			Credits	School Cr	edit: 2	
Department C	Course of Chemical Engineering			Student Grade	3rd		
Term Y	'ear-round			Classes per Week	前期:2 後	期:2	
Textbook and/or Teaching Materials	extbook: 千 ingineering	原秀昭・稲葉章 Library 「物理	・鈴木晴(訳)「ア 化学」 実教出版			人 and 福地賢治編 Professional	
Instructor K	Conishi Tom	oya					
Course Objectives							
Physical chemistry is a branch of science that attempts to understand chemical phenomena essentially from atomic and molecular structures based on knowledge of physics (e.g., thermodynamics and quantum mechanics) and to express various properties quantitatively (quoted from the textbook "Foreword"). The goals of the lecture are as follows: 1. Explains the states of matter, their characteristics, and the changes of state between phases, and solves related applied problen 2. Explains the difference between ideal gas and real gas and their treatment by equation of state, and solves related application problems 3. Explains radiation and radioactive decay in radioactive materials and solves application problems related to the use of radiation and nuclear energy. 4. Describes equilibrium, kinetics and analysis of chemical reaction by using thermodynamics and solve relevant problems. 5. Describes basics of quantum mechanics and solves basic problms.							
Rubric							
	To	deal Level		Standard Level		Unacceptable Level	
Achievement 1	st	olves exercise tates of matte ntermediate ph	r and	Explains the character the three states of intermediate phase critical points, and example problem	of matter and ses, as well as d solves	Cannot explain the three states	
Achievement 2	ievement 2 Treats theoretically the kinetic theory of molecules and velocity distributions for ideal gases and distributions			Treats theoretical theory of molecul distributions for it solves example p	ly the kinetic es and velocit deal gases and	Unable to explain the properties and laws of ideal gases and solve basic problems using the equation of state.	
Achievement 3	la	nd generalized	uation of state I diagram of a Ives exercises.	Explains the equation of state and generalized diagram of a real gas and solves example problems.		Cannot explain the difference between an ideal gas and a real gas.	
Achievement 4		of radiation and nuclear energy, and solves exercises.		Explains the prop of radiation and nand solves examp	uclear energy	S Cannot explain the difference between radioactive material, radioactivity, and radiation.	
Achievement 5		eqilibrium with few errors.		Demonstrates the knowlege of eqilib	e general orium.	Demonstrates little or no knowlege of eqilibrium.	
Achievement 6	k	inetics with fe	w errors.	Demonstrates the knowlege of chen	nical kinetics.	Demonstrates little or no knowlege of chemical kinetics.	
Achievement 7	a	nalysis with fe	lems of reaction w errors.	Demonstrates the knowlege of react	tion analysis.	Demonstrates little or no knowlege of reaction analysis.	
Achievement 8	q	olves the prob uantum mech rrors.	lems of basic anics with few	Demonstrates the general knowlege of basic quantum mechanics.		Demonstrates little or no knowlege of basic quantum mechanics.	
Assigned Departme 学習・教育到達度目標 D-		tives					
Teaching Method							
Outline C	eal gases, a landling high ressure rea haracteristic tudents lead he knowled lesigning ma	and understand h-pressure gas ction vessels. cs of radiation rn to describe ge of thermod	I how to handle g ses in the chemica Students will also to deepen their u chemical eqilibriu ynamics. This kno erature, aging, an	ases using the equal industry and for learn about nucle nderstanding of the metal kineticules wiede is indisper	uation of state designing pre ar reactions of the use of radia cs, and the property and the note that the n	states of matter, ideal gases, and This concept is very useful for ssure-resistant vessels and high- radioactive materials and the tion and nuclear energy. Next, operty of chmical reaction using nanufacturers of chmicals c quantum mechanics for the	
Style c c c c c c c c c c c c c c c c c c c	onsist of (1 he textbook and videos w tudents won experience a organize the) a confirmation will be based will be incorpored will be incorpored alone or in the control of	on test, (2) explar on familiar phenc ated. (3) In the e aroups to solve ex	lations in the texthemena and concrelexercises, after concered to promote them. Each classes to them.	book, and (3) of te examples, a offirming how to e the retention	in advance. The class will mainly exercises. (2) The explanations in nd visual learning through slides a solve example problems, of knowledge and skills through wed using the LMS (manaba) to	
Notice S	Students are and exercise anless the st	e expected to r s. The content sudents actuall	make sure that the s covered in phys y tackle the exerc	eir knowledge and	not be expect	ly established through preparation ed to have any learning effect	
Characteristics of C	Class / Div	vision in Lea	arning				
☐ Active Learning		Aided by IC	Γ	☑ Applicable to F	Remote Class	☐ Instructor Professionally Experienced	
Course Plan	1						
	The	me		Go	oals		

		1st	States of matter (1) - Three states of matter and state change	Explains the mutual changes in the three states of matter.
		2nd	States of matter (2) - gases and liquids	Basic calculations using the equation of state for ideal gases, the van der Waals equation for real gases, and the Clausius-Clapeyron equation.
		3rd	States of matter (3) - solids and intermediate phases	Explains the crystal structure of solids and the characteristics of liquid crystals and soft viscous crystals as intermediate phases.
		4th	Ideal gas (1) - Properties of ideal gas	Understands the equation of state and be able to calculate temperature, pressure, and volume.
	1st Quarter	5th	Ideal gas (2) - Properties of mixed gases	Understands the partial and total pressures of a mixture of gases and be able to calculate the partial and total pressures of an ideal gas from its mole fraction and equation of state.
		6th	Ideal gas (3) - Theory of gas molecular kinetics	Calculates gas pressure from gas molecular kinetics and explains the relationship between temperature and molecular motion.
		7th	Ideal gas (4) - Molecular velocity distribution	Explains that the Maxwell-Boltzmann distribution represents the velocity distribution of molecules, and calculates the mean velocity and mean free path of molecules.
1st		8th	Exercises	Solves exercises on the content studied in weeks 1-7.
Semeste r		9th	Real gas (1) - Deviation from ideal gas	Explains why real gases deviate from the ideal gas law in terms of molecular size and intermolecular forces of attraction. Explains critical temperatures.
		10th	Real gas (2) - Equation of state	Calculates the p-Vm-T relationship for real gases using the van der Waals or virial equation of state.
		11th	Real gas (3) - Correspondence state principle	Obtains the p-Vm-T relationship for real gases using the generalized Z diagram based on the corresponding state principle.
	2nd Quarter	12th	Real gases (4) - Application to mixtures	Obtains the p-Vm-T relationship for real mixed gases using the van der Waals equation, the virial equation of state, and a generalized Z diagram.
		13th	Nuclear Reactions and Radiation (1) - Radiation and its Properties	Explains the types and properties of radiation.
		14th	Nuclear Reactions and Radiation (2) - Radioactive Material, Radioactivity, Radiation	Explains the difference between radioactive materials, radioactivity, and radiation, and solves various calculation problems related to radioactive decay.
		15th	Nuclear Reactions and Radiation (3) - Radiation and Nuclear Energy Applications	Explains how radiation and nuclear energy is used and calculate nuclear energy.
		16th	Exercise	Solves exercises on the content studied in weeks 9-15.
		1st	Chemical equilitrium (1)	1) Explains the law of mass action. 2) Explains Le Chatelier's principle. 3) Describes the direction of equilibrium shift when concentration, pressure, and temperature change in equilibrium.
		2nd	Chemical equilitrium (2)	Explains concentration and pressure equilibrium constants. Describes the pressure equilibrium constant in terms of Gibbs energy. Calculates equilibrium composition (partial pressure) using equilibrium constants.
2nd Semeste	3rd Quarter	3rd	Chemical equilitrium (3)	1) Explains the effect of pressure on chemical equilibrium in terms of pressure equilibrium constants. 2) Explains the effect of temperature on chemical equilibrium using the pressure equilibrium constant. 3) Calculates pressure equilibrium constants at different temperatures using the van't Hoff's equation.
r	Quarter	4th	Chemical equilitrium (4)	1) Describes equilibrium constants for heterogeneous reactions. 2) Describes the temperature dependence of the dissociation pressure. 3) Solves problems involving chemical equilibria of reactions involving solid phases.
		5th	Chemical kinetics (1)	1) Describes and calculates reaction rates in terms of concentrations. 2) Describes reaction rate equations and explain reaction orders. 3) Explains how to determine reaction orders experimentally.
		6th	Chemical kinetics (2)	1) Calculates rate equations for first-order reactions. 2) Calculates rate equations for second-order reactions (unimolecular and bimolecular reactions). 3) Calculates half-lives of reactions.

	7th	Exercise		Solves exercises on the 1-6.	e content studied in weeks		
	8th	Midterm exam.					
	9th	Property of chemical r	reaction (1)	Formulates rate equivalent reactions and solve properties (2) Formulates rate equivalent reactions (2) Formulates (2) Formulat	uations for consecutive oblems. uations for reversible oblems.		
	10th	Property of chemical r	reaction (2)	steps. 2) Derives rate equation	ncluding a rate-limiting		
	11th	Property of chemical r	reaction (3)	activation energy and 2) Determines the acti Arrhenius equation. 3) Describes a catalyst	vation energy using the		
4th Quarter	12th	Basic quantum mecha	anics (1)	 Describes the background of the birth of quantum theory. Describes the blackbody radiation distribution and the quantum energy hypothesis. Describes the photoelectric effect and the quantum photon hypothesis. 			
	13th	Basic quantum mecha	anics (2)	 Describes the photoelectric effect and the light quantum hypothesis. Describes the line spectrum of hydrogen atoms. Describes Bohr's atomic model. 			
	14th	Basic quantum mecha	anics (3)	 Describes Bohr's quantum condition and frequency condition. Describes the uncertainty principle. Describes the outline of Schrödinger's equation. 			
	15th	Basic quantum mecha	anics (4)	Derives the time-independent Schrödinger equation. Describes the meaning and properties of wave functions. Solves the Schrödinger equation for a particle in a one-dimensional box.			
	16th Ex			Solves exercises on the 9-15.	e content studied in weeks		
Evaluation Meth	od and	Weight (%)		•			
		amination	Portfolio	Homework	Total		
Subtotal	70)	5	25	100		
Basic Proficiency	30		5	10	45		
Specialized Proficien	cy 40)	0	15	55		
Cross Area Proficiency 0			0	0	0		

,	Anan Co	llege		Year	2024		Course Chemical Enginee		Engineering 1	
Course	Informa	tion					•			
Course Co	ode	1413E0	3			Course Categor	γ	Specialize	ed / Compul	sory
Class For	mat	Lecture				Credits		School Credit: 1		
Departme	ent	Course	of Chem	nical Engine	eering	Student Grade		3rd		
Term		Second	Semeste	er		Classes per We	ek	後期:2		
Textbook Teaching		ベーシッ	ク化学エ	[学(化学同	人)橋本健治著					
Instructo	r	Ueda Ko	ohei							
Course	Objectiv	es								
2. Unders	stand fluid stand the b	dynamics basic princi	and app ples of c	ly it to the distillation a	design of fluid tra and apply them to	ansport devices. the design of d	istillati	on towers		
Rubric						T			1	
				l Level		Standard Level			Minimum	Level
Achievem	nent 1		appl	erstand flui y it to the o sport devic	d dynamics and design of fluid es.	Understand flui solve basic prol		amics and	Understar fundamen	nding the tals of fluid dynamics
Achievem	nent 2		of di	stillation ar	basic principles apply them to istillation towers.	Understand the of distillation ar			Understar of distillat	nd the basic principles
		tment O	'		Sanddon towers.	ТЫОМСШЭ			1	
	到達度目標 - Matha	-								
Outline	ng Metho	Chemic:	al engine	eering is a oduces the	field of engineering unit operations of the decrease of the de	ng that deals with	h the o	operation a	and design o	of chemical plants. rnamics, material um.
Style		Assignm	nents wi	II be given		The assignments	s will h	elp you re	view and pr	epare for the lecture.
Notice		_			please ask them ted during the ex					
Charact	eristics	of Class	/ Divisi	ion in Lea	arning					
□ Active	Learning		□ A	Aided by IC	Т	☐ Applicable to	o Rem	ote Class	☐ Instruction	ctor Professionally ed
Course	Plan									
			Theme				Goals			
		1st	Fluid transfer principles and equipm			nent	Understand fluid properties and the structure of pumps.			and the structure of
		2nd	Equation	on of contin	nuity		Apply the equation of continuity.			
		3rd	Bernou	ılli's princip	le		Apply	Bernoulli's	principle.	
	3rd Quarter	4th	Viscosit	ty			Under	stand fluic	viscosity.	
	Quarter	5th	Reynol	ds number			Calcul	ate the Re	ynolds num	ber.
		6th	Friction	losses in p	pipe flow		Deterr	mine the f	riction losses	s in the pipe flow.
ı		7th	Power	requiremer	nts for fluid transp	oort.	Deterr	mine powe	r requireme	ents for fluid transport.
		8th	Midterr	m examinat	tion					
2nd Semeste		9th			les and equipmer	nt	Under equipr		structure of	distillation
r		10th	•	liquid equil			x-y dia	agram		
		11th		liquid equil	ibrium 2			ne equation		
	4th	12th		distillation uous distilla	stion 1					e distillation. ate number of a
	Quarter	13th					Determine the theoretical plate number of a distillation tower using the McCabe-Thiele method. Understand the principle of theoretical plate			
		14th		uous distilla			numb Under	er determi stand the	nation. principle of	theoretical plate
		15th		uous distilla			numb	er determi	nation.	•
		16th		xamination						
Evaluat	ion Meth	<u>od and \</u>	<i>N</i> eight	-				1		
		Examina	ation	Quiz	2	Portfolios		Other		Total
Subtotal		70		10		20		0		100
Basic Prof		0		0		0		0		0
Specialize Proficienc	СУ	70		10		20		0		100
Cross Area Proficiency 0 0 0 0				lo						

	Anan Co	llege	Year	2024		Course Title	Biology	
Course	Informa	tion				1		
Course C	ode	1413G01			Course Categor	y Specializ	ed / Compulsory	
Class For	mat	Lecture			Credits	School C	redit: 2	
Departme	ent	Course of C	Chemical Engin	eering	Student Grade	3rd		
Term		Year-round			Classes per Wee	ek 前期:2 後	期:2	
	Matérials		•	nima et al., Tokyo	shoseki			
Instructo		- '	no,Otani Takas	:nı				
1. to be a 2. can ex 3. to be a	plain the sable to exp	lain the origin structure and following the	unction of cells ure and functio	evolution of orga and proteins, and on of genes and th c information and	d their metabolisı ne central dogma	m		
Rubric								
		-	Ideal Level		Standard Level		minimum Level	
Achieven	nent 1		Can explain in of life and the organisms	detail the origin evolution of	Can explain the the evolution of		d Can understand the origin of life and the evolution of organisms	
Achieven	nent 2		can explain in structure and f and proteins, a metabolism	unction of cells	can explain the function of cells and their metab	and proteins,	can understand the structure and function of cells and proteins, and their metabolism	
Achieven	nent 3		the structure a	explain in detail and function of central dogma	to be able to ex structure and fu and the central	inction of genes	to be able to understand the structure and function of genes and the central dogma	
Achieven	nent 5		the expression	explain in detail of genetic d development	to be able to exercise to be able to expression of goinformation and	enetic	to be able to understand the expression of genetic information and development	
Assigne	ed Depar	tment Obje	ctives			<u> </u>		
学習・教育	育到達度目標	票 A-3 学習・教	育到達度目標 D	-1 学習・教育到達	度目標 D-4			
Teachir	ng Metho	od						
Outline Style		Based on "I phenomena their under	Basic Biology" a, and develops standing of the	s students' abilitie basic concepts a	r, this course dea s and attitudes to nd principles of b	ils with a wider oward biological iology and acqu	range of organisms and biological inquiry. Students will deepen ire a scientific view of nature. inking and judgment skills through	
Notice		exercises.						
Charact	teristics	of Class / D	ivision in Le	arning				
	e Learning	•	☐ Aided by IC	<u> </u>	☐ Applicable to	Remote Class	☐ Instructor Professionally Experienced	
	D.							
Course	Plan	<u> </u>						
			eme	I Frankrika		Goals		
			igin of Life, Cel			Can explain the origin of life and cell evolution Can xplain the sexual reproduction and meiosis		
			netic Mechanis	ion and meiosis			genetic Mechanisms	
			olutionary Mec				evolutionary mechanisms	
		Ctr		nction of cells, bior			splain the structure and function of	
	1st	an	d eukaryotic ce	ells	,	cells, biomembr	anes, and eukaryotic cells	
	Quarter		otein structure, gulation	, enzymes and rea		reaction regulat		
		7th Ass	similation and mentation and	catabolism, respir glycolysis	ation,	To be able to explain the assimilation and catabolism, respiration, fermentation and glycolysis		
1st Semeste			otosynthesis, c similation	chemosynthesis, n	itrogen	To be able to exchemosynthesis	plain the Photosynthesis, , nitrogen assimilation	
r		+	dterm examina	ation				
		10th Ge	ne structure a	ene structure and replication, central dogma			splain the gene structure and	
			ranscription and translation, changes in genetic			replication, central dogma To be able to explain the transcription and translation, changes in genetic information		
			anscription and ormation	·	iges in genetic	To be able to ex	plain the transcription and	
	2nd Quarter	infe	ormation		iges in genetic	To be able to extranslation, cha	plain the transcription and	
	2nd Quarter	info 12th De	ormation	translation, chan	iges in genetic	To be able to extranslation, cha Can explain the Can explain the	plain the transcription and nges in genetic information development and gene expression Animal Development	
		info 12th De 13th An	ormation velopment and imal Developm	translation, chan	iges in genetic	To be able to extranslation, cha Can explain the Can explain the	plain the transcription and nges in genetic information development and gene expression	
		12th De 13th An 14th Em 15th ge	ormation velopment and imal Developm	l translation, chan d gene expression nent nd gene expression	ges in genetic	To be able to extranslation, chat Can explain the Can explain the Can explain the Can explain the expression	plain the transcription and nges in genetic information development and gene expression Animal Development	

		1st						
		2nd						
		3rd						
	3rd	4th						
	Quarte	r 5th						
		6th						
		7th						
2nd		8th						
Semeste		9th						
		10th						
		11th						
	4th	12th						
	Quarte	r 13th						
		14th						
		15th						
		16th						
Evaluat	ion Me	thod and V	Veight (%)					
	Examination		quiz	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal		70	30	0	0	0	0	100
Basic Proficienc	У	70	30	0	0	0	0	100
Specialize Proficienc)	0	0	0	0	0	0
Cross Are Proficienc	ea Cy)	0	0	0	0	0	0

A	Anan Co	llege	Year	2024		Cours	se E	Experiments in Materials Chemistry and Exercises 1	
Course	Informa	tion		<u> </u>		Title		chemistry and Exercises 1	
Course Co		1413T05			Course Categor	y Spec	ialized	d / Compulsory	
Class Forr	mat	実験・演習	}		Credits	Scho	School Credit: 2		
Departme	ent	Course of	Course of Chemical Engineering Student Gra			3rd			
Term		First Seme	ester		Classes per Wee	eek 前期:4			
Textbook Teaching		An origina	ıl textbook publi	shed by the chemi	istry course				
Instructor	r	Ueda Koh	ei,Konishi Tomo	ya,Nakamura Atsı	ınobu,Zheng Tao	Ezure Ryo	suke		
Master ba chemical l Be able to	kinetics. o collabora	mental techn	rs in the team to	conduct experim	ents and organize	e data		gases, chemical equilibrium, and the content of process design.	
, tabile			Ideal Level		Standard Level			Minimum Level	
Achievem	ent 1		Be able to solv problems relat experimental t	ed to each	Be able to solve related to each theme.			To be able to explain basic knowledge of each experimental theme.	
Achievem	ent 2		To be able to s problem as we when writing a	set up an original ell as a question a report, and to sider it logically.	To be able to co questions logica a report.		riting	To be able to write a logical discussion in a report.	
Achievem	ent 3		Write easy-to- using figures, schematic diag	tables, and	To be able to we texts according format.			To be able to write scientific texts.	
Achievem	ent 4		Recognize thei	r role in a team endently.	Communicate a within a team.	nd coopera	te	To be able to work in a team and conduct experiments.	
Assigne	d Depar	tment Obj	ectives						
学習・教育	到達度目標	票 B-4 学習・	教育到達度目標 D)-2 学習・教育到達原	度目標 D-4				
Teachin	g Metho								
Style Notice		addition, udiffraction logical scient The cours Bring a will In principle on circum Reports will due date, If there is	understand strue. It also enhancentific reports. e combines exphite lab coat, sae, all experimer stances, such arith less than the points will be desomething you	es the development of the develo	n of molecules and of students' abcises. Lectures we have shown a lab not to be grade a. nay be resubmitted, you should stu-	nd crystals oility to expl rill also be g otebook, an d. Experime ed or reject	using lain ch given o ad a so ent to	in, and chemical kinetics. In infrared spectroscopy and X-ray nemical knowledge and write on some experimental topics. Cientific calculator. pics may be changed depending a report is not submitted by the boks or specialized books	
			•	fore experimenting	j.				
Charact	eristics (of Class / I	<u> Division in Le</u>	arning	1			1	
□ Active	Learning		☐ Aided by IC	CT	☐ Applicable to	Remote C	lass	☐ Instructor Professionally Experienced	
Course	Plan								
		Т	heme			Goals			
		1st C	rientation and F	Review	li li	methods, a	nd ho	mental mindset, evaluation w to write experimental notes iew basic skills.	
		2nd Id	deal gas law			and reports. Review basic skills. Measure the pressure, volume, and temperature of gases and understand the ideal gas law.			
		3rd D	ata organization	n and statistics	(calculate va	arious	tained from experiments and basic statistics.	
	1st	4th C	orrelation coeffi	cient		for data wit	h erro		
1st Semeste	Quarter	5th H	leat of Reaction		1	the heat of	reacti	rimental method for measuring ion and obtain it experimentally.	
r		6th B	rownian motion			Understand observina tl	the p	properties of molecular motion by ownian motion of colloids.	
		7th R	eaction rate		1	Measure the	e deco	omposition rate of hydrogen determine the reaction rate and	
		8th V	iscosity Measure	ement	1	Explain the experimental method for determithe viscosity of EtOH aq. and obtain it experimentally.			
	ا مرا	9th m	nidterm exam						
	2nd Quarter	10th P	reparation of sil	ver samples		Prepare silver samples for using powder X-ray diffraction measurements.			

