# Syllabus

# International Master's Degree Program (2014-Fall Term)

(M41610010)Seminar on Mechanical Engineering I[Seminar on	Mechanical Engineering I
---	--------------------------

Subject name[English]	Seminar on Mech	nanical Engineering I	Seminar on Mech	anical Engineering I]	
Schedule number	M41610010	Subject area	Advanced	Required or	Required
			Mechanical Engineering	elective	
Time of starting a course	Year	Day of the week,period	Intensive	Credit(s)	4
Faculty	Graduate Program	m for Master's Degre	e	Subject grade	1~2
Department Offered	Mechanical Engin			Beggining grade	M1
Charge teacher name[Roman alphabet mark]	S1系教務委員1	kei kyomu Iin−S		8,400	
Numbering					
Objectives of class The seminar aims to provide a bi student. The seminar aims to provide a bi student. Contents of class					
The class provides both of fund the related field by reading rest announced by individual supervis The class provides both of fund the related field by reading rest announced by individual supervis <b>Self Preparation and Review</b>	earch papers and i ors. amental knowledge earch papers and i	monographs. The co of his/her master t	ontents of the cla hesis research wo	ess depend on the s ork and the most ad	supervisor. To be vanced results ir
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference		•			
<b>Goals to be achieved</b> To acquire fundamental knowledg To acquire the ability to find prol			and the presenta	tion skill	
To acquire fundamental knowledg To acquire the ability to find prol	ge of individual rese	arch fields.	·		
Evaluation of achievement					
Coursework, presentation and/or					
Coursework, presentation and/or Examination 試験期間中には何も行わない	ταμυτι.				
None during exam period Details of examination					
Other information					
Reference URL					
Office hours					
Relations to attainment objective	es of learning and e	oducation			

# (M41610020)Seminar on Mechanical Engineering II[Seminar on Mechanical Engineering II]

Calcadula mumb	Seminar on Mech	nanical Engineering I	LSeminar on Miec	hanical Engineering II	
Schedule number	M41610020	Subject area	Advanced	Required or	Required
			Mechanical	elective	1
			Engineering		
Time of starting a course	Year	Day of the week,period	Intensive	Credit(s)	2
Faculty	Graduate Progra	m for Master's Degr	e	Subject grade	2~2
Department Offered	Mechanical Engi	neering		Beggining grade	M2
Charge teacher name[Roman alphabet mark]	S1系教務委員	1kei kyomu Iin−S			
Numbering					
<b>Objectives of class</b> The seminar aims to provide a b student. The seminar aims to provide a b student.	_	-			
Contents of class					
the related field by reading res announced by individual supervis The class provides both of fund the related field by reading res announced by individual supervis <b>Self Preparation and Review</b>	sors. damental knowledge search papers and	of his/her master	hesis research w	ork and the most ad	vanced results ir
Related subjects					
Notes for textbook	de queilable from th				
<b>Notes for textbook</b> Textbook or material will be mad		•			
<b>Notes for textbook</b> Textbook or material will be mad		•			
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference		•			
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference Goals to be achieved	de available from the	e supervisors.			
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference	de available from the	e supervisors. earch fields.	and the presenta	ation skill.	
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference Goals to be achieved To acquire fundamental knowled	le available from the lge of individual rese oblems, the ability to lge of individual rese	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find processory To acquire the ability to find processory	le available from the lge of individual rese oblems, the ability to lge of individual rese	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find proceed To acquire the	lge of individual rese blems, the ability to lge of individual rese blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire fundamental knowled To acquire fundamental knowled To acquire the ability to find proc Evaluation of achievement Coursework, presentation and/or	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find proceed To acquire fundamental knowled To acquire the ability to find proceed To acquire the acquire	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire fundamental knowled To acquire fundamental knowled To acquire the ability to find proc Evaluation of achievement Coursework, presentation and/or Coursework, presentation and/or Examination	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find proceed To acquire the abi	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find proceed To acquire fundamental knowled To acquire the ability to find proceed To acquire the	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find proce To acquire the ability to find proc	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find proceed To acquire fundamental knowled To acquire the ability to find proceed To acquire the	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowled To acquire the ability to find proceed To acquire th	lge of individual rese blems, the ability to blems, the ability to blems, the ability to blems, the ability to	e supervisors. earch fields. o solve the problems earch fields.			

# (M41610030)Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]

Subject name[English]	Thesis Research	on Mechanica	al Engii	neering[Thesis Res	earch on Mechanica	al Engineering]
Schedule number	M41610030	Subject are	a	Advanced	Required or	Required
		_		Mechanical	elective	
				Engineering		
Time of starting a course	2Years	Day of	the	Intensive	Credit(s)	6
		week,period	1			
Faculty	Graduate Progra	m for Master's	Degre	ee	Subject grade	1~2
Department Offered	Mechanical Engir	neering			Beggining	M1, M2
	- · <b>T</b> <sup>1</sup> / <sub>2</sub> <b>X Z D</b>				grade	
Charge teacher name[Roman	S1系教務委員1	lkei kyomu lin-	-8			
alphabet mark]						
Numbering						
Objectives of class						
The thesis research aims to pr understanding of relevant knowle	-	experience of	resea	rch work, and to	acquire research s	kills with a deep
The thesis research aims to pr	-	experience of	resea	irch work, and to	acquire research s	kills with a deep
understanding of relevant knowle	dge.					
Contents of class						
The research subject depends	on the supervisor	and the rese	earch	group you join. Ind	dividual students w	vill have different
research subjects. Discuss with y	our supervisor.					
The research subject depends	on the supervisor	and the rese	earch	group you join. Ind	dividual students w	vill have different
research subjects. Discuss with y	our supervisor.					
Self Preparation and Review						
Related subjects						
Notes for textbook						
Reference and material will be av	ailable from the su	pervisor.				
Reference and material will be av	ailable from the su	pervisor.				
Notes for reference						
Goals to be achieved						
To get something new on individu	al research fields.					
To develop your research skills ir		nd presentatio	n skills	S.		
To get something new on individu	al research fields.					
To develop your research skills ir	ncluding planning a	nd presentatio	n skills	ŝ.		
Evaluation of achievement						
Examination						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	e of learning and a	ducation				
		Julianoli				

(M41610030)Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]

Subject name[English]	Thesis Research	on Mechanical Engir	neering[Thesis Rese	earch on Mechanica	l Engineering]
Schedule number	M41610030	Subject area	Advanced	Required or	Required
			Mechanical	elective	
			Engineering		
Time of starting a course	2Years	Day of the week,period	Intensive	Credit(s)	6
Faculty	Graduate Progran	n for Master's Degre	e	Subject grade	1~1
Department Offered	Mechanical Engin	eering		Beggining	M1, M2
				grade	
Charge teacher name[Roman	S1系教務委員, 1	I系各教員 1kei kyor	mu Iin−S, 1kei kakul	kyouin	
alphabet mark]					
Numbering					
Objectives of class					
The thesis research aims to p	rovide a practical	experience of rese	arch work. and to	acquire research	skills with deep
understanding of the relevant kno	-				
Contents of class	5				
The research subject depends	on the supervisor	and the research	group you join. Inc	lividual students w	ill have different
research subjects. Discuss with y					
Self Preparation and Review	·				
-					
Related subjects					
Notes for textbook					
Reference and material will be av	ailable from the sup	pervisor.			
Notes for reference					
Goals to be achieved					
To get something new on individu					
To develop your research skills in	cluding planning an	d presentation skills	S.		
Evaluation of achievement					
Examination					
その他					
None during exam period					
Details of examination					
Other information					
Reference URL					
Office hours					
Relations to attainment objective	s of learning and e	ducation			
Key words					