		Lecture: Infrared absorption spectrum measurement and analysis (1) Lecture: Powder X-ray diffraction measurement and analysis (1)			Explain the principle, measurement method, and analysis method of infrared absorption spectrum and powder X-ray diffraction measurements.		
12th I			Powder X-ray diffraction measurem analysis (2)	nent and	Determine lattice constants and crystal structures of Ag and AgCl by using the powder X-ray diffraction.		
			Infrared absorption spectrum meas analysis (2)	surement and		teratomic bond distances of HCl om its rotational level energies e infrared absorption spectrum.	
		14th Electromotive Force Measurement			Measure the electromotive force of a Daniel battery and a concentration cell, and explain the composition and mechanism of the battery.		
		15th	Freezing point depression		Measure freezing point depressions and estimate the molecular weight of the solute.		
		16th	final exam				
Evaluation	on Meth	od and V	Veight (%)				
			Experiment report	Other		Total	
Subtotal			60	40		100	
Basic Profi	ciency		20	10		30	
Specialized	d Proficien	СУ	40 20			60	
Cross Area	Proficien	су	0	10		10	

Anan College				Year 2024				Course Title	Experiments in Materials Chemistry and Exercises 2	
Course	Informa	tion	ı		1		ı			
Course Co		1413T06	6			Course Catego	ry	Specializ	ed / Compulsory	
Class For	Class Format 実験・演習				Credits	School Cre		redit: 2		
Department Course of			of Ch	emical Engin	Student Grade 3rd		3rd			
Term Second Se			Seme	ester	Classes per Week 後期:4		後期:4			
Textbook Teaching	and/or Materials	Text prir	ntout	outs to be distributed						
Instructo	uctor Ezure Ryosuke,Zheng Tao,Ueda Kohei,Ota Naotomo,Otani Takashi									
Course Objectives										
physical of To be abl master the To be abl them. To maste Extract, so Observe in Be able to To acquire	chemistry. Ie to explai neir operati le to explai er the basic separate, a issues in bi o collabora e the abilit	n the princion. n the princions operations nd analyze odiversity te with oth y to apply	iples iples for biolo conse	of fluid flow of gas-liquid culturing mic ogical materia ervation and n the team to	and heat transfer separation (distill roorganisms. als understand the cu conduct experime ability to plan, or	from the viewpo ation), drying, a irrent situation ents and organi	pint of idsorpt	mass bala tion, and p	which are the foundation of since and energy balance, and to sowder, and to be able to operate on the content of process design.	
Rubric		•		•	•					
- Tabile			Id	deal Level	Standard Level			Unacceptable Level		
Achievement 1			В	Be able to solve applied problems related to each		Be able to solve basic problems related to each experimental		problems	<u>'</u>	
Achievement 2			To pr	experimental topic. To be able to set up an original problem as well as a question when writing a report, and to be able to consider it logically.		To be able to consider the questions logically when writing a report.			To be able to write a logical discussion in a report.	
Achievement 3			W	Write easy-to-read reports using figures, tables, and schematic diagrams.		To be able to write scientific texts according to the report format.			To be able to write scientific texts.	
Achievement 4			Re	ecognize theind act indepe	Communicate and cooperate within a team.		operate	To be able to work in a team and conduct experiments.		
	育到達度目標 ng Metho	Chemica Knowled	al Eng	到達度目標 D gineering Lab f chemical en	oratory] gineering must be	e applied to orig	inality	and applie	ed aspects, and experiments and	
Outline		configura comparing Biotechn In the find acquain the se endange	practical training are essential for learning. Students will directly touch the equipment to understand the configuration and operation of the equipment, as well as to understand the theory and calculation formulas by comparing them with the experimental data. Biotechnology Experiments In the first half of the course, students learn the experimental methods that form the basis of biotechnology and acquire knowledge of microbiology and biochemistry through experiments. In the second half, students will observe, record, and discuss issues in biodiversity conservation (increase in endangered species due to development) in the field, and understand the current situation toward biodiversity conservation.							
Style Style ex		Students learn ho substand experima principle in equipu Biotechn	Chemical Engineering Experiment] Students learn how to take data and analyze data by operating experimental apparatuses for each theme, learn how to engineer the phenomena occurring in the apparatuses, and gain a deep understanding of the substances, momentum, energy balance, and principles used in the analysis through experiments. Through experiments, students will gain a deep understanding of the material, momentum, energy balance, and principles used in the analysis. In addition, students will learn practical techniques through hands-on training in equipment operation and piping. Biotechnology Experiments Experiments and Lectures							
Remember to bring a lab coat, safety glasses, jacket, lab notebook, and a function calculator. If there is anything in the text that you do not understand, it is recommended that you look up or a specialized book in the library. In principle, all experiments must be performed. The experimental topics may be changed deposituation, such as equipment failure. Chemical Engineering Experiments The course builds on the content acquired in "Fundamentals of Chemical Engineering" and "Chemical Engineering 1. It is desirable to have a good understanding of mathematics, physics, physical chemical engineering.							ed that you look up the textbook ay be changed depending on the gineering" and "Chemical			
Charact	teristics o	_		ision in Le	arning					
	Learning			☐ Aided by ICT ☐ Applicable t			to Rem	o Remote Class Instructor Professionally Experienced		
Course	Plan									
			Theme				Goals			
2nd Semeste r	3rd Quarter	1st		Orientation】 【Orientation			Able to prepare equipment for biotechnology experiments, including sterilization and aseptic manipulation.			
		2nd	d Sterilization and aseptic manipulation				Can culture microorganisms.			
	l .		انتات	nermzation anu aseptic mampuiduon				Tean culture microorganisms.		

		3rd	Biotechnology Exp Microorganisms	eriment] Culture	of	To be able to obsoptical microscop	serve biological sa	amples using an	
		4th	Biotechnology Exp	eriments] Optica	l Microscopy				
		5th	Mid-term examina	tion		Understand how to evaluate, and notebooks and redistillation.	how to write lab	oratory	
		6th	Orientation to Che	emical Engineerin	g Experiments	Understand the principles of distillation and be able to perform calculations for data analysis. Understand the principles and laws of mass transfer in liquids and be able to calculate mass balance.			
		7th	Monodistiliation of water-methanol			Understand the poperation and be To be able to est content and limit	able to calculáte imate equilibrium	data analysis. n moisture	
		8th				Understand the poperation and be To be able to dra		data analysis.	
		9th	dsorption of Acetic Acid on Activated Carbon in iquid Phase (1)			To be able to ope calculate the ame	erate adsorption, ount of adsorptio		
		10th	Adsorption of Acet the Liquid Phase (ted Carbon in	To be able to dra able to calculate materials.	w adsorption iso specific surface a		
			Adsorption of Acet Liquid Phase (3)	dsorption of Acetic Acid by Activated Carbon in iquid Phase (3)			n frictional losses alculate friction co liagrams using flo		
	4th Quarter	12th	Chemical engineer distribution	ring experiment]	Particle size	Understand the principles and operation of the sieving method and be able to prepare a particle size distribution diagram.			
	C	13th	Chemical engineer column	ring experiment]	Distillation	Understand the principles of distillation columns and be able to perform data analysis calculations.			
		14th	Friction Loss of Ci	cular Tubes		To be able to explain how to measure various physical properties measured in a chemical plant, such as flow rate, velocity measurement, and temperature.			
		15th	Particle Size Distri Tubes	bution, Friction L	oss of Circular				
		16th	Return of final exa Examinations	minations】【Fi	nal				
Evaluati	on Met	hod and V	Weight (%)						
	E	kamination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total	
Subtotal	30)	60 0 0		0	10	100		
Basic Proficiency	, 30)	60	0	0	0	10	100	
Specialized Proficiency	d /		0 0		0	0	0		
Cross Area Proficiency			0	0	0	0	0	0	

A	Anan Co	llege	Year	2024		Course Title	Fundamental Physics 2
Course	Informa	tion		<u> </u>			·
Course Co	ode	1414301			Course Category	Speciali	zed / Compulsory
Class Forr	mat	Lecture			Credits	Academ	nic Credit: 2
Departme	ent		f Chemical Engir	neering	Student Grade	4th	
Term		Second S	emester		Classes per Wee	k 後期:2	
Textbook Teaching	Matérials		作成・配布資料				
Instructor		Yoshida 1	Takehito				
1. 熱力学 2. エント 3. ギブス 4. 古典料	トロピーと熱 く分布・マッ	2 法則を理解し 熱力学基本法則 クスウェルの	則を理解し、関連 D速度分布則・ボ	した問題を解析的手 ルツマンの原理・分	、定量的解を得るご 法で解き、定量的解 配関数の概念を理解 いて,定量的に導出	『を得ることが』 『し,定量的取り	できる。 0扱いができる. きる.
Rubric			理想的な到達し	·ベルの日室	標準的な到達レベ	川の日安	未到達レベルの目安
評価項目1			熱力学第1、第	32法則を理解し、 代数・解析的手法	無力学第1、第2 関連した問題を代で考察し、定性解	法則を理解し、 数・解析的手法	熱力学第1、第2法則を理解し、
評価項目2			理解し、関連し	熱力学基本法則を た問題を代数・解 、定量的解を得ら	エントロピーと熱 理解し、関連した 析的手法で考察し れる。	問題を代数・解	マ エントロピーと熱力学基本法則を 軍解し、関連した問題を代数・解
評価項目3			度分布則・ボル	マックスウェルの速 シツマンの原理・分 的定量活用ができ	ギブス分布・マッ 度分布則・ボルツ 配関数の定量解を る.	マンの原理・分	▼ ギブス分布・マックスウェルの速 ・ 度分布則・ボルツマンの原理・分
評価項目4			値(熱力学的諸	系の物理量の期待 量)を,統計的手 用的課題において できる	古典粒子系の物理 力学的諸量)を, いて,定量的に導	統計的手法を用	古典粒子系の物理量の期待値(熱力学的諸量)を,統計的手法を用いて,概略的定量解を得ることができる.
Assigne	d Depar	tment Ob	jectives				
学習・教育	到達度目標	票 B-3					
Teachin	g Metho	od					
Outline		解の端緒と 解決能力を を学ぶ.こ	となる統計力学のを養い、工学分野。 この科目は企業で、	初歩について、一貫 への応用能力を身に 、半導体集積素子の	した論理体系として つける。工学応用で	把握させる。 重要となる物質 スの研究・開発	らよびミクロスコピックな自然現象理 演習問題を多く取り入れることで問題 質の性質を数理科学的に理解すること をを担当していた教員が、その経験を 5のである。
Style		入れる. 🖺	学生への発問はす <i>。</i> 約60問)の課題は	るので(3-5回/1コ゛	マ),積極的に答え	ること。指名さ	るが,関連資料のスライド紹介も取り されない学生も積極的に考えること。計 では自学自習課題の解法をスライドを
Notice		内容をして に自学自習 分で調べる	っかり復習してお 習課題の解説を十分 きえてみて、何が	くこと。また授業各 分に行うことは不可 理解できなかったの	回毎に出された課題	の実施を含む あれば質問に来 から質問に来る	を前提として活用するので、これらの 自学自習が不可欠である。授業時間内 kること。質問にあたっては、先ず自 ること。
Charact	eristics	•	Division in Le				
☐ Active			☐ Aided by I		☐ Applicable to	Remote Class	☑ Instructor Professionally Experienced
Course	Plan						
			Гһете		G	Goals	
		1	1. 熱力学の基礎				念を理解し定性的説明と計算ができる
					李	热力学第1法則	に関する問題を代数もしくは解析的手
			1. 熱力子の基礎 L. 熱力学の基礎		李		に関する問題を代数もしくは解析的手
			L. 熱力学の基礎 L. 熱力学の基礎				関する問題を代数もしくは解析的手法
2nd	3rd Quarter		L. 熱力学の応用		7		・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
Semeste r			L. 熱力学の応用		7	F法で計算でき F可逆過程を含 F法で計算でき	
		7th 1	1. 熱力学の応用		_ 具	一般の熱機関の	効率・クラペイロン-クラウジウスの法 ができ熱力学的問題に適用し代数・解
		8th ^r	 中間試験			<u> 所的解を得るこ</u>	とかじさる
	4th		+回試験 2. 統計力学の基本				

		10th	2. 統計力学の基	———— 本				理解し定性的に説明 対意味を説明でき	
			- /					<u> 対息味を説明できん</u> 東度分布則を導出し	
		11th	2. 統計力学の基	本			量を計算でき		0)) 1 <u>2</u> 2/2/(C)()
		12th	2. 統計力学の基	本				と分配関数の物理的	的意味を理解し説
		13th	2. 統計力学の基	本			関数と自由エス 説明できる	ネルギーの関係を	算出できてその意
		14th	3.統計力学の応用	Ħ		相互 理	作用のない粒 ⁻ 想気体の状態	子系の物理量期待(方程式を理論的に	値を計算できる 導出できる
		15th	3.統計力学の応原	Ħ		固体 ロン)) する	における原子 ・プティ(古! を導出でき, [ことができる	間相互作用のない! 典),アインシュク 固体の比熱を温度の	比熱モデル(デュ タイン(量子 の関数として導出
		16th	期末試験答案返去	即及び解説					
Evaluation	on Me	thod and	Weight (%)						
		式験	発表	相互評価	態度	ポ-	-トフォリオ	自学自習課題	Total
Subtotal	6	50	0	0	0	0		40	100
基礎的能力	2	20	0	0	0	0		10	30
専門的能力	3	30	0	0	0	0		20	50
分野横断的	能力	10	0	0	0	0		10	20

A	Anan Co	llege	Year	2024			Course Title	Organic Chemistry 2	
Course	Informa	tion		•		•			
Course Co	ode	1414A10			Course Categor	У	Specializ	zed / Compulsory	
Class Forr	mat	Lecture			Credits		Academ	ic Credit: 2	
Departme	ent	Course of	Chemical Engin	neering	Student Grade		4th		
Term		First Sem	ester		Classes per We	/eek 前期:2			
Textbook Teaching	Matérials			IC CHEMISTRY sev	enth edition				
Instructor		Sugiyama	Yuuki						
1. The stu 2. The stu 3. The stu	udent will udent will	name alcoho	general propert nmon reactions	oxylic acids, carbox ies, synthetic meth and products of ca	nods, and reaction	ons of	alcohols a	, and ketones and ethers erivatives, aldehydes, and ketones	
Rubric			1		I			T	
			Ideal Level		Standard Level			Minimum Level	
Objective	ojective 1		Write the nom alcohols, ethe acids, carboxy derivatives, alketones.	rs, carboxylic ·lic acid	Write about 70 nomenclature cethers, carboxylic acid aldehydes, and	of alco lic aci deriva	hols, ds, atives,	Write about 50% of the nomenclature of alcohols, ethers, carboxylic acids, carboxylic acid derivatives, aldehydes, and ketones.	
Objective	2		properties, syl	scribe the general nthetic methods, of alcohols and an synthetic	Accurately desc properties, synt and reactions o ethers.	thetic	methods,		
Objective	3		reactions and carboxylic aciderivatives, alketones, as widifferences in	ds, carboxylic acid dehydes, and	reactions and p carboxylic acids derivatives, ald ketones, as wel	urately describe the general citions and products of poxylic acids, carboxylic acid vatives, aldehydes, and ones, as well as the		and products of carboxylic d acids, carboxylic acid derivatives, aldehydes, and ketones, as well as the	
Assigne	d Depar	tment Obj	jectives						
学習・教育	到達度目標	票 D-1							
Teachin	g Metho	d							
Outline		group" ba	ased on the sam	earn about reaction e concept as orgar ntage of the charac	iic chemistry (3r	d yea	r). Studer	aracteristic of each "functional nts also learn about organic	
Style		phenome	re will follow aln na can be logica of compounds.	nost the order of that ally explained based	ne lesson plan. T d on electronega	he co tivity,	urse will e resonanc	emphasize that chemical se, and the three-dimensional	
Notice		Organic c	hemistry is a dis year is essential	scipline in which ac for this lecture. St	cumulation is sigudents are requ	gnifica ired to	int, and k	nowledge of organic chemistry in and study the material.	
Charact	eristics	of Class /	Division in Le	earning					
□ Active	Learning		☑ Aided by IO	СТ	☑ Applicable to	Rem	ote Class	☐ Instructor Professionally Experienced	
Course	Dlan								
Cour SE	i iuii	Т	heme		T	Goals			
		1ct C	Chapter 7: Subst	titution and Elimina	ation Reactions			2 reaction.	
		2nd C	of Alkyl Halides 1 Chapter 7: Subst of Alkyl Halides 2	titution and Elimina	tion Deactions			1 reaction.	
		24	,	titution and Elimina	ation Reactions	Expla	in the E1	and E2 reaction	
	1st	4th		titution and Elimina			in the cor nation rea	npetition between substitution and ctions.	
	Quarter		Chapter 8: React Epoxides 1	tions of Alcohols, E	thers, and	Name Expla	alcohols in the alco	according to IUPAC rules. ohol substitution reactions.	
1st Semeste			Chapter 8: React Epoxides 2	tions of Alcohols, E	thers, and	Expla reacti	in the syr ons of alc	thesis, elimination, and oxidation ochols.	
•			Chapter 8: React Epoxides 3	tions of Alcohols, E	uicis, aliu	rules.		nd epoxides according to IUPAC er and epoxide reactions.	
		8th N	· ⁄lid-term examir	nation		er and epoxide reactions.			
	2nd	Oth F	Return and expla	anation of mid-tern conyl Compounds I	n examinations i-1	rules. Expla	•	es and ketones according to IUPAC ehyde and ketone structure and ties.	
	Quarter	10th C	Chapter 11: Carl	oonyl Compounds 1		Using of ald	reaction	mechanisms, explain the reaction nd ketones with hydrides, amines,	