# (M4161003T)Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]

Subject name[English]	Thesis Research	on Mechanical Engir	neering[Thesis Re	esearch on Mechanica	I Engineering]
Schedule number	M4161003T	Subject area	Advanced	Required or	Required
			Mechanical	elective	
			Engineering		
Time of starting a course	Year	Day of the	Intensive	Credit(s)	6
		week,period			
Faculty	Graduate Program	m for Master's Degre	ee	Subject grade	2~2
Department Offered	Mechanical Engin	neering		Beggining	M2
				grade	
Charge teacher name[Roman	S1系教務委員1	kei kyomu Iin-S			
alphabet mark]					
Numbering					
Objectives of class	1				
•	rovide o prostiaal	ovnorionaa of	rob work and t	and the reasonable -	ام م مانير
The thesis research aims to p		experience of resea	rch work, and to	o acquire research s	kills with a dee
understanding of relevant knowle	eage.				
The thesis research aims to p	rovide a practical o	experience of resea	rch work, and to	o acquire research s	kills with a dee
understanding of relevant knowle	edge.				
Contents of class					
The research subject depends	on the supervisor	and the research	group you ioin. I	Individual students w	ill have differen
research subjects. Discuss with	-				
The research subject depends		and the research	group vou join.	Individual students w	ill have differen
research subjects. Discuss with			Broab Joa Jonn		
Self Preparation and Review	your supervisor.				
<b></b>					
Related subjects					
Notes for textbook					
Reference and material will be a	vailable from the su	pervisor.			
Reference and material will be a	vailable from the su	pervisor.			
Notes for reference					
Goals to be achieved					
To get something new on individ					
To develop your research skills i		nd presentation skills	5.		
To get something new on individ					
To develop your research skills i	including planning ar	nd presentation skills	S.		
Evaluation of achievement					
Examination					
試験期間中には何も行わない					
Details of examination					
Localis of Stamination					
Other information					
Reference URL					
055					
Office hours					
Relations to attainment objectiv	es of learning and e	oducation			
-	-				