	11th	Chapte	er 11: Carbonyl Co	mpounds I-3		Using reaction of aldehydes water, and a	on mechanisms, ex and ketones with alcohols.	plain the reaction hydrides, amines,	
	12th	Chapte	napter 11: Carbonyl Compounds I-4				Wittig reaction.		
	13th	Chapte	hapter 10: Carbonyl Compounds II-1			Name carbonyl compounds according to IUPAC rules. Explain the carbonyl compound structure and physical properties.			
	14th	Chapte	<u> </u>			Explain the I	reaction of carboxy	lic acid derivatives.	
	15th	Chapte	Chapter 10: Carbonyl Compounds II-3			Using reaction esterification	Using reaction mechanisms, explain acylation, esterification, and amidation reactions.		
	16th	Return	and explanation o	f final examination					
Evaluation Met	hod and	Weigh	t (%)						
	Examination	on	Quiz	Portfolio	Prese	entation and ude	Other	Total	
Subtotal	70		0	0	0		30	100	
Basic Proficiency	30		0	0	0		10	40	
Specialized Proficiency	40	0 0		0		20	60		
Cross Area Proficiency	0	0 0 0		0		0	0		

	Anan Co	llege	Year	2024			ourse Title	Advanced Organic Chemistry	
Course	Informa	tion						·	
Course Co	ode	1414A11			Course Categor	У	Specializ	ed / Compulsory	
Class For	mat	Lecture			Credits		Academ	ic Credit: 2	
Departme	ent	Course of	Chemical Engir	neering	Student Grade		4th		
Term		Second Se			Classes per Wee		後期:2		
	Materials	(Tokyo Ka	agaku Doujin)	em Collection (Shou	ukabo), Fundame	entals	of ORGAN	NIC CHEMISTRY seventh edition	
Instructo		Sugiyama	Yuuki						
1. The stu 2. The stu	udents will	determine discuss elec	trophilic additio	organic compound n and substitution n and substitution	reactions.				
Rubric									
			Ideal Level		Standard Level			Minimum Level	
Objective	bjective 1 composition prediction struct			termine organic tructure and wn compounds'	Accurately deter	rmine ucture	organic	Determine organic compounds' structure.	
Objective	2		Ireactions and	plain electrophilic substitution predict reaction nthetic methods.	Accurately expla addition and sul reactions.	ain ele bstitut	ctrophilic	Explain electrophilic addition and substitution reactions.	
Objective	3		Accurately desaddition and s	scribe nucleophilic	Accurately describe nucleopl addition and substitution reactions.		and substitution real		
Assigne	d Depar	tment Obj							
	ng Metho								
Outline	<u> </u>	The object	group, to be al	rse is to understand ole to predict react ermine structures.	d chemical pheno ion results and sy	mena ynthes	commor sis metho	n to each group of compounds by ds of organic compounds, and to	
Style		A self-stu	dv assignment v	will be given each	week. The assign	ments	will cons	sist of similar problems from that the next week's lesson.	
Notice						F F			
Charact	eristics	of Class /	Division in Le	earning					
□ Active	Learning		☐ Aided by I	СТ	☐ Applicable to	Rem	ote Class	☐ Instructor Professionally Experienced	
Course	Plan								
200.00		Т	heme		10	Goals			
				onyl Compounds 1			n keto-er	iol tautomerism.	
				onyl Compounds 1		Explai	n malonio	ester synthesis.	
				onyl Compounds I	111 2	Explai	n aldol re	actions and Claisen condensation mechanisms.	
		4th C	Chapter 13, Stru Compounds 1	cture Determination	on organic	Descri molec the da	ular form	spectrometry and determine the ula of an organic compound from	
	3rd Quarter	5th	Chapter 13, Stru Compounds 2	cture Determination	on of Organic	Explai group	n the IR a s of orga	and determine the functional nic compounds from the data.	
		6th A	lkanes			config		nenclature and stereo f alkanes. Explain the synthetic kanes.	
		7th A	lkenes			Explai alkene	n the rea	ction results and synthesis of ophilic addition reactions).	
2nd Semeste		8th N	1id-term exam						
Semeste r		9th A	alkynes			Explai alkyne	n the rea	ction results and synthesis of ophilic addition reactions).	
		10th A	romatic compo	unds		results	and syn	c compounds and explain reaction thetic methods.	
		11th A	romatic compo	unds		Explai	n electro	philic substitution reactions.	
		12th A	lkyl Halides					hilic substitution reactions.	
	4th Quarter	13th A	Alcohols and Eth	ers		alcoho	ls and et		
		14th C	Carbonyl Compo	unds 1	[ketone compo	es, etc.) a ounds.	ults of reactions (aldehydes and and synthetic methods of carbonyl	
		15th C	Carbonyl Compo	unds 2		deriva	n the res tives, etc nyl compo	ults of reactions (carboxylic acid .) and synthetic methods of ounds.	
		16th R	eturn of final ex	kam papers					

Evaluation Method and Weight (%)									
Examination Quiz Portfolio Presentation and Attitude Other Total									
Subtotal	60	0	0	0	40	100			
Basic Proficiency	40	0	0	0	20	60			
Specialized Proficiency	20	0	0	0	20	40			
Cross Area Proficiency	0	0	0	0	0	0			

	Anan Col	lege	Year	2024			Course Title	Inorganic Chemistry 2		
Course 1	Informat	tion						•		
Course Co	de	1414B10	0		Course Categor	ry	Specializ	ed / Compulsory		
Class Forn	nat	Lecture			Credits		Academ	ic Credit: 2		
Departme	nt	Course of	of Chemical Engir	neering	Student Grade		4th			
Term		First Ser	nester		Classes per We	eek	前期:2			
Textbook Teaching I		Inorgani	ic Chemistry: A M	1odern Approach	(Tokyo Kagaku	Doujir	n)			
Instructor		Zheng T	ao							
electrons a 2. to be al	erstand the and the pr ble to und	e periodicit operties of erstand the	f the elements.	omenclature of cor	•			nucleus and the state of the outer		
Rubric										
			Ideal Level		Standard Level			Unacceptable Level		
Achieveme	ent 1		Explain the proclassification of Explain all proclements and each block.	of elements.	end Explain the properties and ts. classification of elements. To be able to explain the properties of ds in elements and compounds of		Explain the properties and classification of elements. Briefly explain the properties of elements and compounds in each block.			
Achieveme	ent 2		definition of compounds, a structures. To		To be able to e definition and s coordination be coordination coable to explain complexes and structures.	structu onds ar ompour isome	re of nd nds. To bors rs of	To be able to explain the definition and structure of coordination bonds and coordination compounds. To be able to explain isomers of complexes.		
Achieveme	ent 3		valence bond field theory. T explain the re	lationship al field splitting,	To be able to e bond theory an theory. To be a the relationship field splitting, r color of comple	explain valence and crystal field able to explain p between crystal magnetism and exes.		nd crystal field able to explain between crystal magnetism and		To be able to explain about valence bond theory and crystal field theory. To be able to explain about the relationship between crystal field splitting, magnetism and color of complexes.
Achieveme			and reaction of be able to calc constants and	explain stability of complexes. To culate all stability concentrations.		explain stability f complexes. To complexel tability be abliconcentrations calculated tables and calculated tables are concentrations.		To be able to explain the stability and reactions of complexes in simple terms To be able to perform basic calculations related to stability constants and concentrations		
		tment Ob	ojectives							
	到達度目標									
Teaching	g Metho	d								
Outline		In the fil inorgani among h In the se	rst half of this lec c compounds cor nomologous elem econd half of the	nposed of them wil lents. lecture, the definiti	, synthesis, and I be explained, v ion and structur	physic while b e of co	cal proper being awa implexes,	round the nucleus. ties of major elements and re of similarities and differences valence bond theory, crystal field lor of complexes, will be explained		
		land dev	elopment related	ce This course is ta to inorganic mater panic chemistry in a	ials such as elec	ctrode	ers who h materials	nave been in charge of research in companies, and they use this		
Style		compou	nds of each famil	у.	•	•	•	operties of elements and mbers will answer questions.		
Notice		Reference Schreibe	ce books er Inorganic Chen	nistry (Upper and L			•			
<u>Characte</u>	eristics o	of Class /	Division in Le	earning	Т			1		
□ Active	Learning		☑ Aided by I	CT	☑ Applicable to	o Rem	ote Class	☐ Instructor Professionally Experienced		
Co	Dlass									
Course I	rian		7							
		1st	Theme Coordination con	mpounds (metal co lds. Structure of co	mplexes) and	coordi	ination bo			
1st Semeste	1st Quarter	2nd		of coordination com		1. Exp compo	olain the rounds.	nomenclature of complexes. ers of complexes and draw ures.		
'	-	3rd	Valence bond th complexes.	neory and magnetis	sm of	Explai	n valence	bond theory and use this theory nagnetism of complexes.		
		4th	Overview of cry	stal field theory.			n crystal	field theory and crystal field		

						1		
		5th	Crystal fields and	electronic states	of metal ions.	Explain crystal electronic state	field stabilizati es of metal ions	on energies and the s.
		6th	Electronic structu complexes	are and spectroso	copy of	 Explain d-d transitions, spectrochemical series, etc. Explain the relationship between energy ranking and the color of complexes. 		
		7th	Stability and reac	tion of complexe	s	Explain equilib complexes in a	rium and stabil queous solutio	lity constants of
		8th	Intermediate test					
	10th		Oxidation and red	uction reactions		Explain oxidati and reducing a equations.	on/reduction regents, and wri	eactions, oxidizing ite redox reaction
			Properties and cla Hydrogen, noble		ments.	elements.	roperties of h	classification of ydrogen and noble
		11th	Alkali metals and elements of group		etals. Boron and	Explain the pr alkaline earth i group 13 and s	operties of alka metals, boron a solve problems	and elements of
	2nd Quarte	r 12th	Carbon and eleme	ents of group 14.	. Nitrogen and	Explain and solve problems on the properties of carbon and elements of group 14, nitrogen and elements of group 15.		
		13th	Oxygen and halog	xygen and halogens.			perties of oxyglems.	gen and halogens
		14th	Zinc and group 12 actinide elements	2 elements. Rare earth and		Explain the properties of zinc and group 12 elements and solve problems. Can explain the properties of rare earth and actinide elements an solve problems.		
		15th	final exam					
		16th	Return of Final Ex	am Answer Shee	et			
Evaluati	on Me	thod and	Weight (%)					
	I	Examination	n Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal		70	0	0	0	0	30	100
Basic Proficiency			0	0	20	70		
Specialized Proficiency	ecialized officiency 20 0 0 0		0	0	10	30		
Cross Area Proficiency	ross Area		0	0	0	0	0	0

,	Anan Co	llege	Year	2024		Course Title	Advanced Inorganic Chemistry	
Course	Informa	tion				•	,	
Course Co	ode	1414B1	1		Course Category	Specializ	ed / Compulsory	
Class For	mat	Lecture			Credits	Academi	c Credit: 2	
Departme	ent	Course	of Chemical Engir	neering	Student Grade	4th		
Term		Second	Semester		Classes per Weel	k 後期:2		
Textbook Teaching	and/or Materials	(Tokyo I	Kagaku Doujin)	nemistry: From the	Basics to the Grad	duate School E	intrance Examination, 2nd Edition	
Instructo	r	Zheng T	ao					
Course	Objectiv	'es						
complexe The stude the state	es) and to ent should of the out	solve exerc be able to er electrons	ises. To achieve understand the part of the nucleus.	this goal, the follow periodicity of the el	ving elements will ements and be ab e able to understa	be accomplish le to understa	nic compounds, and metal led. nd the structure of the nucleus and n configuration of atoms. Students	
Rubric								
			Ideal Level		Standard Level		Minimum Level	
Objective	1		To be able to atomic structu	solve exercises on ure	Solve example po to atomic structu	roblems relate ıre.	Explain the structure of atoms.	
Objective	2		To be able to chemical bond	solve exercises on ding	To solve example related to chemic		Explain chemical bonding. Explain the structure of solids.	
Objective	: 3		To be able to the structure	solve exercises on of solids	Students will be example problem the structure of structu	ns related to	To be able to explain the structure of solids.	
Objective	: 4		acids and bas		related to acids a	e problems and bases	To explain about acids and bases	
Objective	: 5		To be able to complexes	solve exercises on	To solve example related to comple		Explain complexes.	
Assigne	ed Depar	tment Ol	ojectives					
Teachin	ng Metho	od						
Style		research their exp After lec A self-st week, a	perience. ctures on each ur cudy assignment s well as confirm s should review "	nd development of inorganic materials such as électrode materials at companies, making use of lence. es on each unit, problems will be explained. assignment will be given each week. The assignments will consist of similar problems from the ell as confirmation of the basic points covered in preparation for the next week's lesson. nould review "Inorganic Chemistry 1" taken in the third year and "Inorganic Chemistry 2" taken				
Notice		Referen	ce books	emistry (upper and	l lower), Tokyo Ka	gaku Doujin		
Charact	eristics	of Class /	[/] Division in L	earning				
□ Active	Learning		☑ Aided by I	СТ	☑ Applicable to	Remote Class	☑ Instructor Professionally Experienced	
Course	Plan							
Course	1011		Theme		ام	Goals		
		1st	Molecular Symr	netry	E		try operations and symmetry	
		2nd	Molecular Point	Groups			oups of molecules.	
		3rd	Atomic Structure	•	D		e of atomic orbitals. Organic	
		4th	Structure of Ato	ms (2)	2	. Explain the e . Explain shield uclear charge.	lectronic configuration of atoms ding and penetration and effective	
2nd 3rd 5 Semeste Quarter	5th	Chemical Bondir	ng (1)	si 2 b	tructures Explain the by VSEPR theor	is structures and resonance approximate shape of a molecule y. polarity of a molecule.		
		6th	Chemical Bondir	ng (2)	le 2 n	engths Explain the nolecular geon	ratomic potentials and bond types of hybridized orbitals and netry ridized orbitals in molecules	
		7th	Chemical Bondir		1 0	. Explain the	energy level diagram of molecular electron configuration of molecular	

		8th	Mid-te	rm exam						
		9th	Struct	cure of Solids (1)			1. Explain th 2. Explain d space-filling	ne crystal lattice ensity, coordinatio ratio from crystal s	n number, and structure	
		10th	Structi	ure of Solids (2)			 Explain madelung constant and lattice energy Explain the Born-Haber cycle 			
		11th	Acids	and Bases			I. Identify acids and bases in reaction equations. Explain the strength of acids and bases and the HSAB law.			
	Quarter		Redox	(1. Write read reduction rea	ction equations for actions.	oxidation-	
			Comple	ex Chemistry (1)			lisomersof co	e structure of com mplexes e crystal field theo	'	
		14th	Chemis	stry of Complexes	plexes (2)		2. Explain th	 Explain the spectrochemical series Explain the low-spin and high-spin complexes Explain the Jahn-Teller effect 		
		15th	Eleme	ents				Explain the properties and reactions of elements and compounds of each group		
		16th	Return	of final exam pape	ers					
Evaluati	ion Met	hod and	Weigh ⁻	t (%)						
		Examination	on	Quiz	Portfolio	Prese Attitu	entation and ude	Other	Total	
Subtotal		60		0	0	0		40	100	
Basic Prof	asic Proficiency 40			0	0	0		20	60	
Specialize Proficienc				0	0	0		20	40	
Cross Are Proficienc		0		0	0	0		0	0	

,	Anan Co	llege	Year	2024		Course Title	Physical Chemistry 2
Course	Informa	tion	•				
Course Co		1414D0	4		Course Categor	y Special	ized / Compulsory
Class Forr	mat	Lecture			Credits	′ 	nic Credit: 2
Departme	ent	Course of	of Chemical Engir	neering	Student Grade	4th	
Term		First Ser		<u>_</u>	Classes per We	ek 前期:2	
Textbook Teaching		教科書:	福地賢治編 Profes	ssinal Egineering L	ibrary 「物理化学」		
Instructor	-	Yoshida	Takehito				
1. 熱力学 用として、 2. 熱力学 ーとヘル <i>ム</i> 3. 相平復	標準反応熱 対第2法則、 スホルツエネ	また熱力学第 外及び任意温 エントロピ・ スルギーを用	度の反応熱を求め - 、熱力学基本法則 いて、状態変化の	ることができる。	エントロピー増大 <i>0</i> 現できる。	O方向に状態変ん	を得ることができる。また化学への応 とすることを理解する。ギブスエネルギ ることができる。
Rubric					_		
評価項目1			則を理解し、関題を解析的手法を得ることがでいる。 一般を解析的手法を得ることがでいる。 一般を表現して、 一般を表現して、 一般を表現して、 一般を表現し、関係を表現し、関係を表現し、関係を表現し、関係を表現し、関係を表現して、	ベルの目安 なと熱力学第1法 関連した熱力学的問題で解き、定量的解で解き、また場所を で解き、また場所を で構造反応熱及びで 様で求めることができない。	標準的な到達レイ 熱力学の基礎概念 理解析的手法できる。 所ととして、標を考慮 度の反応熱科書して、 、 、 、 、 、 、 、 、 、 、 、 、 、 、 、 、 、 、	念と熱力学第18 た熱力学的問題を き、定量的解を行 また化学への原 反応熱及び任意 かることができ	を 理解し、関連した熱力学的問題を 解析的手法で解き、定量的解を得 ることが一部できる。また化学へ 品 の応用として、標準反応執及び任
評価項目2			カ学基本法則か ントロピー増大 することを理解 ルギーとヘルム を用いて、状態	、エントロピー、 から、断熱系ではエ の方向に状態変化 はする。ギブスエネ ボルツエネルギー 気化の方向と平衡 である。(参考書レベ	熱力学第2法則、 力学基本法則から ントロピー増大の することを理解する ルギーと、状態を 条件を表現できる レベル)	ら、断熱系ではこの方向に状態変化する。ギブスエネトルツエネルギ・ で化の方向と平径	エ 1. 然ガチネ2次別、エントロビー、 教力学基本法則から、断熱系では エントロピー増大の方向に状態変 化することを一部理解できる。ギ ブスエネルギーとヘルムホルツエ
ル)				を 相平側と溶液に熱力子的子法を取り入れることで、これらの性質を 解析的手法で道き 定量的解を得			
Assigne	d Depar	tment Ob	jectives				
	到達度目標		-				
	g Metho						
Outline		本講義はた理論体を学ぶ。企業で、について	系として把握する。 演習問題を多く取 半導体集積素子の 講義形式で授業を は授業計画を参照	。次に化学への重要 り入れることで問題 設計及び製造プロセ 行うものである。 すること。基本的に	な応用として、相望解決能力を養い、成果の研究・開発を持た。 大の研究・開発を持ている。 講義形式をとる。	平衡と溶液を熱 応用化学分野へ 担当していた教 ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・	ついて、数学的手段を強化して一貫し 力学の観点から数理的に理解すること の適応能力を身につける。この科目は 員が、その経験を活かし、化学熱力学
Style		人/にる。 15回(計	学生への発問はす <i>。</i> 約60問)の課題は	るので(3-5回/1コ は、自主的に考えて飼	イ),積極的に合え 解き問題解法の力を	てること。指名で 養うこと。	されない学生も積極的に考えること。計
Notice		3年生まった授業各とは不可かったのシラバス	での数学・物理・化 回毎に出された課 能なので、疑問点 かをはっきりさせ 指定参考書:千原	と学系科目の知識を 題の実施を含む自学 があれば質問に来る てから質問に来るご ・稲葉訳 「アトキ	前提として活用する 自習が不可欠である。こと、質問にあた。	るので、これらの る。授業時間内 っては、先ず自	D内容をしっかり復習しておくこと。ま に自学自習課題の解説を十分に行う <i>こ</i> 分で調べ考えてみて、何が理解できな ローチ-(下)」 第2版 東京化学同人
<u>Charact</u>	eristics (of Class /	Division in Le	earning	T		
☐ Active	Learning		☑ Aided by I	СТ	☑ Applicable to	Remote Class	s
Course	Plan						
204100			Theme		I	Goals	
		1st	Meme 熱力学の基礎概念			熱力学に必要な 比熱、熱、仕事	基礎概念(SI単位系、圧力、熱容量・ も内部エネルギー等を理解し、換算な もができる。
		2nd	熱力学第1法則:	熱力学第1法則			かできる。)基となる各種過程(準静的、可逆・不 説明でき、和差による各種計算に活用
1st Semeste			熱力学第1法則:	各種変化		 各種(定積・定 ネルギー・エン	E圧・等温・断熱)変化における内部エッタルピー・仕事などの計算ができて、いては、マイヤーの関係式・ボアッソン・開できる。
r	2001001	4th	熱力学第1法則:	反応熱		標準生成熱から 式を用いて任意	標準反応熱を計算し、キルヒホッフの の温度の反応熱が計算できる。
		5th	熱力学第2法則:				的に理解し説明できる。カルノーサイ 解し、作業物質を理想気体とした場合 きる。
		6th	熱力学第2法則:			第2法則(熱比	の式)から状態量であるエントロピーできる。膨張・温度変化など各種変化の

		7th	熱力学	第2法則:			熱力学ポテン ツエネルギー 積変化の方向 る。	シャル(ギブスエネ))を用いて、等温・ あるいは平衡状態を記	ルギー、ヘルムホル 等圧変化、等温・等 説明することができ		
		8th	中間試	· 験							
		9th	熱力学	第2法則:			マックスウェ (独立、従属 ブス-ヘルムオ 存性の基礎)		、熱力学的状態量 とができる。またギ る(平衡定数温度依		
		10th	熱力学	第3法則:			第3法則に基づいて標準エントロピーについて説明できる。簡単な化学反応におけるエントロピー変化(任意温度)を計算することができる。				
	2nd	11th	相平衡	:			相転移・相平衡について理解し、ギブスの相律を活用することができる。純物質の状態図を理解し、クラウジウス-クラペイロンの式を理解・活用して、圧力変化と相転移温度の関係を導ける。				
	Quarter	12th	相平衡	と溶液:				-液平衡条件を理解し 蒸気圧を計算できる。	、ラウールの法則か		
		13th	相平衡	と溶液:			ヘンリーの法 ス吸収を計算	則から理想希薄溶液のできる。	の蒸気圧・液体のガ		
		14th	相平衡	と溶液:			活量の定義から実在溶液の蒸気圧・沸点を算出できる。				
		15th	相平衡	と溶液:			東一的性質を理解し、沸点上昇、凝固点降下、浸透圧 に関係する計算ができる。				
		16th	期末試	験答案返却・解答解詞	兑						
Evaluati	on Meth	nod and	Weigh	t (%)							
		定期試験	ルテスト ポートフォリオ 勢				取り組み姿	課題・レポート	Total		
Subtotal		60		0	0	0		40	100		
基礎的能力	J	20		0	0	0		10	30		
専門的能力)	30		0	0	0		20	50		
分野横断的	能力	10		0	0	0		10	20		

,	Anan Co	llege	Year	2024		Cour		Physical Chemistry 3	
Course	Informa	tion							
Course Co	ode	1414D11			Course Categor	ry Spe	cialized	d / Compulsory	
Class Forr	mat	Lecture			Credits	Aca	demic	Credit: 2	
Departme	ent		Chemical Engine	eering	Student Grade	4th			
Term		Second Se	emester		Classes per We	ek 後期	後期:2		
Textbook Teaching	Matérials			gineering Library	Butsurikagaku, I	ukuchi (Zikkyosyuppan)			
Instructor			a Atsunobu						
1. Unders 2. Unders 3. Unders	stand the b stand redo	rical conduct behavior of ic x reactions t	ons in electric fie hat occur at batt	of electrolyte solu lds and the ionizat tery electrodes and the electromo	tion equilibrium.				
Rubric									
			Ideal Level		Standard Level			Minimum Level	
Achievem	ent 1		Explain electric phenomenon c electrolyte solu perform relate	of aqueous utions and	Explain an elector aqueous elector solutions.		ıctivity	Calculate an electrical conductivity of aqueous electrolyte solution.	
Achievem	ent 2		Explain the bel electric fields a equilibrium, ar related calcula	nd perform	Explain the behan electric field ionization equil	l and the	ns in	Calculate ionization equilibrium constants.	
Achievem	ent 3	Explain redox reactions that				at s.	Determine the change in oxidation number for redox reactions that occur at battery electrodes.		
Achievem	ent 4			ndard electrode he electromotive form related	Explain the sta potential and the force.	ndard elect he electrom	rode iotive	Calculate an electromotive force from a standard electrode potential.	
Assigne	d Depar	tment Obj	ectives						
学習・教育	到達度目標	 ₹ D-1							
Teachin	g Metho	d							
Outline Style		fields such with exerc Lectures We will so	n as batteries an cises. will be given acc olve exercises as	d energy conversi cording to the text much as possible	on. In this lectubook, but the m	re, the basi issing parts it if there is	cs of e will be no time	ield has been applied to various electrochemistry will be explained e supplemented with exercises. There	
Notice		The know	vledge about rec	of each unit, so pl lox reactions and of so be sure to revigaku, Atkins (Toky	electrolysis learr	ned in the lo	wer a	rades of chemistry will be used	
Charact	oristics		Division in Le		OKagaKuuouziii)				
☐ Active		Ji Ciass /	☐ Aided by IC		☐ Applicable t	o Remote (Class	☐ Instructor Professionally Experienced	
Course	Plan								
		Т	heme			Goals			
		1st I	onization of elec	trolytes		Calculate t	he dea	ree of ionization in electrolytes.	
			lectrical conduct	•				conductivity.	
				transport number				nsport numbers.	
	24	4th A	rrhenius theory	of ionization		Understand	d Arrhe	enius theory of ionization.	
	3rd Quarter	5th A	activity coefficien	ts in electrolyte so	olutions	Express ph coefficients		quantities using Activity	
		6th I	onic strength			Calculate v	alues o	of ionic strength.	
		7th I	onization equilib	ria of acids and ba	ises	Calculate i	onizatio	on constants.	
2J		8th N	1idterm exam						
2nd Semeste	e 9th Basics of battery					quations for half-cells.			
r	10th Redox reaction 1				Calculate o	xidatio	on numbers and write simple		
		11th R	Redox reaction 2			Derive red		ations.	
	4th 12th			and electromotiv	e force	Calculate e	lectror	motive forces and equilibrium ingly soluble salts.	
	Quarter	13th E	Battery and elect	rolysis		Understand	d the n	nechanism of practical batteries ulations related to electrolysis.	
		14th C	Colloid					tion of colloidal particles.	
		urface tension and adsorption			Solve problems related to surface tension, and understand the characteristics of adsorption isotherms.				

	16th Fin	al exam									
Evaluation Method and Weight (%)											
	Examination	Quiz	Portfolio	Presentation/Attit ude	Other	Total					
Subtotal	60	10	30	0	0	100					
Basic Proficiency	20	0	10	0	0	30					
Specialized Proficiency	40	10	20	0	0	70					
Cross Area Proficiency	0	0	0	0	0	0					

,	Anan Co	llege	Year	2024			ourse Title	Biochemistry 2	
Course	Informa	tion							
Course Co	ode	1414G02			Course Categor	ry	Specialize	d / Compulsory	
Class Forr	mat	Lecture			Credits		Academic	Credit: 2	
Departme	ent	Course of	Chemical Engin	eering	Student Grade		4th		
Term		Second Se	emester		Classes per We	Veek 後期:2			
Textbook Teaching		Fundamer	ntals of General,	, Organic and Biolo	gical Chemistry,	y, 8th Edition			
Instructor	-	Otani Taka	ashi						
Course	Objectiv	es							
1. Unders 2. Unders 3. Unders	tand chen tand the o tand chen	nical concepts chemical cond nical reaction	s related to biolocepts of substan s in living organ	ogical functions. ices that make up iisms.	living things.				
Rubric			1						
			Ideal Level		Standard Level			Unacceptable Level	
Achievem	ent 1		Explain chemic related to biolo detail by giving	ogical functions in	Explain chemic related to biolo giving example	gical fu	cepts unctions by	Not explain chemical concepts related to biological functions by giving examples	
Achievem	ent 2		concepts of su	hil the chemical bstances that I things, giving	Explain the che of substances t living things, gi	hat ma	ake up	Not explain the chemical concepts of substances that make up living things, giving examples.	
Achievem	ent 3			cal reactions in ns in detail using	Explain chemic living organism examples.	al reac is using	tions in	Not explain chemical reactions in living organisms using examples.	
Assigne	<u>d Depa</u> r	tment Obj	ectives						
学習・教育									
Teachin	g Metho	od							
Outline	J		e focuses on 1)	metabolism of glu	icose, lipid, and	proteir	n, 2) Nucle	ic acids and protein synthesis.	
Style		Face-to-fa			, , ,		, ,		
Notice									
Charact	eristics	of Class / [Division in Le	arning					
		<u> </u>						☐ Instructor Professionally	
☐ Active	Learning		☐ Aided by IC	√	☐ Applicable t	o Rem	ote Class	Experienced	
Course	Plan								
		Т	heme			Goals			
		1st G	lycolysis, the fa	te of pyruvate		Descri	be the gly	colysis pathway and its products.	
		2nd T	he citric acid cy	cle		Descri	be the rea	ctions in the citric acid cycle and	
						-		energy production.	
		3rd T	he electron-trar	nsport chain and A	TP production	Describe the electron-transport chain, oxida phosphorylation, and how the two-processe coupled.			
			egulation of glu uring stress	cose metabolism a	and metabolism	Identify the hormones that influence glucose metabolism and describe the changes in metabolism during stress conditions			
	3rd Quarter	5th G	luconeogenesis			Explaii from r	n the path noncarbohy	ways for synthesis of glucose drate molecules.	
		6th Li	pids 1			proper	rties of fatt	mical structures and general y acids. Recognize phospholipids nd describe their functions.	
2nd Semeste		7th Li	pids 2			structi transp	ures and ro ort and ac	nbrane lipids and describe their olls. Distinguish between passive tive transport and between and facilitated diffusion.	
r		8th M	lidterm exam			Jp.C		and the second control of the second control	
			pid metabolism	1		the na	iture and f	classes of lipoproteins, specify unction of the lipids they entify their destinations.	
		10th Li	pid metabolism	2		Name breakd identif	the major down of tri v their cor	pathway for the synthesis and acylglycerols and fatty acids, and inections to other metabolic ibe fatty acid oxidation.	
	4th Quarter	11th Pi	rotein and amin	o acid metabolism	1	List th amino	e steps of acids are	protein digestion. Explain how catabolized and describe the fate of an amino acid.	
		12th Pi	rotein and amin	o acid metabolism	2	Identif urea c	fy the majorycle. Desc	or reactants and products of the ribe the metabolic fate of the an amino acid.	
	13th Nucleic acids and protei			protein synthesis	1			y, and draw the components of nucleotides. Describe and identify ns in DNA and RNA.	

		14th	Nucleic acids and	protein synthesis	; 2		Interpret the structures of DNA, and write complementary sequences. Explain the process of DNA replication.				
		15th	Nucleic acids and	protein synthesis	; 3	complementary s	Explain the process of transcription, and write complementary strands through mRNA. Identify the initiation, elongation, and termination steps in translation for protein synthesis.				
		16th									
Evaluation	luation Method and Weight (%)										
		Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total			
Subtotal		70	0	0	0	30	0	100			
Basic Proficiency	,	50	0	0	0	15	0	65			
Specialized Proficiency			0	0	0	15	0	35			
Cross Area Proficiency	oss Area		0	0	0	0	0	0			

Course Co	Anan College			Year	2024			ırse tle	Biochemistr	y1
Cource Co	informa	ation								
course co	de	1414G(03			Course Category	y S _I	pecialize	d / Compulsor	У
Class Form	nat	Lecture	9			Credits	A	cademic	Credit: 2	
Departmer	nt	Course	of Che	mical Engine	eering	Student Grade	41	th		
Term		First Se	emeste	r		Classes per Week 前期:2				
Textbook Teaching N		Fundan	nentals	of General,	Organic and Biolo	gical Chemistry,	8th Edit	ion		
Instructor		Otani T	akashi							
Course (Objecti ^o	ves								
Rubric										
			Ide	eal Level		Standard Level			Unacceptable	e Level
Achieveme	ent 1		of		fferent functions cisely and give an ch function.	Describe the diff	give an		Describe the of proteins a	different functions nd not give an each function.
Achieveme	ent 2		en	scribe the fu zymes and v schemical rea		Describe the fur enzymes and vit biochemical read	tamins iı		Not describe enzymes and biochemical i	
Achieveme	ent 3		thr mo dis po str	essify carboh ree subtypes onosaccharid accharides, a lysaccharides ucture and for bohydrates	: es, and s, describe unction of	Classify carbohy three subtypes: monosaccharides disaccharides, a polysaccharides structure and fu carbohydrates.	es, nd , describ	e	Not classify of three subtypy monosaccharides disaccharides polysaccharides structure and carbohydrates	rides, s, and des, describe d function of
Assigned	d Depa	rtment O	biecti	ives						
学習・教育										
Teaching										
Outline	g i ictii		urse fo	cuses on fun	nctions of proteins	enzymes vitam	nins and	l carboby	vdrates	
Style		Face-to			ictions of proteins	, crizyrries, vicari	iiris, aric	Carbon	yaraces.	
Notice		T dec te	race i	ccture						
	- rietiee	of Class	/ Divi	sion in Lea	a waina					
☐ Active				Aided by IC	<u> </u>	☐ Applicable to	Remote	e Class	☐ Instructor Experienced	r Professionally
Course F	Plan									
			Them	ne			Goals			
		1st		o acids and p	proteins 1	1	Function	s of prot	eins	
		2nd	Amin	o acids and p	proteins 2	,	Amino a	cids		
		3rd		o acids and p					acture of amino	o acids
	1st	4th		o acids and p		Primary and secondary protein structu				
	Quarter	5th		o acids and p			Tertiary and quaternary protein structure			
		6th		nes and vita			Catalysis by enymes			
		7th		nes and vita			How Enzymes work			
1st		8th		nes and vita			Vitamins			
Semeste		9th		rm exam	5			•		
1		10th	_	hydrates 1		 	Monosao	charides	: 1	
		11th		ohydrates 1 ohydrates 2				charides		
	ا سرا	12th		ohydrates 2 ohydrates 3			Disaccha		, _	
	2nd Quarter	13th		ohydrates 3 ohydrates 4			Polysacc			
		14th		•	biochemical ener				biochemical re	eactions
										EUCLIOI IS
		15th	ine g	jerieration of	biochemical ener	yy∠ :	ou ategy	of meta	וווטטווטוו	
Fyaluati	on Met	16th hod and	Weial	nt (%)						
_, _, _,		kamination		esentation	Mutual Evaluations between students	Behavior	Portfoli	0	Other	Total
	7()	0		0	0	30		0	100
Subtotal						0	20		0	60
Subtotal Basic Proficiency	, 40)	0		0	10	20		10	100
	/ d 2/		0		0	0	10		0	30

Anan College Course Information		ege	Year	2024		Cours Title	е	Experiments in Chemistry Lab	n Advanced oratory	
Course	Inforn	natio	on							
Course Co	ode		1414T07			Course Categor	y Spec	ializ	ed / Compulsory	
Class For	mat		Experiment	t / Practical train	ning	Credits	Academic Credit: 2			
Departme	ent		Course of C	Chemical Engine	ering	Student Grade	4th			
Term			Second Ser	mester		Classes per Wee	ek 後期:	4		
Textbook Teaching	and/or Materia	ls								
Instructo			Ryosuke,Su	Atsunobu,Ota N ugiyama Yuuki	laotomo,Konishi 1	Tomoya,Zheng Ta	ao,Otani Ta	kash	ni,Ueda Kohei,Ezur	e
Course	Object	tives	5							
Rubric										
				Ideal Level		Standard Level			MinimumLevel	
Achievem	nent 1									
Achievem	nent 2									
Achievem	nent 3									
Achievem	nent 4									
Assigne	d Den	artn	nent Obje	ctives		•				
					 -4 学習・教育到達/	=====================================				
Teachin			1 1/		. 1 1 1/11/21/22	<u> </u>				
Outline	ig Mcc	iiou								
Style										
Notice										
	-orietie		Class / D	ivision in Lor						
Charact	eristic	S OI	Class / D	pivision in Lea	arning	I				
☐ Active	Learnir	ng		☐ Aided by IC	Т	☐ Applicable to	Remote Cl	ass	☐ Instructor Pr Experienced	oressionally
_										
Course	Plan									
			Th	ieme			Goals			
		—	st							
		_	nd							
		_	rd							
	3rd	_	th							
	Quarte	<u> </u>	th							
		_	th							
24			th							
2nd Semeste			th							
r			th							
			0th							
			1th							
	4th		2th							
	Quarte	- 1≐	3th							
			4th							
			5th							
			6th							
Evaluat	ion Me	etho	d and We	ight (%)		1				
		Exam	nination	Presentation	Mutual Evaluations between students	Behavior	Portfolio		Other	Total
Subtotal		0		0	0	0	0		0	0
Basic Proficienc	су	0		0	0	0	0	_	0	0
Specialize Proficienc	ed Cy	0		0	0	0	0		0	0
Cross Are Proficienc		0		0	0	0	0		0	0

,	Anan Col	lege	Yea	r	2024		_	ourse Title	Chemical	Engineering 2
Course	Informat	ion								
Course Co		1414T09)			Course Categor	v	Specialize	ed / Compuls	sorv
Class Forr		Lecture				Credits	,	•	c Credit: 2	,
Departme			f Chemical E	naine	eerina	Student Grade		4th		
Term		First Sen		<u>.</u>		Classes per Wee	ek	前期:2		
Textbook Teaching	and/or Materials	ベーシック	ク化学工学(イ	七学同	同人)橋本健治著					
Instructor		Ezure Ry	rosuke							
Course	Objective	25								
1. 熱の流	れの基礎を	学んで、熱	交換に必要な(抽出・分離の)	云熱配 支術た	面積の算出ができる。 が理解でき、説明で	きる。				
Rubric										
			理想的な到	達レ	ベルの目安	標準的な到達レヘ	ジレのE]安	未到達レベ	ルの目安(可)
到達目標1	熱の流れ				法則を理解し、熱 ための計算ができ	熱の流れの物理法 熱の基本的な計算	t則を理 ができ	 理解し、伝 きる。	熱の流れの。	物理法則を理解できる
到達目標			液液平衡の		を理解し、抽出装 の計算ができる。	液液平衡の原理を な計算ができる。	⊵理解し	ノ、基本的	液液平衡の	原理を理解している。
Assigne	d Depart	ment Oh								
	到達度目標		Jeen ves							
	g Metho									
Outline	ig Method			ントの)運転と設計を扱う	学問です。4年生 <i>の</i>	化学エ	学2では,	最初に, 伝熱	の基礎, 次に, 抽出操
Style		講義の最後	後に宿題を与え		「。宿題をすることだ 持ってきてください。		よがりる	ます。授業	中に練習問題	を課しますので, 講義
Notice		不明なが課題の	点は授業中に質 提出状況も評値 問題作成後は質	質問し	ってください。 くります。 は一切受け付けられる	きせん。				
Charact	eristics c		Division ir			K C 700				
☐ Active		i Class /	☐ Aided b			☐ Applicable to	Rem	ote Class	☐ Instruc	tor Professionally
									12/10/10/10/10	
Course	Plan									
			Theme				Goals			
			 熱交換器の基礎	楚とる				一、蒸発缶	おどの熱交換	器の構造が理解できる
		2nd	 熱伝導 1				フーリ	工の法則と	:熱伝導度を理	!解できる。
		3rd	熱伝導 2				様々な形状の固体の中の熱の伝わり方を理解し、計算ができる。			
	1st	4th	対流熱伝達1				ができる。 熱伝達と熱伝導の違いを理解し、総括伝熱係数を計算 できる。			
	Quarter	5th	対流熱伝達 2				ヌッセ ができ		シトル数およ	び境膜伝熱係数の計算
		6th	熱放射				赤外線 、放射	が空間を飛熱の吸収率	び越えて熱を が計算できる	伝える熱放射を理解し
1st Semeste		7th	熱交換器の設	i†				式熱交換器 計算できる		収支を理解して、伝熱
r		8th	中間試験							
		9th	抽出の原理と	装置			抽出の	工業的な意	(義が理解でき	·る。
		10th	液液平衡関係	1			三角線	図により温	合液の状態が	表現できる。
		11th	液液平衡関係	2			てこの	原理が理解	ごさる。	
	2nd	12th	溶解度曲線				3成分 る。	の混合液の	溶解度曲線を	:三角線図上に作図でき
Quarter 13th 単抽出の計算							単抽出	による溶質	の回収率が計	 -算できる。
14th 多回抽出の計				<u>算</u>			単抽出による溶質の回収率が計算できる。 多回抽出による溶質の回収率が計算できる。			
		15th	吸着や膜分離の	の基礎	* 定	I	吸着や	膜分離の原	理・目的・方	法を理解できる。
		16th	期末試験・試験	険返去	.					
<u>Eval</u> uati	ion Meth	<u>od an</u> d W	Veight (%)							
		定期試験		課題	1					Total
Subtotal	<u> </u>	70		30		0		0		100
基礎的能力]	0		0				0		0
専門的能力	J	70		30		0		0		100
分野構断的	能力	lo		0		lo		0		0