# (M41610040)Seminar on Mechanical Engineering[Seminar on Mechanical Engineering]

Time of starting a course       Ye         Faculty       Gr         Department Offered       Me         Charge teacher name[Roman alphabet mark]       Sr         Numbering       Objectives of class         The seminar aims to provide a broad student.       The seminar aims to provide a broad student.         The seminar aims to provide a broad student.       The seminar aims to provide a broad student.         Contents of class       The class provides both of fundamer the related field by reading research announced by individual supervisors.         The class provides both of fundamer       The class provides both of fundamer	raduate Progra echanical Engir 1系教務委員 1 understanding understanding	lkei kyomu Iin-S	ngineering availab	Required or elective         Credit(s)         Subject grade         Beggining grade	Required 6 2~2 M2
Faculty       Gr         Department Offered       Me         Charge teacher name[Roman alphabet mark]       Sr         Numbering       Dijectives of class         The seminar aims to provide a broad student.       The seminar aims to provide a broad student.         The seminar aims to provide a broad student.       Gontents of class         The class provides both of fundament the related field by reading research announced by individual supervisors.       The class provides both of fundament the related field by reading research announced by individual supervisors.	raduate Progra echanical Engir 1系教務委員 1 understanding understanding	week,period m for Master's Degreen neering Ikei kyomu Iin-S	Engineering Intensive Se ngineering availab	Credit(s) Subject grade Beggining	2~2
Faculty       Gr         Department Offered       Me         Charge teacher name[Roman alphabet mark]       Sr         Numbering       Objectives of class         The seminar aims to provide a broad student.       The seminar aims to provide a broad student.         The seminar aims to provide a broad student.       Sr         The seminar aims to provide a broad student.       Sr         The class provides both of fundamer the related field by reading research announced by individual supervisors.       The class provides both of fundamer	raduate Progra echanical Engir 1系教務委員 1 understanding understanding	week,period m for Master's Degreen neering Ikei kyomu Iin-S	Intensive	Subject grade Beggining	2~2
Faculty       Gr         Department Offered       Me         Charge teacher name[Roman alphabet mark]       Sr         Numbering       Objectives of class         The seminar aims to provide a broad student.       The seminar aims to provide a broad student.         The seminar aims to provide a broad student.       Ontents of class         The class provides both of fundamer the related field by reading research announced by individual supervisors.       The class provides both of fundamer	raduate Progra echanical Engir 1系教務委員 1 understanding understanding	week,period m for Master's Degreen neering Ikei kyomu Iin-S	se ngineering availab	Subject grade Beggining	2~2
Department Offered     Me       Charge teacher name[Roman alphabet mark]     S       alphabet mark]     S       Numbering     S       Objectives of class       The seminar aims to provide a broad student.       The seminar aims to provide a broad student.       Contents of class       The class provides both of fundamer the related field by reading research announced by individual supervisors.       The class provides both of fundamer the related field by reading research announced by individual supervisors.	echanical Engir 1系教務委員 1 understanding understanding ntal knowledge	n for Master's Degreeneering Ikei kyomu Iin-S	ngineering availab	Beggining	
Department Offered       Me         Charge teacher name[Roman alphabet mark]       S         alphabet mark]       S         Numbering       S         Objectives of class       S         The seminar aims to provide a broad student.       S         The seminar aims to provide a broad student.       S         Contents of class       S         The class provides both of fundamer the related field by reading research announced by individual supervisors.       The class provides both of fundamer	echanical Engir 1系教務委員 1 understanding understanding ntal knowledge	neering Ikei kyomu Iin-S ; of the mechanical e	ngineering availab	Beggining	
Charge teacher name[Roman alphabet mark]       S         alphabet mark]       Numbering         Objectives of class       The seminar aims to provide a broad student.         The seminar aims to provide a broad student.       The seminar aims to provide a broad student.         Contents of class       The class provides both of fundamer the related field by reading research announced by individual supervisors.         The class provides both of fundamer the related field by reading research announced by individual supervisors.	1系教務委員 1 understanding understanding	lkei kyomu Iin-S			M2
alphabet mark]         Numbering         Objectives of class         The seminar aims to provide a broad student.         The seminar aims to provide a broad student.         Contents of class         The class provides both of fundamer the related field by reading research announced by individual supervisors.         The class provides both of fundamer the related field by reading research announced by individual supervisors.	understanding understanding ntal knowledge	, of the mechanical e		grade	
alphabet mark]         Numbering         Objectives of class         The seminar aims to provide a broad student.         The seminar aims to provide a broad student.         Contents of class         The class provides both of fundamer the related field by reading research announced by individual supervisors.         The class provides both of fundamer the related field by reading research announced by individual supervisors.	understanding understanding ntal knowledge	, of the mechanical e			
Numbering Objectives of class The seminar aims to provide a broad student. The seminar aims to provide a broad student. Contents of class The class provides both of fundamer the related field by reading research announced by individual supervisors. The class provides both of fundamer	understanding ntal knowledge				
Objectives of class The seminar aims to provide a broad student. The seminar aims to provide a broad student. Contents of class The class provides both of fundamer the related field by reading research announced by individual supervisors. The class provides both of fundamer	understanding ntal knowledge				
The seminar aims to provide a broad student. The seminar aims to provide a broad student. <b>Contents of class</b> The class provides both of fundament the related field by reading research announced by individual supervisors. The class provides both of fundament	understanding ntal knowledge				
The seminar aims to provide a broad student. The seminar aims to provide a broad student. <b>Contents of class</b> The class provides both of fundament the related field by reading research announced by individual supervisors. The class provides both of fundament	understanding ntal knowledge				
student. The seminar aims to provide a broad student. <b>Contents of class</b> The class provides both of fundamer the related field by reading research announced by individual supervisors. The class provides both of fundamer	understanding ntal knowledge			le for the master the	sis research of
The seminar aims to provide a broad student. <b>Contents of class</b> The class provides both of fundament the related field by reading research announced by individual supervisors. The class provides both of fundament	ntal knowledge	; of the mechanical e	ngineering availab		esis research of
student. Contents of class The class provides both of fundamer the related field by reading research announced by individual supervisors. The class provides both of fundamer	ntal knowledge		ngineering availab	la far tha maatar the	ain research of
<b>Contents of class</b> The class provides both of fundamer the related field by reading research announced by individual supervisors. The class provides both of fundamer			5	le for the master the	esis research of
The class provides both of fundamer the related field by reading research announced by individual supervisors. The class provides both of fundamer					
the related field by reading research announced by individual supervisors. The class provides both of fundamen		of his /hay was t	haala waxaawala	ا الحجيب ما المام ما الم	· · · · · · · · · · · · · · · · · · ·
announced by individual supervisors. The class provides both of fundamen	n papers and				
The class provides both of fundamen		monographs. The co	ontents of the cla	ass depend on the s	supervisor. To b
		• · · · <i>/</i>			
	-				
the related field by reading research	h papers and	monographs. The co	ontents of the cla	ass depend on the s	supervisor. To b
announced by individual supervisors.					
Self Preparation and Review					
Related subjects					
Notes for textbook					
Textbook or material will be made ava	ailabla fuana tha				
Textbook or material will be made ava		•			
Notes for reference		e supervisors.			
Goals to be achieved					
To acquire fundamental knowledge of	individual rese	earch fields.			
To acquire the ability to find problems	s, the ability to	solve the problems,	and the presenta	tion skill.	
To acquire fundamental knowledge of	<sup>i</sup> individual rese	earch fields.			
To acquire the ability to find problems	s, the ability to	solve the problems,	and the presenta	tion skill.	
Evaluation of achievement					
Coursework, presentation and/or repo	ort.				
Coursework, presentation and/or repo	ort.				
Examination					
試験期間中には何も行わない					
None during exam period					
Details of examination					
Other information					
Reference URL					
Reference URL					
Reference URL Office hours					
Office hours					
	f learning and e	education			
Office hours	f learning and e	education			
Office hours	f learning and e	education			