ļ	Anan Col	lege	Year	2024		Course Title	Experiments and Exercises in Materials Chemistry 3	
Course 2	Informat	tion						
Course Co	ode	1414T12			Course Category	/ Specializ	zed / Compulsory	
Class Forn	mat	Experimer	nt / Practical trai	ning	Credits	Academ	ic Credit: 2	
Departme	ent	Course of	Chemical Engine	eering	Student Grade	4th		
Term		First Seme	ester		Classes per Wee	k 前期:4		
Textbook Teaching I		Distribute	resumes and tex	xtbooks				
Instructor	-		a Atsunobu,Konis re Ryosuke	shi Tomoya,Ota N	aotomo,Otani Tal	kashi,Zheng Ta	ao,Ueda Kohei,Sugiyama	
Course (Objectiv	es						
To master each laboi	r the proce ratory. To	ess of proble recognize th	m solving in rese le fundamental d	earch by conductir lifference betweer	ng experiments (i n "student experir	nvestigations) ments" and "gı	related to the research theme in raduation research".	
Rubric			1		1			
			Ideal Level		Standard Level		minimum Level	
Achievem	ent 1		Can discover properties of the control of the contr	esearch theme by	Be able to expla to be solved in t theme.	in the problem he research	To be able to explain to the supervisor the problems to be solved in the research theme.	
Achievem	ent 2		Able to propose solutions to proresearch theme	blems in the	Be able to expla problems in the theme.		To be able to explain to the supervisor how to solve problems in the research theme.	
Achievemo	ent 3		how to solve pr	rvestigations) on roblems with an of the meaning e of the	To be able to ca experiments (in how to solve pro	vestigations) o	To be able to conduct experiments (investigations) on how to solve problems with assistance.	
Achievem	ent 4			xplain one's own about the results nt (survey).	Be able to expla the experiments conducted.			
		tment Obj		4 学羽 教卒副志	-		Leafer	
	到建设日标 g Metho		教育到建设日保 D	-4 学習・教育到達原	支出信 C-1			
Outline		first four s working o for the lab methods (graduation research a company	sessions. Thereal in the experimen poratory they wis (thinking and apport of the presearch. In the produced their experies)	fter, students will ts or investigatior th to belong to an proaches for ident e fourth semester	visit all laboratorius presented in ead the research the ifying and solving of this course, the manufacturing of the manufacturing in the manufacturing in the manufacturius of t	ies in the chen ach laboratory, emes they wis g problems) ne he faculty men process of sem	biochemical experiments for the nistry course on a weekly basis. By students will learn the guidelines th to work on, as well as the cessary for conducting their nbers who were in charge of niconductor integrated devices at a tal format.	
Style		Students a resumes of graduation a report a 60 hours of Translated	are required to solistributed to the research in each of take a quiz or of class time + 3 with www.Dee	tudy the contents m, and to conduct h laboratory. After the content of the content of the complex of self-structure plcom/Translatory.	and process of the texperiments or the completing the ne experiment or ady	investigations experiment or investigation.	s in advance by reading the related to the theme of their investigation, students will submit	
Notice		 safety instructions will be given at the beginning of each session, so please be at the location indical your resume by the start time. Wear appropriate clothing, footwear and protective equipment for each experiment or investigation resume for details). Carry the necessary items for each experiment or investigation (see resume for details). carry the necessary items for each experiment or investigation (see resume for details). reports must be submitted within one week after the completion of the experiment (investigation). Translated with www.DeepL.com/Translator (free version)						
 Characte	eristics o	-	Division in Lea		,			
☐ Active		. 2,400 / 1	☐ Aided by IC		☐ Applicable to	Remote Class	☐ Instructor Professionally Experienced	
Course	Dlan		•		•			
Course I	riall	 -	heme			 Goals		
			neme xperimental Guid	dance	E	Be able to expl	ain the safety measures to be experiments and the content of	
1ct			NA and protein o		f	uture experim	ents. ins can be extracted.	
1st Semeste r	1st Quarter		estriction endonu		[DNA can be separated by electrophoresis afte restriction enzyme treatment.		
r Quarter 3rd	4th D	rotoin activity m		Can measure protein activity				
			rotein activity in	n activity measurement ing of translucent alumina ceramics		Can measure p	rotein activity	

		6th	Survey of distribut	cion of alien speci	es - dandelion	Be able to explain experiment (inverse)	n the meaning of	each	
		7th	Preparation and e	valuation of cera	mic phosphors	Be able to explain the meaning of each experiment (investigation) and conduct it safely.			
		8th	Synthesis and Eva Nanoparticles	luation of Lithiun	n Titanate	Be able to explain the meaning of each experiment (investigation) and conduct it safely.			
		9th	Optical resolution	of mandelic acid		Be able to explain experiment (inve			
		10th	Substance Separa	tion and Compon	ent Analysis	Be able to explain experiment (inve	n the meaning of estigation) and co	each enduct it safely.	
		11th	Conduct experime graduation research	nts (surveys) relact theme of each	ated to the laboratory	Be able to explain experiment (inve	n the meaning of stigation) and co	each nduct it safely.	
	2nd	12th	Conduct experime graduation research	nts (surveys) rela ch theme of each	ated to the laboratory	Be able to explain experiment (inve	n the meaning of stigation) and co	each nduct it safely.	
	Quarter	13th	Conduct experime graduation research	nts (surveys) relact theme of each	ated to the laboratory	Be able to explain the meaning of each experiment (investigation) and conduct it safely.			
		14th	Presentation and the experiment (s		e contents of	Describe the resultance been conduled to solutions to	cted and explain	ts (surveys) that how they have	
		15th	Learning about rescompanies and res			Explain problem practice.	finding and probl	em solving in	
		16th							
Evaluati	on Met	hod and \	Weight (%)						
	E	kamination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total	
Subtotal	0		0	0	0	100	0	100	
Basic Proficience	y 0		0	0	0	50	0	50	
Specialize Proficience			0	0	0	50	0	50	
Cross Are Proficience			0	0	0	0	0	0	

, A	Anan Co	llege	Year	2024		Course Title	Information Processing				
Course	Informa	tion				1100					
Course Co		1494001			Course Categor	y Speciali:	zed / Elective				
Class Forr	mat	Lecture			Credits	Academ	ic Credit: 2				
Departme	ent	Course of	Chemical Engin	eering	Student Grade	4th					
Term		Second Se	mester		Classes per Wee	/eek 後期:2					
Textbook Teaching		Yasashikuı	manaberu C ge	ngo - ANSI Kikaku	zyunkyo, Fukuda	da (Morikita Syuppan)					
Instructor	ſ	Nakamura	ıra Atsunobu								
1. Unders 2. Unders 3. Unders	stand basio stand arith	C language algorithms a	and be able to one one of the contract of the	create C language to create program out to a data file.	programs. s.						
Kubi ic			Ideal Level		Standard Level		Minimum Level				
Achievem	ent 1		Understand th C language, a	plain grammatical	Understand the of the C language	ge, anď be able	Understand the basic grammar of the C language, and be able				
Achievem	ent 2			asic C language create programs Igorithms.	Understand bas programs and c programs.		Understand basic C language programs to some extent and can create simple programs.				
Achievem	ent 3		defined function	ctions and user- ons.	Create simple p arithmetic funct defined function	tions and user- ns.	Create simple programs using arithmetic functions.				
Achievem	ent 4		Understand th data files and programs usin	e input/output of create C language g them.	C language nput/output to	Write a simple C language a program with output to a data file.					
Assigne	d Depar	tment Obje	ectives								
学習・教育	到達度目標	票 B-4 学習・教	文育到達度目標 C)-1 学習・教育到達原	度目標 D-3						
Teachin	g Metho	od									
Outline		of this class languages language of This cours company.	es is to (1) under, and (2) be ab grammar relate se will be taugh	erstand the basic of le to create simple d to programming it by a faculty men	grammar of the C programs. For t through example nber who was in	Clanguage, wh his purpose, st es and exercise charge of sem	on only with a calculator. The goal ich is one of the programming udents will learn the basic C ess. conductor development at a cited using a personal computer.				
Style Notice		There will I would lik	be assignments e students to a	s for each lecture, ctively try to mast	so be sure to sul	omit them.	e assignments using computers in				
			ar room or the								
Charact	eristics	or Class / L	Division in Le	earning							
☐ Active	Learning		☐ Aided by I	CT	☑ Applicable to	Remote Class	☐ Instructor Professionally Experienced				
Course	Plan										
Course	i iui i		neme			Goals					
				etting, binary and	hovadocimal		en binary, decimal and umbers				
		2nd Ba	asic operations	for programming		Understand prodebugging prod	ogram entry, error handling, and cedures				
	3rd		ata types and c	leclarations		initialize and as					
	Quarter		andard output				rd output function				
			andard input a				output functions and basic operators				
			epeat sentence				nts and switch statements				
2nd			epeat sentence		+	Use for statem	ents				
Semeste r			idterm exam binters and stru	eturos		Use pointers					
	1		le processing	ictui 63		•	e procedure for inputting and				
		11th A	rays				ray types, declarations, and				
	4th Quarter	12th A	oplications of a	rrays			s for inner and outer products of				
		13th Fu	ınction			Use arithmetic create function	functions and understand how to s				
	14th Applications of repeat sentences					Make a numerical differentiation program and an integration program					

	15th	Applica	ation example			Make programs using Newton's method and finite difference method					
	16th	Final e	xam								
Evaluation Method and Weight (%)											
	Examination	on	Quiz	Portfolio	Prese ude	entation/Attit	Other	Total			
Subtotal	50		0	50	0		0	100			
Basic Proficiency	10		0	10	0		0	20			
Specialized Proficiency	30		0	30	0		0	60			
Cross Area Proficiency	10	·	0	10	0		0	20			

A	Anan Co	llege	Year	2024		Course	e	Environmental Engineering
Course	Informa	tion				Title		
Course Co		1494F0	3		Course Categor	rv Speci	ialized	d / Elective
Class Forr		Lecture			Credits	<i>,</i>		Credit: 2
Departme			of Chemical Engine	eerina	Student Grade	4th	CITIC	Greater 2
Term		First Sei		<u>-</u>	Classes per We	 	2	
Textbook	and/or			th Revised Edition	<u> </u>	for Environmental Society, Tokyo Chamber of		
Teaching		Comme	ce and Industry,	JMA Management	Center, Inc.			
Instructor	-	Ota Nao	tomo					
Course (Objectiv	es						
2. Explain the enviro 3. To be a chemical sconservat 4. To be a conservat	i the physionment. The ble to exposite exposite to exposite to exposite exposi	cal, chemic plain the cu s, radioacti plain the cu ds, enviror	cal, and biological rrent status and is vity, and regional rrent status and is nmental education	ssues of global wa and global enviro ssues of basic prin , and environmen	the earth and th rming, energy p nmental problen ciples, plans, en tal impact asses	roblems, bions from the vivironmental sment in env	divers viewp stand vironn	nd issues in society related to sity, recycling-oriented society, oint of environmental dards, environmental nental conservation. tal conservation and the roles of
Rubric								
Nubile			Ideal Level		Standard Level			minimum Level
				stainability and	Understand sus		nd	Understand sustainability and
Achievem	ent 1		be able to expl environmental	ain the history of issues in detail.	be able to explain environmental	ain the histor issues.		the history of environmental issues.
Achievem	ent 2		the physical, cl biological chara earth and the	acteristics of the current status ociety regarding	characteristics of the earth and the current status and issues of society regarding the			characteristics of the earth and the current status and issues of society regarding the environment.
Achievem	ent 3		about global w problems, biod recycling-orien chemical subst radioactivity, a	ted society, ances, nd regional and mental problems point of	To be able to explain about global warming, energy problems, biodiversity, recycling-oriented society, chemical substances, radioactivity, and regional and global environmental problems from the viewpoint of environmental conservation.		To be able to understand about global warming, energy problems, biodiversity, recycling-oriented society, chemical substances, radioactivity, and regional and global environmental problems from the viewpoint of environmental conservation.	
Achievem	ent 4		the current sta regarding basic planning, envir standards, env conservation n	c principles, conmental cironmental nethods, education, and	regarding basic principles, planning, environmental standards, environmental conservation methods, environmental education, and environmental impact		To be able to understand the current status and issues regarding basic principles, planning, environmental standards, environmental conservation methods, environmental education, and environmental impact assessment.	
Achievem	ent 5		Understand an explain in deta collaboration a government, b citizens in enviconservation a each.	il the mong usiness, and ronmental	Understand and be able to explain the collaboration among government, business, and citizens in environmental conservation and the roles of each.		Understand the collaboration among government, business, and citizens in environmental conservation and the roles of each.	
Assigne	d Depar	tment Ol	ojectives					
				-1 学習・教育到達原	度目標 D-4			
Teachin	g Metho							
Outline			a broad knowledg of leading a "sust	e of the entire en ainable society" th	vironmental field at balances the	l with the air environment	n of b t and	pecoming a human resource the economy.
Style		Student	s will be evaluated	l by quizzes, repo	rts, and present	ations.		
Notice								
Charact	eristics of	of Class /	Division in Le	arning				
☐ Active		,	☐ Aided by IC	_	☐ Applicable t	o Remote Cl	ass	☐ Instructor Professionally Experienced
Course	Plan							
Theme				Goals				
	1st Guidance							
Somosto 1st ZIIU Issu		History with Sust Issues	·			Understand sustainability and explain the history of environmental issues.		
r	Quarter 3rd Fundamentals of the Earth			2. Explain the physical, chemical, and biological characteristics of the earth and the current status				

2. Explain the physical, chemical, and biological characteristics of the earth and the current status and issues in society related to the environment.

3rd

		4th	Current state of s food, resources, p		n, economy,	2. Explain the ph characteristics of and issues in soc	the earth and the	ne current status	
		5th	Global Warming			3. To be able to issues of global v biodiversity, recy substances, radic environmental prenvironmental co	varming, energy cling-oriented so pactivity, and recoblems from the	problems, ociety, chemical gional and global	
		6th	Energy Issues			issues of global v biodiversity, recy substances, radio environmental pr	3. To be able to explain the current status and issues of global warming, energy problems, biodiversity, recycling-oriented society, chemical substances, radioactivity, and regional and global environmental problems from the viewpoint of environmental conservation.		
		7th	Biodiversity and it	ts crisis		issues of global v biodiversity, recy substances, radio environmental pi	3. To be able to explain the current status and issues of global warming, energy problems, biodiversity, recycling-oriented society, chemical substances, radioactivity, and regional and global environmental problems from the viewpoint of environmental conservation.		
	9		Global environme	ntal problems		3. To be able to issues of global v biodiversity, recy substances, radio environmental prenvironmental co	varming, energy cling-oriented so pactivity, and recoblems from the	problems, ociety, chemical gional and global	
			Recycling-oriented	d society		3. To be able to issues of global v biodiversity, recy substances, radie environmental prenvironmental control process.	varming, energy cling-oriented so pactivity, and reg oblems from the	problems, ociety, chemical jional and global	
		10th	Local Environmen	tal Issues		3. To be able to explain the current status and issues of global warming, energy problems, biodiversity, recycling-oriented society, chemical substances, radioactivity, and regional and global environmental problems from the viewpoint of environmental conservation.			
	11th		Chemical Substan	ices and Radioac	tivity	issues of global v biodiversity, recy substances, radio environmental pi	3. To be able to explain the current status and issues of global warming, energy problems, biodiversity, recycling-oriented society, chemical substances, radioactivity, and regional and global environmental problems from the viewpoint of environmental conservation.		
	2nd Quarter	12th	Basic principles, pand methods of e			4. To be able to explain the current status and issues of basic principles, plans, environmental standards, environmental conservation methods, environmental education, and environmental impact assessment in environmental conservation.			
		13th	Environmental ed assessment	ucation, environi	mental impact	4. To be able to explain the current status and issues of basic principles, plans, environmental standards, environmental conservation methods, environmental education, and environmental impact assessment in environmental conservation.			
		14th	Roles of governm	ent and business	3	5.Understand and explain the collaboration among government, business, and citizens in environmental conservation and the roles of each			
		15th	Role of individuals	s and NPOs		5.Understand an among governmental co	ent, business, ar		
		16th							
Evaluati	on Meth	nod and	Weight (%)	Mutual					
	qu	iz	Presentation	Evaluations between students	Behavior	Portfolio	Other	Total	
Subtotal	65		15	0	0	20	0	100	
Basic Proficience	y 65	<u> </u>	15	0	0	20	0	100	
Specialize Proficience	d y 0		0	0	0	0	0	0	
Cross Are Proficienc	s Area			0	0 0 0				
	Tonciency		1	1	-	1	1	1	

A	Anan Col	lege		Year	2024			ourse itle	Internship	
Course	Informat	ion								
Course Co	ode	1494R11	L			Course Categor	ry	Specialize	d / Elective	
Class Forr	mat	Lecture				Credits		School Cre	edit: 1	
Departme	ent	Course o	of Che	mical Engine	ering	Student Grade		4th		
Term		Year-rou	ınd			Classes per We	ek	前期:2 後期	阴:2	
Textbook Teaching		NA								
Instructor	-	Ueda Ko	hei							
Course	Objective	es								
2. To be a 3. To be a	able to exp able to pre	lain the na	ture o	of the work at the results c	acquire as a men t the training site. of practical training aining at the train	a at the training	ı site.			
Rubric										
			Ide	eal Level		Standard Level			MinimumLevel	
Achievem	ent 1		ma a m abl		nould acquire as ociety, and to be	To be able to e manners one s a member of so	hòuld a		To be able to explain the manners one should acquire as a member of society.	
Achievem	ent 2		res con	rk content ar ponsibility (C	xplain about the nd social CSR, SR) of the ethe trainee is	To be able to e of the work of t where the train practical trainin	the com nee will	ipany	To be able to explain the nature of the work of the company where the trainee will receive practical training.	
Achievem	ent 3		on trai log eas	the results o ining at the t ical and orde	raining site in a erly manner, with tand items such	To be able to p on the results of training at the	of practi	cal [·]	To be able to prepare a report on the results of practical training at the training site.	
Achievem	ent 4		To res the und app	be able to production	resent the cal training at in an easy-to-nner using	To be able to present the results of practical training at the training site.			To be able to present the results of practical training at the training site.	
Assigne	d Depart	ment Ob	iecti	ves						
				数育到達度目標 A-2 学習・教育到達度目標 A-3 学習・教育到達度目標 B-1						
	g Metho									
Outline	griculo	The object at compare understa	anies, Inding acquir	universities, of the work e the attitud	etc. The program of the host institute e and awareness	n also aims to de ution and to cult required to bec	eepen v ivate a ome en	ocational work ethi gineers th	citution through practical training understanding through an c. The goal is for students to rough practical training social experiences.	
Style		debriefin an aband a plan fo During the tardiness	g sess donme or tran ne trai s and	sion. Please i ent of the consportation to ining period.	note that absence urse and will not to and from work a students are exp , and work hard e	from work duri fulfill the acquisi and commuting ected to take go	ing the ition rector it is to and for the contract to the cont	practical t juirements rom work e of their h	ort and make a presentation at a raining period will be regarded as s. Students are required to make during the period of the training nealth, pay close attention to all training by using the Internet	
Notice										
Charact	eristics o	of Class /	Divi	sion in Lea	arning					
□ Active	Learning			Aided by IC	Γ	☐ Applicable t	o Remo	te Class	☐ Instructor Professionally Experienced	
Course	Plan									
			Them	ie			Goals			
1st (Guida	ince			conten		plain the significance and ampus training, and the flow of		
1st let		2nd	Deter	mination of p	oractical training s	sites	campus	s training	cide on a host institution for off- and write a resume and an entry nitted to the host institution.	
Semeste r	Quarter	3rd	Same	as above						
		4th	Same	as above						
		5th	Same	as above						
6		6th	Pre-practicum briefing				To understand and be able to explain general precautions for off-campus training.			