# (M41610050)Internship[Internship]

Subject name[English]	Internship[Intern	ship]			
Schedule number	M41610050	Subject area	Advanced	Required or	Required
		-	Mechanical	elective	
			Engineering		
Time of starting a course	Fall term	Day of the	Intensive	Credit(s)	0
<b>F</b>	Que du ete Due me	week,period		Outlinet and a	00
Faculty	_	m for Master's Degr	ee	Subject grade	2~2
Department Offered	Mechanical Engir	leering		Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	S1系教務委員,	内山 直樹 1kei kyo	mu Iin−S, UCHIYA	-	
Numbering					
Objectives of class					
Experience research, design and	d development in	industries and und	erstand problem	formulation and solv	ving strategies i
practical applications. Cultivate a	-		-		
communication with an internship	-	being an engineer			
Experience research, design and		industries and und	erstand problem	formulation and solv	ving strategies i
practical applications. Cultivate a	-		-		
communication with an internship	-	un onginool	can cano che		000BIT 0103
Contents of class					
Participate in research, design a	ind development n	roiects in industrie	s that are suitabl	e for master's progra	am studies unde
supervision by industrial engineer					
Participate in research, design a	-	roiects in industrie	s that are suitabl	e for master's progra	am studies und
supervision by industrial engineer					
Self Preparation and Review					
Prepare well for internship projec	ts by contacting in	dustrial supervisors			
Prepare well for internship projec		•			
Related subjects			-		
Depend on participating internshi	p projects				
Depend on participating internshi					
Notes for textbook					
May be prepared by participating	industries				
May be prepared by participating					
Notes for reference	industries.				
Goals to be achieved					
Acquire communication skills for	or completing pro	iects and applicati	on skills of mat	erials studied in oth	er courses, ar
understand their importance.	eenipresing pre				
Acquire communication skills for	or completing pro	iects and applicati	on skills of mat	erials studied in oth	er courses ar
understand their importance.	o completing pro				
Evaluation of achievement					
Determined based on internship	project evaluation	sheets internship r	roject reports su	rvev reports of inter	nship project ar
internship project presentation.	, <u>, ,</u>	,	J porto, ou	,	
A: 80 or over (out of 100)					
B: 65-79					
C: 55–64					
Determined based on internship	project evaluation	sheets internehin r	roject reports of	invev reports of inter	nshin project ar
internship project presentation.		ensete, internenip p			
A: 80 or over (out of 100)					
B: 65-79					
C: 55–64					
Examination					
その他					
Other					
	reports and press	tation are required			

Other informatio	1			
Contact Uchiyam	a by e-mail for inquiry			
Contact Uchiyam	a by e-mail for inquiry			
Reference URL				
Office hours				
Contact Uchiyam	a by e-mail first.			
Contact Uchiyam	a by e-mail first.			
<b>Relations to atta</b>	inment objectives of le	earning and educa	ition	
		<b>U</b>		