		7th	Implementation of content	of practical trainin	g and recording	To be able to co training under the a period of about vacation. To be able to re items and sumn training in a pra	it 5 days during flect on daily pr narize the conte	actical training ent of practical
		8th	Same as above					
		9th	Same as above					
		10th	Same as above					
		11th	Same as above					
	2nd	12th	Same as above					
	Quarte	r 13th	Same as above					
		14th	Same as above					
		15th	Same as above					
		16th						
		1st	Implementation of content	of practical trainin	g and recording	To be able to co training under the a period of about vacation. To be able to re items and sumn training in a pra	he guidance of t it 5 days during flect on daily pr narize the conte	the training site for the summer actical training ent of practical
	3rd	2nd	Same as above					
	Quarte	r 3rd	Same as above					
		4th	Same as above					
		5th	Same as above					
		6th	Same as above					
		7th	Same as above					
2nd		8th	Same as above					
Semeste		9th	Same as above					
		10th	Same as above					
		11th	Same as above					
	4th	12th	Preparation of pr	actical training re	port	training, and wh	g site, the conte nat was gained t g in a report of	ent of the practical
	Quarte	r 13th	Same as above				,	
		14th		n on the results o	f practical	site, the content	t of the training training at the	ew of the training , and what was debriefing session
		15th	Same as above				<u> </u>	
		16th						
Evaluat	ion Me	thod and	Weight (%)			•		
		Examination		Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	()	40	0	0	20	40	100
Basic Proficienc	cy 0 10 0		0	10	10	30		
Specialize Proficienc	у ()	30	0	0	5	10	45
Cross Area Proficiency 0 0 0 25			25					

A	Anan Co	llege	Year		2024		(Course Title	Probability and Statistics	
Course	Informa	tion								
Course Co	ode	1514A01				Course Categor	γ	Specializ	ed / Compulsory	
Class Forr	mat	Lecture				Credits			c Credit: 2	
Departme	ent		f Chemical Eng	gine	eering	Student Grade		4th		
Term	1,	First Sen	nester			Classes per We	/eek 前期:2			
Textbook Teaching		Shin Kak	uritsu-tokei Ka	aitei	iban, Dainihon Tos	sho				
Instructor	1	Sugino R	yuzaburo							
Course	Objectiv	es								
We car	n understa	nd basic pro	pperties and ge	et t	e fundamentals of he conditional pro nce and standard	hability and Bay	's est	imation. bability dis	tributions.	
Rubric										
			Ideal Level			Standard Level			Unacceptable Level	
Achievem	Achievement 1 compu fundar proces			n' of als c ind	te the basic the of statistic apply these for oblems.	We can comput computation of fundamentals o processes.	the		We can compute the basic computation of the elementary statistic processes.	
Achievem	ent 2		We can und properties a conditional pestimation at the various	and pro and	get the bability and Bay's apply these for	We can underst properties and conditional prob estimation.	aet th	ne	We can understand basic properties and get the elementaries of conditional probability and Bay's estimation.	
Achievem	ent 3		mean value standard de probability o	e, va evia dist	a solution of ariance and tion of basic ributions and the various	We can make a mean value, va standard deviat probability distr	riance	e and f basic	We can make a solution of mean value, variance and standard deviation of elementary probability distributions.	
Assigne	d Depar	tment Ob	jectives						•	
	到達度目標		•							
Teachin	g Metho	d								
Outline		We are to mathema	o make a conc atics to constru	cent ucti	ration for our clas on of understandi	s and use the kr ng of the probab	nowle pility a	edges and t and statisti	echniques about undergraduate cs.	
Style		1. Review 2. Lectur 3. Short	v the importar e about the ne exercises.	nt fa		ious class.				
Notice		You will b	ouild up the go of this course	boo	eration and self-re- style to do home- required to compl	work of the prev	ious o atical	class. and Data	Science and AI Education Program	
Charact	eristics	of Class /	Division in	Le	arning					
☐ Active	Learning		☐ Aided by	y IC	T	☐ Applicable to	to Remote Class			
Course	Dlan									
Course	riaii	-	Theme				Goals	:		
				dat	a of one-dimensio	nal variable	We c	an underst	and and explain of frequency its measures of center.	
		2nd	Analyzing the	dat	a of one-dimensio	nal variable	We c	an underst and the dis	and and explain of its distribution spersion.	
		3rd	Analyzing the	dat	a of one-dimensio	nal variable	We c	an underst and the dis	and and explain of its distribution spersion.	
	1st	4th	Analyzing the	dat	a of two-dimensio	nal variables			and and explain of its distribution and the regression line.	
	Quarter	5th	Analyzing the	dat	a of two-dimensio	nal variables	We c	an underst ariance and	and and explain of its distribution the correlation coefficient.	
1st Semeste		6th	Analyzing the	dat	a of two-dimensio	nal variables			and and explain of its distribution I the correlation coefficient.	
r		7th	The properties	s of	probability		We c	an underst obability ar	and and explain of the definition and the number of cases.	
		8th	The properties	s of	probability		We c	an underst ems of the	and and explain of its probability addition and multiplication .	
		9th	The properties	s of	probability		We c	an underst ems of the	and and explain of its probability addition and multiplication .	
	2nd	10th	Mid-term exan	nina	ation					
	2nd Quarter		Mid-term examination The probability variables and its prodistributions			bability	We can understand and explain of the discrete variables and binomial distribution.			
			distributions The probability variables and its pridistributions				<u>vai ia</u>	We can understand and explain of the continuo variables and normal distribution.		

		13th	The probability values	ariables and its p	robability	We can under variables and	We can understand and explain of the continuous variables and normal distribution.			
	14th T		The fundamental	e fundamentals of statistic			We can understand and explain of the statistics and sampling distribution.			
		15th	Final examination	xamination						
		16th								
Evaluati	on M	ethod and	Weight (%)							
		Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total		
Subtotal		60	0	0	0	40	0	100		
Basic Proficience	у	30	0	0	0	20	0	50		
Specialized Proficiency		20	0	0	0	15	0	35		
Cross Are Proficience			0	5	0	15				

	Anan Co	llege	Year	2024		Course Title Minor		
Course	Informa	tion						
Course Co	ode	1554200			Course Category	/ Specializ	ed / Elective	
Class For	mat	Lecture			Credits	Academi	c Credit: 2	
Departme	ent	Course of (Chemical Engine	eering	Student Grade	4th		
Term		First Seme	ster		Classes per Wee	ek 前期:2		
Textbook Teaching		Kagakunot	amenosuugaku	(Syokabo) By Ta	akashi Fujikawa, I	Kiyotaka Asaku	ra e	
Instructo	r	Ueda Kohe	i					
Course	Objectiv	'es						
1. Unders 2. Unders	stand vecto stand the p	or analysis, w properties and	hich is essential I calculational m	for learning chen nethods of comple	nistry and electro ex numbers.	magnetism.		
Rubric			Tru III III III III III III III III III I				Minimum Lovel	
			Ideal Level	nuahlama waina	Standard Level	ui, ati o and	Minimum Level	
Achievem	ent 1		vector analysis		Calculate the de integral operation		Calculate the basic algebraic operations on vectors.	
Achievem	ent 2		calculations of numbers and a chemistry.	e properties and complex pply them to	Understand the calculational me complex numbe	thods of	Understand the properties of complex numbers.	
Assigne	d Depar	tment Obje	ectives					
Teachin	g Metho	od						
Outline		necessary	to understand t ical mathematic	he electromagnet	ic interactions be	tween nuclei ar	oy a cloud of negatively charged es, and larger systems, it is nd electrons. This course deals sm, without being concerned with	
Style		Assignmen Short exer	ts will be given cises will be giv	for each lecture. en during the clas	The assignments	will help you re	eview and prepare for the lecture.	
Notice		_		, please ask them sted during the ex				
Charact	eristics		ivision in Le		, , , , , , , , , , , , , , , , , , ,			
□ Active			☐ Aided by IC		☐ Applicable to	Remote Class	☐ Instructor Professionally Experienced	
Course	Plan							
		Th	neme			Goals		
		1st Ve		cosine, inner prod	luct, cross	Calculate inner	and cross products	
		2nd De	erivatives of vec	tor	(Calculate derivatives of vectors		
		3rd Sc	alar fields, vect	or fields	[Explain scalar a	nd vector fields	
	1st	4th Lii	ne integral of sc	alars		Calculate the lin	e integral of scalars	
	Quarter	5th Liı	ne integral of ve	ector fields	(Calculate the lin	e integral of vector fields	
		6th Su	ırface integral s	calars	(Calculate the su	rface integral of scalars	
		7th Su	ırface integral v	ector fields	(Calculate the su	rface integral of vector fields	
1st		8th Mi	dterm examina	tion				
Semeste		9th Ba	sic properties o	of complex number		Jnderstand the numbers	basic properties of complex	
		10th Ba	sic properties c	of complex number		Understand the numbers	basic properties of complex	
		11th Co	mplex function		ı	Jnderstand the	complex function	
	2nd	12th Di	fferentiation of	complex functions	6 (Calculate the de	erivative of complex functions	
	Quarter	13th In	tegral of comple	ex functions	(Calculate compl	ex integrals	
		14th Ca	uchy's integral	theorem	,	Able to explain	Cauchy's integral theorem	
				expression		Calculate perim ntegral express	eter integrals using the Cauchy ion	
16th Final examination								
Evaluation Method and Weight (%)								
Examination				Portfolio		Total		
Subtotal 50				50		100		
	Basic Proficiency 20				15		35	
	Specialized Proficiency 15				20		35	
	a Proficier		15		15		30	
		-	-		•			

,	Anan Co	llege	Year	2024		Course Title	Research for Graduation Thesis
Course	Informa	tion	•	•		•	
Course Co	ode	1415000			Course Category	Special	ized / Compulsory
Class For	mat	Seminar			Credits	School	Credit: 10
Departme	ent	Course of 0	Chemical Engin	neering	Student Grade	5th	
Term		Year-round	l		Classes per Weel	k 10	
Textbook Teaching	and/or Materials	As directed	by the faculty	advisor.			
Instructo	r	Nakamura Tomoya,Ue	Atsunobu,Yosh eda Kohei,Ezur	nida Takehito,Ota e Ryosuke	Naotomo,Zheng Ta	ao,Otani Tak	ashi,Sugiyama Yuuki,Konishi
Course	Objectiv	es					
2. To inde analyze n 3. To sun	ependently nethods to	conduct rese promote the	arch under the research them	eme and its signif e guidance of a fac le. earch in a graduat	culty member in ch	narge in orde	r to plan, conduct experiments, and
Rubric		1	* 1 1 1 1 1		G. 1 11 1		
			Ideal Level	· .	Standard Level		Unacceptable Level
Achievem	ent 1		explain the baperipheral kno	wledge, and anificance of the	engineering significance of the research topic under the		research topic as instructed by
Achievem	ent 2		and analytical	ns, experimental methods, etc. to esearch theme on isis.	Examines plans a experimental and methods to prom research theme u guidance of the f	d analytical note the under the	Promotes the research theme according to the instructions of the advisor.
Achievem	nent 3		presents the re	graduation thesis	Compiles and pre results of their re graduation thesis abstract under the the faculty advisor	esearch in a s with English ne guidance (Compiles the results of their research into a graduation thesis with an English abstract as instructed by the advisor.
	d Donar	tment Obje	ctives		,		•
Assigne	ומטבטמו						
					 度目標 C-2 学習・教	女育到達度目標	
学習・教育		票 B-1 学習・教		こ1 学習・教育到達	度目標 C-2 学習・教	放育到達度目標	ED-2 学習・教育到達度目標 E-3
学習・教育 Teachin	· 到達度目標	B-1 学習・教 d In the proc problems a year. In ad The studer charge of r devices at	ress of promotion ind issues by a dition, the goants concerned interpretable to the search and decompanies, and	ing their research pplying and utilizin il is to acquire the n this course (2-4 evelopment of des d who use their ex	themes, students of the specialized in nurturing skills to students) are taugign and manufacturing and manufacturing and manufacturic students of the students	will acquire t knowledge tl be an enging ght by facult uring process	he practical skills to solve given hey have acquired up to the fourther who can contribute to society. If y members who have been in the sees for semiconductor integrated a format that combines lectures,
学習・教育	· 到達度目標	B-1 学習・教 d In the proc problems a year. In ad The studen charge of r devices at exercises, Students w Two preser	ress of promotion dissues by a dition, the goants concerned interested and decompanies, and experimen will carry out the nations are sci	ing their research pplying and utilizing is to acquire the notation this course (2-4 evelopment of desid who use their exits.	themes, students of the specialized nurturing skills to students) are taugign and manufacturerience to conduendently in each la Presentation," and	will acquire t knowledge the an enging ght by faculte uring process ct classes in	he practical skills to solve given eey have acquired up to the fourth eer who can contribute to society. y members who have been in ess for semiconductor integrated
学習・教育 Teachin Outline Style	· 到達度目標	B-1 学習・教 d In the proc problems a year. In ad The studer charge of r devices at exercises, i Students w Two preser are require	ress of promotion ind issues by a dition, the goal dition, and experimen will carry out the stations are sold to write and	ing their research pplying and utilizing it is to acquire the nothing the nothing to acquire the nothing the nothing the nothing and utilized the nothing the nothing the nothing and utilized the nothing	themes, students of the specialized in nurturing skills to students) are taugign and manufacturence to conduct endently in each la Presentation," and on thesis.	will acquire t knowledge the be an engine ght by facult uring process act classes in aboratory un d'Graduation	he practical skills to solve given ney have acquired up to the fourth eer who can contribute to society. It is made to society and the society of the semiconductor integrated a format that combines lectures, der the guidance of the advisor.
学習・教育 Teachin Outline Style Notice	野選度目標 g Metho	B-1 学習・第 d In the proc problems a year. In ad The studer charge of r devices at exercises, Students w Two preser are require	ress of promotind issues by a dition, the goal this concerned intesearch and docompanies, and experimen will carry out that ions are sold to write and nust plan well f	ing their research pplying and utilizing lis to acquire the nothing the nothing course (2-4 evelopment of desid who use their exits. eir research indep heduled: "Interim submit a graduation of their assignment of their assignment in the polying their assignment in the submit and utilized their assignment in the submit and utilized the submit as graduation of the submit as graduation	themes, students of the specialized in nurturing skills to students) are taugign and manufacturence to conduct endently in each la Presentation," and on thesis.	will acquire t knowledge the be an engine ght by facult uring process act classes in aboratory un d'Graduation	he practical skills to solve given ney have acquired up to the fourth eer who can contribute to society. y members who have been in ses for semiconductor integrated a format that combines lectures, der the guidance of the advisor. In Research Presentation. Students
学習・教育 Teachin Outline Style Notice Charact	野選度目標 g Metho	B-1 学習・第 d In the proc problems a year. In ad The studer charge of r devices at exercises, Students w Two preser are require	ress of promotion ind issues by a dition, the goal dition, and experimen will carry out the stations are sold to write and	ing their research inplying and utilizing an	themes, students of the specialized in nurturing skills to students) are taugign and manufacturence to conduct endently in each la Presentation," and on thesis.	will acquire t knowledge tl be an enging ght by facult uring process ict classes in aboratory un d "Graduation their research	he practical skills to solve given hey have acquired up to the fourth her who can contribute to society. If members who have been in hes for semiconductor integrated a format that combines lectures, he research Presentation. Students in independently and continuously.
学習・教育 Teachin Outline Style Notice Charact	可達度目標 g Metho ceristics (B-1 学習・第 d In the proc problems a year. In ad The studer charge of r devices at exercises, Students w Two preser are require	ress of promotion in dissues by a dition, the goal dition, the goal dissues by a loss concerned in the search and decompanies, and experimential carry out the stations are sold to write and must plan well for the search and the search and the search are search as the search are search are search as the search are search as the search are search are search as the search are search are search as the search are search a	ing their research inplying and utilizing an	themes, students of the specialized nurturing skills to students) are tauging and manufacturence to conducted and the sistemation," and on thesis.	will acquire t knowledge tl be an enging ght by facult uring process ict classes in aboratory un d "Graduation their research	he practical skills to solve given hey have acquired up to the fourth eer who can contribute to society. If y members who have been in ses for semiconductor integrated a format that combines lectures, and the guidance of the advisor. If Research Presentation. Students in independently and continuously.
学習・教育 Teachin Outline Style Notice Charact	可達度目標 g Metho ceristics (B-1 学習・第 d In the proc problems a year. In ad The studer charge of r devices at exercises, Students w Two preser are require Students n of Class / D	ress of promotind issues by a dition, the goal dition, the goal dition, the goal dissues by a dition, the goal dissues concerned in esearch and decompanies, and experimen will carry out that ations are sold to write and must plan well for bivision in Le	ing their research inplying and utilizing an	themes, students of the specialized nurturing skills to students) are tauging and manufacture of the students of the students of the students of the students of the sis. Applicable to	will acquire t knowledge tl be an enging ght by facult uring process ict classes in aboratory un d "Graduation their research	he practical skills to solve given hey have acquired up to the fourth eer who can contribute to society. If y members who have been in ses for semiconductor integrated a format that combines lectures, and the guidance of the advisor. If Research Presentation. Students in independently and continuously.
学習・教育 Teachin Outline Style Notice Charact	可達度目標 g Metho ceristics (B-1 学習・教d In the prooproblems a year. In ad The studer charge of r devices at exercises, Students was Two presentare require Students mof Class / D	ress of promotion in dissues by a dition, the goal dition, the goal dissues by a loss concerned in the search and decompanies, and experimential carry out the stations are sold to write and must plan well for the search and the search and the search are search as the search are search are search as the search are search as the search are search are search as the search are search are search as the search are search a	ing their research ipplying and utilizing according to their expension and utilizing and utilizing and utilizing and utilizing according according according and utilizing according according and utilizing according acc	themes, students of the specialized nurturing skills to students) are tauging and manufacture of the students	will acquire to knowledge to be an enging the process of the control of the contr	he practical skills to solve given hey have acquired up to the fourth eer who can contribute to society. If y members who have been in ses for semiconductor integrated a format that combines lectures, and the guidance of the advisor. If Research Presentation. Students in independently and continuously.
学習・教育 Teachin Outline Style Notice Charact	可達度目標 g Metho ceristics (B-1 学習・第 d In the proc problems a year. In ad The studer charge of r devices at exercises, students must be students must b	r育到達度目標 Cress of promotion in the goal its concerned in the goal its	ing their research ipplying and utilizing an	themes, students of the specialized nurturing skills to students) are tauging and manufacture free free free free free free free f	will acquire to knowledge to be an enging ght by facultiuring process of classes in aboratory und "Graduation their research Remote Classon their research to also be a complete to the comple	he practical skills to solve given hey have acquired up to the fourth her who can contribute to society. It members who have been in hes for semiconductor integrated a format that combines lectures, he research Presentation. Students in independently and continuously. Instructor Professionally Experienced The research background, conducts the research background, conducts
学習・教育 Teachin Outline Style Notice Charact	可達度目標 g Metho ceristics (B-1 学習・第 d In the proc problems a year. In ad The studer charge of r devices at exercises, a Students w Two present are required Students m of Class / D Th 1st Su 2nd Su	r育到達度目標 Cress of promotion in the goal its concerned in the search and decompanies, and experimentations are sold to write and must plan well foivision in Lease Aided by IC	ing their research ipplying and utilizing and use their experience are a graduation and utilizing and utilizing and utilizing arming arming arch	themes, students of the specialized nurturing skills to students) are tauging and manufacture of the special students of the students of the students of the students of the special students of the students of the special s	will acquire to knowledge to be an enging the py faculturing process for classes in aboratory und "Graduation their research t	he practical skills to solve given hey have acquired up to the fourth her who can contribute to society. It members who have been in hes for semiconductor integrated a format that combines lectures, he research Presentation. Students in independently and continuously. Instructor Professionally Experienced The research background, conducts and analysis, and discusses the he research background, conducts the research background, conducts and research background, conducts the research background, conducts the research background, conducts
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学習·教育 Teachin Outline Style Notice Charact □ Active	可達度目標 g Metho eristics (Learning	B-1 学習・第 d In the proc problems a year. In ad The studer charge of r devices at exercises, so Students more Class / D The students more Class / D	r育到達度目標 Control of the season of promotion of the goal and its concerned in the search and decompanies, and experiment of the search and the search of	ing their research inpplying and utilizing and utilizing and utilizing and utilizing and utilizing and it is to acquire the nothic course (2-4 evelopment of design design and use their exits. eir research indepheduled: "Interim submit a graduation of their assignment and graduation of their ass	themes, students of the specialized nurturing skills to students) are taugign and manufacture of the special students of the students of the students of the students of the special students of the students of the special s	will acquire to knowledge to be an engine ght by faculturing process ct classes in aboratory und "Graduation their research th	he practical skills to solve given hey have acquired up to the fourth her who can contribute to society. It members who have been in hes for semiconductor integrated a format that combines lectures, and the guidance of the advisor. It Research Presentation. Students in independently and continuously. Instructor Professionally Experienced The research background, conducts and analysis, and discusses the he research background, conducts and analysis, and discusses the he research background, conducts and analysis, and discusses the he research background, conducts and analysis, and discusses the he research background, conducts and analysis, and discusses the he research background, conducts and analysis, and discusses the he research background, conducts and analysis, and discusses the he research background, conducts and research background, conducts are research background, conducts and research background and research background and research background and research backgrou

Surveys and Research Investigates the research background, conducts experiments and analysis, and discusses the results.							
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2nd Quarter 13th			11th	Surveys and Research		experiments and	research background, conducts analysis, and discusses the
13th Surveys and Research Investigates the research background, conducts experiments and analysis, and discusses the results.			12th	Surveys and Research		experiments and	research background, conducts analysis, and discusses the
14th Surveys and Research experiments and analysis, and discusses the results.		Quarter	13th	Surveys and Research		experiments and	
15th Surveys and Research experiments and analysis, and discusses the results.			14th	Surveys and Research		experiments and	research background, conducts analysis, and discusses the
Semester Semester			15th	Surveys and Research		experiments and	
Part Conducting Research Examine and discuss the results.			16th	midterm (mid-semester) preser	ntation		
And Quarter Conducting Research Conducts experiments, analyses, etc., and examine and discuss the results.			1st	Conducting Research		Conducts experi examine and dis	ments, analyses, etc., and cuss the results.
Subtotal Basic Proficiency Subtotal Basic Proficency Subtotal Basic Profice Process Subtotal Basic Profice P			2nd	Conducting Research			
Ath Conducting Research Conducts experiments, analyses, etc., and examine and discuss the results.			3rd	Conducting Research		Conducts experi	ments, analyses, etc., and
Sth Conducting Research Conducts experiments, analyses, etc., and examine and discuss the results.			4th	Conducting Research		Conducts experi	ments, analyses, etc., and
Conducting Research Examine and discuss the results.			5th	Conducting Research			
Tth Conducting Research Conducts experiments, analyses, etc., and examine and discuss the results.			6th	Conducting Research		Conducts experi examine and dis	ments, analyses, etc., and cuss the results.
2nd Semester 1 9th Conducting Research Conducts experiments, analyses, etc., and examine and discuss the results. 10th Conducting Research Conducts experiments, analyses, etc., and examine and discuss the results. 10th Conducting Research Conducts experiments, analyses, etc., and examine and discuss the results. 11th Research and Dissertation Writing Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. 12th Research and Dissertation Writing Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. 13th Research and Dissertation Writing Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. 14th Research and Dissertation Writing Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. 15th Research and Dissertation Writing Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. 15th Research and Dissertation Writing Summarizes the results in a paper based on examination and discussion of the results. 15th Graduation Research Presentation Summarizes the results in a paper based on examination and discussion of the results. 15th Graduation Research Presentation Total Subtotal 50 50 100 Basic Proficiency 0 0 0 0 Specialized Proficiency 40 00 70			7th	Conducting Research		Conducts experi	ments, analyses, etc., and
2nd Semeste 10th Conducting Research 10th Conducting Research 10th Conducting Research 11th Research and Dissertation Writing Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. 12th Research and Dissertation Writing Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc., and summarizes the results in a paper based on examination and discussion of the results. Conducts experiments, analyses, etc			8th	Conducting Research			
10th Conducting Research Examine and discuss the results.	2nd		9th	Conducting Research		Conducts experi examine and dis	ments, analyses, etc., and cuss the results.
11th Research and Dissertation Writing Summarizes the results in a paper based on examination and discussion of the results.	Semeste		10th	Conducting Research		Conducts experi examine and dis	ments, analyses, etc., and cuss the results.
12th Research and Dissertation Writing Summarizes the results in a paper based on examination and discussion of the results.			11th	Research and Dissertation Writi	ng	summarizes the	results in a paper based on
Quarter 13th Research and Dissertation Writing Summarizes the results in a paper based on examination and discussion of the results.			12th	Research and Dissertation Writi	ng	summarizes the	results in a paper based on
14th Research and Dissertation Writing summarizes the results in a paper based on examination and discussion of the results.		_	13th	Research and Dissertation Writi	ng	summarizes the	results in a paper based on
Subtotal Subtotal			14th	Research and Dissertation Writi	ng	summarizes the	results in a paper based on
16th Graduation Research Presentation research paper and presents the outline of the research. Evaluation Method and Weight (%) Presentation / Attitude Other Total			15th	Research and Dissertation Writi	ng	summarizes the	results in a paper based on
Evaluation Method and Weight (%) Presentation / Attitude Other Total Subtotal 50 50 100 Basic Proficiency 0 0 0 Specialized Proficiency 40 30 70		16th Graduation Research Presentation		on	research paper a	research results in a graduation and presents the outline of the	
Presentation / Attitude Other Total Subtotal 50 50 100 Basic Proficiency 0 0 0 Specialized Proficiency 40 30 70	Evaluat	ion Meth	od and	Weight (%)		'	
Basic Proficiency 0 0 0 Specialized Proficiency 40 30 70					Other		Total
Specialized Proficiency 40 30 70	Subtotal				100		
Cross Area Proficiency102030							
	Cross Are	a Proficier	псу	10	20		30

,	Anan C	College	e	Year	2024		Course Title	Biotechnology	/
Course	Inform	ation							
Course Co	ode	14	415H01			Course Categor	y Specializ	zed / Compulsory	
Class For	mat	Le	ecture			Credits	Academ	ic Credit: 2	
Departme	ent	Co	ourse of Cl	hemical Engine	ering	Student Grade	5th		
Term		Se	econd Sem	nester		Classes per We	ek 後期:2		
Textbook Teaching		s Ap	pplied Micr	obiology, Saka	i et al. Asakura sl	noten			
Instructo	r	Ot	ta Naotom	10					
Course	Object	ives							
2. To be a	able to e able to e	xplain xplain	the types the function	of microorganions of microorg	sms, their charac janisms and their	teristics, and me application met	ethods of cultivation	ating microorganis	ms.
Rubric						ī			
				deal Level		Standard Level		Minimum Level	
Achievement 1			t t r	L. To be able to the types of mid their characterismethods of cult microorganisms	stics, and ivating	1. To be able to types of microo characteristics, cultivating micr	rganisms, their and methods o	types of microc	o understand the organisms, their and methods of corganisms.
Achievem	nent 2		t	Fo be able to ex the functions of and their applic	xplain in detail microorganisms ation methods.	To be able to ex functions of mid and their applic	croorganisms	To be able to u functions of midand their applications	croorganisms
Assigne	d Depa	<u>artme</u>	nt Objec	ctives					
学習・教育	到達度 目	■標 A-3	3 学習・教育	育到達度目標 D-	1 学習・教育到達原	度目標 D-4			
Teachin									
			s a basis o	f biotechnoloa	, learn about the	properties and f	functions of mid	croorganisms, and	learn how to
Outline		ha	andle and	use them.		· ·			
Style		30) hours of	class time + 6	iizzes, presentation O hours of self-st	ıdy	•		
Notice									
Charact	eristics	of C	lass / Di	vision in Lea	arning				
□ Active	Learnin	g		☐ Aided by IC	Γ	☐ Applicable to	o Remote Class	☐ Instructor P Experienced	rofessionally
Course	Plan								
Course			The	eme			Goals		
		1st		tory of Applied	Microbiology			microbiology can b	e explained
		2nd		rent state of m		i		current state of r	
		3rd		structure of m				cell structure of r	
		4th		netics of microc			•	genetics of micro	
	3rd Quarte	5th			expression in mi	croorganisms	Can explain the regulation of gene expression in microorganisms		
	Quarter	6th	reg	ulation of gene	expression in mi	croorganisms		regulation of gen	e expression in
		7th	pro	perties of prote	eins and enzymes			e properties of pro	teins and
<u>.</u> .		8th	me	tabolism of mid	roorganisms		•	metabolism of m	icroorganisms
2nd Semeste		9th		tabolism of mid			•	metabolism of m	
r		10t		tabolism of mid		t t	•	metabolism of m	
		11t		eding of micro		i	-	croorganisms can	
		12t		eding of micro				croorganisms can	<u> </u>
	4th	13t			th of microorgani	ieme		out isolation and g	•
	Quarte	- 14t			erial cycle and en	vironmental	To be able to e	xplain about troph onmental conserva	ic form, material ation technology
		15t	troi	ohic form, mate	erial cycle and en nology of microor	vironmental	To be able to e	xplain about troph onmental conserva	ic form, material ation technology
		100				555.115	of microorganis	sms	
F 1	 	16t	· · · · · · · · · · · · · · · · · · ·	-b+ (0/)					
∟valuat	<u>ion Me</u>	tnod	and Wei	gnt (%)		I			
Quiz Presentation Mutual Evaluations between students			Behavior	Portfolio	Other	Total			
Subtotal		ł0	3	30	0	0	30	0	100
Basic		_		-				0	
Proficienc	Proficiency 40 30 0 0					30		100	

Specialized Proficiency	0	0	0	0	0	0	0
Cross Area Proficiency	0	0	0	0	0	0	0

	Anan Co	llege	Year	2024		Course	Materials Engineering	
	Informa			l		Title		
Course Co		1495202			Course Category	Specializ	red / Elective	
Class For		Lecture			Credits		c Credit: 2	
Departme	ent	Course of	Chemical Engine	eering	Student Grade	5th		
Term		Second Se			Classes per Wee			
Textbook Teaching	and/or Materials	れたけは知	っておきたいファ	ce book : 足立吟せ インセラミックスの	!・南努「現代無機! かすべて」日刊工業	材料科学」 化学 新聞社	:同人、(社)日本セラミックス協会「こ 	
Instructo		Konishi To	moya					
1. To und 2. To exp 3. To exp 4. To disc	olain the cl lain the fu cuss energ	ow to obtain haracteristics nctionality of v issues and	of various inorg	substances and ex janic materials an- ic materials and tl ation of inorganic f new materials.	d the principles of he processing me	f their develop thods to realiz	ment.	
Rubric								
			Ideal Level		Standard Level		Unacceptable Level	
Achievem	nent 1		Explains, with sexamples, the to a material a functionality.	structure given	Explains that ma obtained by proc substances to give	cessing	Cannot explain the difference between a substance and a material.	
Achievem	ent 2		Explains how to functionality of inorganic mate	various	Explains the stru functionality of v inorganic materia	arious	Cannot give specific examples of the types of inorganic materials and their functionality.	
Achievem	nent 3		materials and h	the viewpoint of now inorganic otentially used to	Explains how to problems from the materials and ho materials are pol- achieve these so	he viewpoint o ow inorganic tentially used t	viewpoint of materials and how	
Assigne	d Depar	tment Obj	ectives					
学習・教育	到達度目標	票 B-3 学習・	教育到達度目標 D	-1 学習・教育到達原	度目標 D-3			
Teachin	g Metho	d						
Outline		used in ou origin of s of materials "Materials knowledge in examin	ir daily lives. In auch advantages ils is closely relar Processing will and skills to being the functionare will be given re	this lecture, we wand functionality, ted to the process also be included. It come practical enaity and utilization and utiliza	ill focus on the mand learn about a ling methods that The goal of this c gineers, while con of inorganic mat and writable wor	orphology of ir cutting-edge a impart form, s course is to pro nsidering how erials. rksheets, so th	nd functionalities and are widely norganic materials, explore the pplications. Since the functionality some of the topics covered in wide students with the basic to apply their previous knowledge ere is no need to prepare notes or concrete examples as much as	
Notice		This cours	se is a subject co	0 hrs of self-study orresponding to th stry, physics, and	e sub-maior, and	students will ugeneral educat	use the basic knowledge and ion to understand the functionality ba will be used for reviewing	
Notice		lectures a	nd submitting as	ssignments, stude	nts are required t	o have an Inte	ernet connection via PC or mobile	
Charact	eristics (Division in Le	arning				
	Learning	<u> </u>	☐ Aided by IC		☐ Applicable to	Remote Class	☐ Instructor Professionally Experienced	
Course	Plan							
		Т	heme		G	Goals		
		1st I	ntroduction to M	aterials Engineerir	ng a		ference between a substance and the form and function of	
		2nd B	asics of Ceramic	Materialas	E		aracteristics of ceramic materials	
	24	3rd F	undamentals of	Crystals and Phas	e mansicions p	Explains types of crystals, their physical properties, and phase transitions.		
	3rd Quarter		irconia materials		to	oùghness of pa	stabilization of zirconia and artially stabilized zirconia materials.	
2nd Semeste		5th Z	irconia materials	s (II)			onal properties of stabilized zirconia	
r		6th P	rocessing Metho	ds of Fine Cerami	u u	ısıng complexe	raw material purification process s and various sintering methods.	
		7th S	oft Solution Che	mistry Methods		explains how to colution proces	synthesize Fine Ceramics by ses.	
		8th [I	Mid-term exam]					
	4.1		ielectric materia	ls	E	Explains structu	ure and physical properties, types s of dielectric materials.	
	4th Quarter	10th F	luorescent mate	prescent materials		Explains the fluorescent emission characteristics of rare earth ions, and the characteristics and applications of inorganic fluorescent materials		

		11th	Magnetic Material	S		Explains the ch magnetic mate	Explains the characteristics and applications of magnetic materials.			
		12th	Glass materials		Understands the characteristics of glas and explain processing, strengthening, functionalization methods.			of glass materials hening, and		
		13th					Explains processing methods and functionalization of nano materials, using catalyst materials as an example.			
		14th	Energy Materials	(I)		Explains the str	ucture and mate	erials of fuel cells.		
		15th Energy Materials (II)				Explains structures and materials of dyesensitized solar cells.				
		16th	[Return of final ex	(am]						
Evaluation	on Met	hod and V	Veight (%)							
	E:	xamination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total		
Subtotal	7	0	0	0	0	0	30	100		
Basic Proficiency	, 3	0	0	0	0	0	30	60		
Specialized Proficiency		0	0	0	0	0	0	40		
Cross Area Proficiency			0	0	0	0	0	0		

	Anan Co	llege	Year	2024			Course Title	Engineering Semiconduc	for ctors	
Course	Informa	tion								
Course Co	ode	1495802			Course (Category	Specializ	ed / Elective		
Class Forr	mat	Lecture			Credits		Academ	ic Credit: 2		
Departme	ent	Course of	Chemical Engine	eering	Student	Grade	5th	5th		
Term		First Seme	ester		Classes	oer Week	ek 前期:2			
Textbook Teaching		Kisodensik	ougaku, Fuzimo	oto (Morikita:	syuppan)					
Instructor	r	Nakamura	Atsunobu							
Course	Objectiv	'es								
2. Unders	stand the p	o-n junction a	on phenomena and the current- d the working p	voltage char	acteristics of se					
Rubric										
			Ideal Level		Standard	d Level		Minimum Lev	vel	
Achievem	ent 1		Explain electric phenomena ba energy band st semiconductor equation of mo	sed on the ructure of s and derive	electrons the ener the semicon	the behavious and holes gy band stouctors and farrier mo	based on ructure of d calculate		lifference between conductors and	
Achievement 2			Derive equation rectification projunction capacition capacition.	operty and the	ne Injunctio	ns and Cui	perties of prent-voltag	e Draw a curre	ent-voltage curve ction	
Achievem	ent 3		Understand the principle of transcription the characteristics	nsistors and	operatio draw a d	Explain the outline of the operation of a transistor and draw a diagram of current-voltage characteristics.			ram of current- acteristics.	
	•	tment Obj								
			教育到達度目標 D	-3						
<u>Teachin</u>	ig Metho									
Outline		learn the b	emiconductor de basic matters re actor devices an	lated to sem	iconductors tha	at engineer	nic products s need. Spe	around us. In tecifically, the str	his lecture, you will ucture of	
Style							ng parts will	be supplement	ed with exercises.	
•			se requires basic							
Notice			rting this course							
Charact	eristics	of Class / [Division in Le	arning						
☐ Active	Learning		☐ Aided by IC	T	☑ Appli	cable to Re	mote Class	☑ Instructor Experienced	Professionally	
	D.									
Course	Plan									
			heme			Goa	ıls			
		1st E	nergy band stru	cture of solic	11	Und	Understand the energy band structure.			
		2nd E	nergy band stru	cture of solic	12	Und	Understand the role of electrons and holes.			
		3rd Ca	arrier density ar	nd electrical (conductivity 1	solu	culate the electron density of states from the ution of the Schrödinger equation.			
	1st Quarter	4th C	arrier density ar	nd electrical	conductivity 2			ate the carrier density using the Fermi-Diraution function.		
	Quarter	 	all effect and me			Cald	culate carrie	r mobilities.		
		6th C	urrent and conti	nuity equation	ons 1	Cald	culate diffus	ion current and	drift current.	
		7th C	urrent and conti	nuity equation	ons 2		culate carrie	r density taking	recombination into	
1st		8th M	idterm exam							
Semeste r		9th P-	-N junction 1				lerstand the	current-voltage	e characteristics of	
•		10th P-	-N junction 2					of a depletion	region.	
		11th P-	-N junction 3			Cald	culate p-n ji	unction capacita	nce.	
		12th Bi	ipolar transistor			Und	Understand the structure and the working principle of bipolar transistors.			
	2nd Quarter	13th M	etal-semiconductor junction			Und	Understand the difference between Schottky junction and Ohmic junction.			
		14th M	OSFET 1		Und	lerstand the	structure and t	the working		
		15th M	OSFET 2			Und	principle of MOSFET. Understand the structure and the working principle of MOSFET.			
	<u>L</u>	16th Fi	nal exam							
Evaluati	ion Meth	nod and We	eight (%)			-	-			
	CU									
	Ι.	Examination	Quiz	D==	tfolio	Presentat	ion/Attit	ther	Total	

Subtotal	60	0	40	0	0	100
Basic Proficiency	20	0	10	0	0	30
Specialized Proficiency	40	0	30	0	0	70
Cross Area Proficiency	0	0	0	0	0	0