# (M41630020)Deformation Processing Technology[Deformation Processing Technology]

Subject name[English]	Deformation Fr	ocessing rechnology		cessing Technology]	
Schedule number	M41630020	Subject area	Advanced	Required or	Elective
			Mechanical	elective	
			Engineering		
Time of starting a course	Fall1 term	Day of the	Tue.1~1	Credit(s)	1
Faculty	Graduate Progr	week,period		Subject grade	1~2
Department Offered	Mechanical Eng	0		Beggining	M1, M2
	·····			grade	,
Charge teacher name[Roman	森 謙一郎 MO	RI Ken-Ichiro			L
alphabet mark]					
Numbering					
Objectives of class					
With the recent development of	computers, nume	erical methods tend to	be used in the	field of manufacturing	g processes. The
finite element method is mainly e					
such as solid mechanics, fluid me	-			, , , , , , , , , , , , , , , , , , , ,	01
With the recent development of	computers, nume	erical methods tend to	be used in the	field of manufacturing	g processes. The
finite element method is mainly e	explained in this I	ecture. The finite ele	ment method is	widely applied to engi	neering problems
such as solid mechanics, fluid me	chanics, etc.				
Contents of class					
1st week: Numerical Methods: fini	ite difference me	thod, finite element m	ethod and bounda	ary element method	
2nd week: Finite difference met		onduction: discretizato	on of differential	equation governing	heat conductior
calculation of temperature distrib					
3rd week: Basic equations in solid			and strain, equilik	orium equations, cons	titutive equation
in elasticity and plasticity, yield c	•	•			
4th week: Finite element method		-	ents, distribution	s of displacement and	strain
5th week: Equilibrium equations o		iffness matrix,			
6th week: Treatment of boundary					
7th week: Plasticity, elastic-plast	ic finite element	method			
8th week: Summary					
1st week: Numerical Methods: fini				-	haat aandustion
2nd week: Finite difference met calculation of temperature distribution		nduction: discretizato	on of differential	equation governing	near conduction
3rd week: Basic equations in solic		a-dimensional stress	and strain equilik	rium equations cons	titutive equation
in elasticity and plasticity, yield ci			and scrain, equilit	Shum equations, cons	
4th week: Finite element method			ents distribution	s of displacement and	strain
5th week: Equilibrium equations of					ocium
6th week: Treatment of boundary					
7th week: Plasticity, elastic-plast		method			
8th week: Summary					
Self Preparation and Review					
a alial magaalaamigaa					
solid mechanics					
solid mechanics					
solid mechanics Related subjects					
solid mechanics <b>Related subjects</b> Strength of material, Solid mecha					
solid mechanics Related subjects Strength of material, Solid mecha Strength of material, Solid mecha					
solid mechanics Related subjects Strength of material, Solid mecha Strength of material, Solid mecha Notes for textbook					
solid mechanics Related subjects Strength of material, Solid mecha Strength of material, Solid mecha					
solid mechanics Related subjects Strength of material, Solid mecha Strength of material, Solid mecha Notes for textbook Handout					
solid mechanics Related subjects Strength of material, Solid mecha Strength of material, Solid mecha Notes for textbook					
solid mechanics Related subjects Strength of material, Solid mecha Strength of material, Solid mecha Notes for textbook Handout					
solid mechanics <b>Related subjects</b> Strength of material, Solid mecha Strength of material, Solid mecha <b>Notes for textbook</b> Handout Handout					
solid mechanics <b>Related subjects</b> Strength of material, Solid mecha Strength of material, Solid mecha <b>Notes for textbook</b> Handout Handout <b>Notes for reference</b>	nics, Numerical n				

Evaluation of achievement
Reports of every week
Reports of every week
Examination
レポートで実施
By Report
Details of examination
solid mechanics, calculation using finite element method, numerical methods, etc.
solid mechanics, calculation using finite element method, numerical methods, etc.
Other information
room number: D-606
extension number: 6707
room number: D-606
extension number: 6707
Reference URL
http://plast.me.tut.ac.jp/index.eng.html
http://plast.me.tut.ac.jp/index.eng.html
Office hours
Tuesday
Tuesday
Relations to attainment objectives of learning and education
To understand the numerical analysis in solid mechanics
To understand the numerical analysis in solid mechanics
Key words
forming processes, solid mechanics, finite element method
forming processes, solid mechanics, finite element method

# (M41630160)Applied Thermal Engineering[Applied Thermal Engineering]

Schedule number		g[Applied Therma	I Engin	eering		
	M41630160	Subject	area	Advanced	Required or	Elective
				Mechanical	elective	
				Engineering		
lime of starting a	Fall1 term	Day of	the	Thu.2~2	Credit(s)	1
ourse		week,pe	riod			
Faculty	Graduate Program for Mast	er's Degree			Subject grade	1~2
Department Offered	Mechanical Engineering				Beggining grade	M1, M2
Charge teacher	北村 健三 KITAMURA Ken	izo				
name[Roman alphabet						
mark]						
Numbering						
Objectives of class						
•	d advanced knowledge on he	eat transfer. Par	icular	concerns will be	directed to the h	eat tansfer
	ection. In the former subject,					
	er subject, the forced conve					
	nish the ability to calculate p			-		-
	d advanced knowledge on h					
	-					
	ection. In the former subject,					
	er subject, the forced conve mish the ability to calculate r					
Contents of class	nish the ability to calculate p	nacucal problem	Source	sineu with the Cor	nuccion and conve	
	ant annoticeties. Essentian?					
	eat conduction, Fourier's lav					
	conduction equations in recta			-	5.	
	nal steady heat conduction th					
	nal steady heat conduction t			te sizes.		
	nal unsteady heat conduction	i through the plat	es.			
6th week, Principles of co						
7th mark Daring C			<b>.</b>			
	governing equations for conv					
				tes.		
8th week, Convective hea 1st week, Principles of he	governing equations for conv at transfer of laminar flows ir eat conduction, Fourier's lav	n pipes and over t	flat plat			
8th week, Convective her 1st week, Principles of he 2nd week, Derivation of c	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's lav conduction equations in recta	n pipes and over v of heat conduct angular and cylind	flat plat ion rical co	oordinate systems	i.	
8th week, Convective hea 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimensior	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's lav conduction equations in recta nal steady heat conduction th	n pipes and over v of heat conduct angular and cylind nrough plates and	flat plat ion rical co circula	oordinate systems ar cylinders.		
8th week, Convective hea 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimensior 4th week, Two-dimensior	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta nal steady heat conduction the nal steady heat conduction the	n pipes and over v of heat conduct angular and cylinc nrough plates and hrough the plates	flat plat ion rical co circula of finit	oordinate systems ar cylinders.		
8th week, Convective hea 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimensior 4th week, Two-dimensior 5th week, One-dimensior	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta nal steady heat conduction the nal steady heat conduction the nal unsteady heat conduction	n pipes and over v of heat conduct angular and cylinc nrough plates and hrough the plates	flat plat ion rical co circula of finit	oordinate systems ar cylinders.		
8th week, Convective hea 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimensior 4th week, Two-dimensior 5th week, One-dimensior 6th week, Principles of co	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta nal steady heat conduction th nal steady heat conduction th nal unsteady heat conduction onvective heat transfer.	n pipes and over v of heat conduct angular and cylinc nrough plates and hrough the plates n through the plat	ion rical co circula of finit es.	oordinate systems ar cylinders.		
8th week, Convective her 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimensior 4th week, Two-dimensior 5th week, One-dimensior 6th week, Principles of c 7th week, Derivations of	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta nal steady heat conduction th nal steady heat conduction to nal unsteady heat conduction onvective heat transfer. governing equations for conv	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans	ion rical co circula of finit es.	pordinate systems ar cylinders. te sizes.		
8th week, Convective her 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimensior 4th week, Two-dimensior 5th week, One-dimensior 6th week, Principles of c 7th week, Derivations of	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta nal steady heat conduction th nal steady heat conduction th nal unsteady heat conduction onvective heat transfer.	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans	ion rical co circula of finit es.	pordinate systems ar cylinders. te sizes.	i.	
8th week, Convective her 1st week, Principles of he 2nd week, Derivation of of 3rd week, One-dimensior 4th week, Two-dimensior 5th week, One-dimensior 6th week, Principles of ca 7th week, Derivations of 8th week, Convective her Self Preparation and Rev	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's lav conduction equations in recta hal steady heat conduction the hal steady heat conduction the hal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b>	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans n pipes and over	Tat plat ion rical co circula of finit es. fer. Tat plat	oordinate systems ar cylinders. :e sizes. tes.		