Course I Course Coo Class Form Departmen Term Textbook Teaching M Instructor Course C 1. 等核2原 2. 異核2原 3. 多原子 3.	de nat nt and/or Materials Objective	1495806 Lecture Course of (First Seme 教科書:真化学) 裳華 Yoshida Taes	船文隆著 「量子 房 kehito	- 化学 – 基礎からのア 	Course Category Credits Student Grade Classes per Weel プローチー」 化学阿	Aca 5th	ecialize idemic 月:2	ed / Elective : Credit: 2 真船文隆著 「新化学シリーズ 量子	
Course Coo Class Form Departmen Term Textbook Teaching M Instructor Course C 1. 等核2原 2. 異核2原 3. 多原子 3.	de nat nt and/or Materials Objective	1495806 Lecture Course of (First Seme 教科書:真化学) 裳華 Yoshida Taes	ster 鉛文隆著「量子 房 ikehito	- 化学 – 基礎からのア 	Credits Student Grade Classes per Weel	Aca 5th	ndemic 月:2	: Credit: 2	
Class Form Departmen Term Textbook Teaching M Instructor Course C 1. 等核2原 2. 異核2原 3. 多原子 3.	nat nt and/or Materials Objective	Lecture Course of (First Seme 教科書:真化学) 裳華 Yoshida Ta	ster 鉛文隆著「量子 房 ikehito	- 化学 – 基礎からのア 	Credits Student Grade Classes per Weel	Aca 5th	ndemic 月:2	: Credit: 2	
Term Textbook Teaching M Instructor Course C 1. 等核2原 2. 異核2原 3. 多原子 る。	and/or Materials Objective	First Seme 教科書:真 化学」裳華 Yoshida Ta	ster 鉛文隆著「量子 房 ikehito	- 化学 – 基礎からのア 	Classes per Weel	(前其	月:2		
Textbook Teaching M Instructor Course C 1. 等核2原 2. 異核2原 3. 多原子 3.	Materials Objective	教科書:真l 化学」裳華 Yoshida Ta ess	船文隆著 「量子 房 kehito	CAO-MO)法を適用				真船文隆著 「新化学シリーズ 量子	
Teaching M Instructor Course C 1. 等核2原 2. 異核2原 3. 多原子 る。	Materials Objective	Yoshida Ta es e子軌道1次結	kehito 合-分子軌道(L	CAO-MO)法を適用	プローチ-」 化学院	司人,近藤	孫保・真	副船文隆著 「新化学シリーズ 量子	
Course C 1. 等核2原 2. 異核2原 3. 多原子 る。	子分子に「		会-分子軌道()	CAO-MO)法を適用 CAO-MO)法を適用 これ、これを適用					
1. 等核2原 2. 異核2原 3. 多原子の	子分子に「	夏子軌道1次結	合-分子軌道(L 合-分子軌道(L 軌道1次結合-分	CAO-MO)法を適用 CAO-MO)法を適用					
2. 異核2原 3. 多原子 る。	原子分子に原子分子に原子分子に原子分子に原子分子にある。 分子及び固	原子軌道1次結 原子軌道1次結 体結晶に原子	合-分子軌道(L 合-分子軌道(L 軌道1次結合-分	CAO-MO)法を適用 CAO-MO)法を適用					
Rubric				于則道(LCAU-MU)	することで、エネル することで、エネル 法を適用すること	レギー準位 レギー準位 で、エネノ	でに でででである。 ででである。 でである。 でである。 でである。 でである。 できる。 できる。 できる。 できる。 できる。 できる。 できる。 でき	関数を導出することができる。 関数を導出することができる。 集位と波動関数を導出することができ	
			理想的な到達レ	ベルの目安	標準的な到達レベ	ルの目安		最低限の到達レベルの目安(可)	
評価項目1			分子軌道(LCA ることで、エネ 関数を導出する た記号σ, π, g, 類ができる。簡	こ原子軌道1次結合- O-MO) 法を適用す ルギー準位と波動 ことができる。ま uを用いてMOの分 単な等核2原子分子 次数を算出できる	等核2原子分子に原分子に原分子軌道(LCAO- ることで、エネル- することができる。 g, uを用いてMOの	MO)法を ギー準位を 、また記号	:適用す を導出 号σ, π,		
評価項目2			分字動道(ICA	こ原子軌道1次結合- O-MO)法を適用す ルギー準位と波動 ことができる。	異核2原子分子に原分子軌道(LCAO- ることで、エネル- することができる。	MO)法を	適用す		
評価項目3			道1次結合-分子 MO) 法を適用す	固体結晶に原子軌 軌道(LCAO- することで、エネル 関数を導出するこ	道1次結合-分子軌。 MO) 法を適用する	か子及び固体結晶に原子軌 記合-分子軌道(LCAO- を適用することで、エネル 立を導出することができる		多原子分子及び固体結晶に原子軌 道1次結合-分子軌道 (LCAO- MO) 法を適用することで、エネル ギー準位の導出方法を説明できる。	
	•	ment Obje			1-			1.	
学習・教育									
Teaching	g Method								
Outline		を数学的手! 態に関して 適応能力を!	段を駆使した一覧 数理的に理解する 身につける。この	貫した理論体系としることを学ぶ。具体に の科目は企業で、半週	て把握する。次に化 的問題解法を多く取 導体集積素子の設計	学への重要 り入れる。 及び製造	要な応用 ことです プロセノ	展した量子化学について、その基礎 相として、分子と固体結晶の電子状 理解力を涵養し、応用化学分野への スの研究・開発を担当していた教員 で授業を行うものである。	
Style		入れる(特	に分子軌道). 🖺		ので(3-5回/1コマ)	,積極的	りに答え	が,関連資料のスライド紹介も取り えること。指名されない学生も積極的 養うこと。	
Notice		こと。また! に行うこと! 解できなか	授業各回毎に出る は不可能なので、 ったのかをはっる	された課題の実施を演	含む自学自習が不可 問に来ること。質問 に来ること。	欠である。 にあたっ ⁻	。授業はては、 5	これらの内容をしっかり復習しておく 時間内に自学自習課題の解説を十分 先ず自分で調べ考えてみて、何が理 東京化学同人	
Characte	ristics c	•	Division in Le					262710 3 1-327	
☐ Active L		ii Class / L	☐ Aided by I		☐ Applicable to	Remote	Class	☐ Instructor Professionally Experienced	
Course	lan								
Course P	iaii		nomo			oals			
			neme ルン-オッペンハ	 ハイマー(B-O)近似	, В	-O近似に			
	•	2nd 分	 子軌道(MO)法	±:	原		ニアンを書き下すことができる。 軌道1次結合(LCAO)によるMOの構成方法につ		
		3rd 分	子軌道(MO)沒	************************************	多	が 分法をB- し、重な	O近似 り積分	水素分子イオンハミルトニアンに適 、クーロン積分、共鳴積分、永年方程	
		4th 分	子軌道(MO)沒	 :: 水素分子イオン	L	CAO-MO	法を水	説明できる。 素分子イオンに適用した際の,波動 準位を導出することができる.	
	1st Quarter	5th 分	子軌道(MO)沒	芸:水素分子イオン	L	CAO-MO lン積分に	法を水	素分子イオンに適用した際の, クー核間距離依存性などを定量的に図示	
		6th 分	子軌道(MO)沒	去:水素分子イオン	L 程	CAO-MO うかについ	説明できる. CAO-MO法を水素分子イオンに適用した際の,共鳴 分について核間距離依存性などを定量的に図示・説		
	7th 分		子軌道(MO)沒	ま: 水素分子イオン	明できる. LCAO-MO法による水素分子イオンの,波動関数合性,反結合性)形状とエネルギー準位を核間距 関数として図示することができる.重なり積分, ロン積分,共鳴積分の挙動も併せて,水素分子イ			形状とエネルギー準位を核間距離のることができる. 重なり積分,クー分の挙動も併せて,水素分子イオン	
		8th 中	間試験			ついての	説明が		

		9th	th 多原子分子:sp混成軌道					LCAO-MO法を用いて,BeH2のsp混成軌道を導出することができる.			
		10th	多原子:	多原子分子:sp2混成軌道				LCAO-MO法を用いて、BH3のsp2混成軌道を導出することができる。			
		11th	多原子	多原子分子:sp3混成軌道				LCAO-MO法を用いて, CH4のsp3混成軌道を導出する ことができる.			
	2nd	12th	多原子	分子:ヒュッケル近似	IJ.		ヒュッケル近似について概要説明できる。エテン分子 にヒュッケル近似を適用し、エネルギー準位を導出で きる。				
	Quarter	13th	多原子:	分子:ヒュッケル近仏),		3ブタジエン分子パイ電子軌道にヒュッケル近似を適用 し、エネルギー準位を導出し波動関数の概形を描ける				
		14th	固体の	電子状態		LCAO-MO法な ド構造の導出		J、エネルギーバン			
		15th	固体の	電子状態			フェルミ-ディラック分布を用いた絶縁体・半導体の電子構造について説明できる。バンドの底(有効質量近似)のエネルギー状態密度を計算することができる.				
		16th	期末試	験答案返却・解答解詞	 兑						
Evaluati	on Meth	nod and	Weigh	t (%)							
		定期試験		小テスト	ポートフォリオ	発表・勢	・取り組み姿	レポート・課題	Total		
Subtotal	Subtotal 60		0	0	0		40	100			
基礎的能力)	20		0	0	0	-	10	30		
専門的能力)	30		0	0	0		20	50		
分野横断的]能力	10		0	0	0		10	20		

,	Anan Co	llege	Year	2024		Course Title QuantumChemis				
Course	Informa	tion	<u> </u>	•		•	•			
Course Co		149580	7		Course Categor	y Speciali	zed / Elective			
Class Forr	mat	Lecture			Credits	Academic Credit: 2				
Departme	ent	Course	of Chemical Engir	Chemical Engineering Student Grade			5th			
Term		Second	Semester		Classes per We	ek 後期:2				
Textbook Teaching	Matérials			著 「新化学シリーズ	量子化学」 裳華原	房				
Instructor			Takehito							
1. 量子化 2. 電子ス る。この過 3. 軌道, 安定性を評	(ビン、多体) 程でクーC スピン, 全1	列近似法であ 本系反対称性 コン積分, 交 角運動量演算	E波動関数としての 換積分についても特 算子の各々の性質及	スレーター行列式を ³ 勿理的意味を説明でき	理解し、2電子系問 きる。 とし、各原子軌道を	問題に適用しエネ ・項記号で表現で	状態エネルギーを算出できる。 ベルギー準位を導出する方法を説明でき きる。またフントの規則から各軌道の			
Rubric					1					
			理想的な到達し	バルの目安	標準的な到達レイ	ジルの目安	最低限の到達レベルの目安(可)			
評価項目1			動法,変分法の	的近似法である摂 概略を理解し、これ でHe原子の基底状 :算出できる。	量子化学の基本的動法,変分法の概らかの近似法でHエネルギーを算出	略を理解し、と le原子の基底状	大 動法, 後方法の概略を理解し、これ			
評価項目2			関数としてのス 理解し、2電子 ルギー準位を導 できる。この過	体系反対称性波動 レーター行列式を 系問題に適用しエネ 出する方法を説明 程でクーロン積分, いても物理的意味を	電子スピン、多6 関数としてのスL 理解し、2電子系 ルギー準位を導出 できる。	ノーター行列式を 問題に適用しエ	〒 電子スピン、多体系反対称性波動 ネ 関数としてのスレーター行列式に			
評価項目3			各々の性質及ひし、各原子軌道 きる。またフン 道の安定性を評原子状態問遷移	全角運動量演算子の ド合成の規則を理解 を項記号で表現で トの規則から各軌 呼できる。さらに で表現記号で表現で の選択側を判定で	軌道, スピン, 全 各々の性質及び合 し、各原子軌道を きる。またフント 道の安定性を評価	合成の規則を理例 と項記号で表現で トの規則から各軸	報題, 人にブ, 主角建動量展算する 名々の性質及び合成の規則を理解			
Assigne	d Depar	tment Ol	bjectives				•			
学習・教育	到達度目標	₹ D-1								
Teachin	a Metho	d								
Outline		を数学的 て多電子 用化学分	手段を駆使したー 原子の電子状態を 野への適応能力を	貫した理論体系とし ⁻ 数理的に理解するこ。 身につける。この科E	て把握する。次にイ とを学ぶ。具体的「 目は企業で、半導イ	化学への重要な原 問題解法を多く原 本集積素子の設	生展した量子化学について、その基礎 む用として、いくつかの近似法を用い 取り入れることで理解力を涵養し、応 計及び製造プロセスの研究・開発を担 養形式で授業を行うものである。			
Style		入れる(【特に分子軌道) こと。計15回(計	学生への発問はするの	かで(3-5回/1コミ	7) . 積極的に答	るが,関連資料のスライド紹介も取り 答えること。指名されない学生も積極的 を養うこと。授業中に解法の説明を課			
Notice		こと。ま に行うこ 解できな	た授業各回毎に出 とは不可能なので、 かったのかをはっ	された課題の実施を記 、疑問点があれば質問 きりさせてから質問	含む自学自習が不同 問に来ること。質問 こまること	可欠である。授詞 問にあたっては、	これらの内容をしっかり復習しておく 業時間内に自学自習課題の解説を十分 先ず自分で調べ考えてみて、何が理 、物理化学(上)・(下)」 東京化学			
Charact	eristics o	of Class /	Division in Le	earning						
□ Active	Learning		☐ Aided by I	СТ	☐ Applicable to	Remote Class	Instructor Professionally Experienced			
Course	Plan	1								
			Theme			Goals				
		1st	量子化学における	近似法の基礎			こよりHe原子の基底状態エネルギー準 とができる。			
		2nd	量子化学における	量子化学における近似法の基礎			位を導出することができる。 変分法(試行関数をH原子1s状態とする)によりHe原子の基底状態エネルギー準位を導出することができる			
2nd Semeste r	3rd Quarter	3rd	電子スピン			<u>。</u> シュテルン-ゲラ 算子・固有関数 できる。	ラッ八の実験、電子スピン角運動量の演 ・固有値(固有方程式)について説明			
		4th	波動関数の対称性	・反対称性		波動関数の対称性と反対称性(電子は交換に対しては 反対称)を数理的に表現できる。パウリの排他律と反				
	i .					対称性波動関数の関係を説明できる。 多体系反対称性波動関数としてのスレーター行列式に ついて説明できる。				

		6th	反対称	生波動関数を用いたト	le原子モデル		性波動関数) 法を説明でき	He原子中の2電子に2×2のスレーター行列式(反対称性波動関数)を適用し、エネルギー準位を導出する方法を説明できる。クーロン積分, 交換積分について数理的に説明できる。			
		7th	前半の	まとめと演習問題							
		8th	中間試	験							
		9th	ハミル	トニアンと角運動量派	寅 算子		ハミルトニアンと軌道角運動量L^2, Lz及びスピン角 運動量s^2, szの交換関係を算出できる。これらの同 観測性を説明できる。				
		10th	スピン!	軌道相互作用			スピン軌道相 表現でき、軌 動量Jz, J^2 これらの同時	ピン軌道相互作用のハミルトニアンHsoを数理的に現でき、軌道角運動量Lz,スピン角運動量Sz,全角運量Jz,J^2(J=L+S)との交換関係を算出できる、れらの同時観測性を説明できる。			
	4+1-	11th	原子の	項記号			原子の項記号 よって表現で		原子軌道を項記号に		
	4th Quarter	12th	ラッセ	ル-ソーンダース(LS	S) 結合		LS結合法によ を項記号で表		はを理解し、原子軌道		
		13th	フント	の規則			フントの規則 道の安定性を		で表現された原子軌		
		14th	原子スク	ペクトルと項記号			L, S, Jの変化 項記号表現に る。	Jの変化で表現された原子状態間遷移の選択側を 号表現に適用し、遷移の許容・禁制の判定ができ			
		15th	後半の	まとめと演習問題							
		16th	期末試	験答案返却及び解説							
Evaluati	ion Metl	hod and	Weigh [*]	t (%)							
							・取り組み姿	課題・レポート	Total		
Subtotal	Subtotal 60			0	0	0		40	100		
基礎的能力	כ – כ	20		0	0	0		10	30		
専門的能力	כ	30		0	0	0		20	50		
分野横断的	的能力	10		0	0	0		10	20		

	Anan (College		Year	2024		Course Title		Polymer Che	mistry	
Course	Inforn	nation									
Course C	ode	1495A	01			Course Catego	ry	Specialize	ed / Elective		
Class For	mat	Lectur	e			Credits		Academic	: Credit: 2		
Departme	ent	Course	e of Cl	hemical Engine	ering	Student Grade		5th			
Term		Secon	d Sem	nester		Classes per We	Classes per Week 後期:2				
Textbook Teaching	and/or Materia	ls									
Instructo	r	Otani	Takas	hi							
Course	Object	ives									
Rubric											
			I	deal Level		Standard Leve			Unacceptable	Level	
Achievem	nent 1		s	Can explain in o structure and sy polymers	letail the ynthesis of	Can explain the synthesis of po			Cannot explain and synthesis	n the structure of polymers	
Achievem	nent 2		r	Describe in deta polymers, their nechanical pro unctionality	thermal and	Describe the ty their thermal a properties and	pes of nd me function	polymers, chanical onality	types of polyn	cribe in detail the ners, their thermal al properties and	
Achieven	nent 3										
Assigne	ed Dep	artment (Objec	ctives							
学習・教育	到達度	目標 D-1									
Teachir	ng Met	nod									
Outline		Polym synthe the po	ers ca etic po lymer	in be broadly cloly blymers, such a s that exist arc	assified into natu s plastics and filn ound us are synth	ıral polymers, sı ns synthesized b nesized, as well a	ich as by hum as thei	fibers and nans. In thi r types and	foods found in r s course, studer d properties.	nature, and nts will learn how	
Style		In add	ition t		ed on textbooks a	·			•	conducted as	
Notice											
Charact	teristic	s of Class	/ Di	vision in Lea	arning						
□ Active	e Learnir	ng		☐ Aided by IC	Γ	☐ Applicable t	o Rem	ote Class	☐ Instructor Experienced	Professionally	
C	Dlan										
Course	Plan						G 1				
	1		The	eme			Goals	nbat nal	the	hiuth and histon	
		1st	Intr	roduction Macro	omolecules arour	nd us	of polithe cl	ymer chemassification	nistry, the polyn of polymers.	birth and history ner industry, and	
		2nd	Intr	troduction to Natural Polymers				Can explain natural polymers.			
		3rd	Intr	roduction to Sy	nthetic Polymers		Can explain synthetic polymers.				
	3rd	4th	Phy	sical Properties	s of Polymers 1		Explain thermal and mechanical properties of polymers.				
	Quarte	r 5th	Phy	sical Properties	s of Polymers 2		Explain electrical and optical properties of polymers.				
		6th	Seq	quential polyme	erization 1		Explain the synth polycondensation		hesis of polymein reactions.	rs by	
		7th	Seq	quential polyme	erization 2		Explai reacti		hesis of polyme	rs by polyaddition	
2nd Semeste		8th	Seq	quential polyme	erization 3		Explain the synthesis of Polymers by Addition- Condensation Polymerization Reaction.				
r		9th	Mid	lterm examinat	ion		of the	course.		ht in the first half	
		10th	Rac	dical polymeriza	ation of vinyl mor	nomers	Explai polym mono	ierizatión a	hesis of polymei and radical polyr	rs by nerization of vinyl	
	4.1	11th	Rac	dical copolymer	ization		Explai		hesis of polymei	rs by radical	
	4th Quarte	r 12th	Cat	ionic and anior	ic polymerization	1	Explai		hesis of polyme	rs by cationic and	
		13th	Rin	g-opening poly	merization		Explain the synthesis of polymers by ring-opening polymerization.				
		14th	Fun	nctional polyme	r 1		Can e	xplain fund	tional polymers		
		15th	Fun	nctional polyme	r 2		Can s	ynthesize f	unctional polym	iers.	
		16th									
<u>Eval</u> uat	ion Me	thod and	Wei	ght (%)							
		Examination		Assignment Submission	Mutual Evaluations between	Behavior	Porti	folio	Other	Total	
Cubtatal		70		20	students	0				100	
Subtotal		70	3	30	0	0	0		0	100	

Basic Proficiency	25	20	0	0	0	0	45
Specialized Proficiency	35	10	0	0	0	0	45
Cross Area Proficiency	10	0	0	0	0	0	10