8th week, Convective her 1st week, Principles of he 2nd week, Derivation of oc 3rd week, One-dimension 4th week, Two-dimension 5th week, One-dimension 6th week, Principles of co 7th week, Derivations of 8th week, Convective her Self Preparation and Rev	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's lav conduction equations in recta hal steady heat conduction the hal steady heat conduction to hal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans n pipes and over	Tat plat ion rical co circula of finit es. fer. Tat plat	oordinate systems ar cylinders. :e sizes. tes.		will be given
8th week, Convective heat 1st week, Principles of he 2nd week, Derivation of of 3rd week, One-dimension 4th week, Two-dimension 5th week, One-dimension 6th week, Principles of ca 7th week, Derivations of 8th week, Convective heat Self Preparation and Rev Pre and after homework every lecture.	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta hal steady heat conduction the hal steady heat conduction the nal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b> will be neccesary to persui	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans n pipes and over t the class. For	Tat plat ion rical co circula of finit es. fler. flat plat	pordinate systems ar cylinders. te sizes. tes.	ns for homework v	-
8th week, Convective her 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimension 4th week, Two-dimension 5th week, One-dimension 6th week, Principles of ca 7th week, Derivations of 8th week, Convective her <b>Self Preparation and Rev</b> Pre and after homework every lecture.	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's lav conduction equations in recta hal steady heat conduction the hal steady heat conduction the hal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b>	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans n pipes and over t the class. For	Tat plat ion rical co circula of finit es. fler. flat plat	pordinate systems ar cylinders. te sizes. tes.	ns for homework v	-
8th week, Convective hea 1st week, Principles of he 2nd week, Derivation of of 3rd week, One-dimension 4th week, Two-dimension 5th week, One-dimension 6th week, Principles of co 7th week, Derivations of 8th week, Convective hea Self Preparation and Rev Pre and after homework every lecture. Pre and after homework	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta hal steady heat conduction the hal steady heat conduction the nal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b> will be neccesary to persui	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans n pipes and over t the class. For	Tat plat ion rical co circula of finit es. fler. flat plat	pordinate systems ar cylinders. te sizes. tes.	ns for homework v	-
8th week, Convective heat 1st week, Principles of he 2nd week, Derivation of co 3rd week, One-dimension 4th week, Two-dimension 5th week, One-dimension 6th week, Principles of co 7th week, Derivations of 8th week, Convective heat Self Preparation and Rev Pre and after homework every lecture. Pre and after homework every lecture. Related subjects	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta hal steady heat conduction the hal steady heat conduction the nal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b> will be neccesary to persui	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans n pipes and over t the class. For t the class. For	Tat plat ion rical co circula of finit es. fat plat the sak	coordinate systems ar cylinders. te sizes. tes. tes. te of this, problem	ns for homework w	will be given
8th week, Convective heat 1st week, Principles of he 2nd week, Derivation of of 3rd week, One-dimensior 4th week, Two-dimensior 5th week, One-dimensior 6th week, Principles of ca 7th week, Derivations of 8th week, Convective heat <b>Self Preparation and Rev</b> Pre and after homework every lecture. Pre and after homework every lecture. <b>Related subjects</b>	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta hal steady heat conduction the hal steady heat conduction the nal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b> will be neccesary to persui	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plat vective heat trans n pipes and over t the class. For t the class. For	Tat plat ion rical co circula of finit es. fat plat the sak	coordinate systems ar cylinders. te sizes. tes. tes. te of this, problem	ns for homework w	will be given
8th week, Convective heat 1st week, Principles of he 2nd week, Derivation of of 3rd week, One-dimension 4th week, Two-dimension 5th week, One-dimension 6th week, Principles of ca 7th week, Derivations of 8th week, Convective heat <b>Self Preparation and Rev</b> Pre and after homework every lecture. Pre and after homework every lecture. <b>Related subjects</b> Bachelor level knowledge pre-requisite.Otherwise,	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta hal steady heat conduction the hal steady heat conduction the nal unsteady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b> will be neccesary to persuin will be neccesary to persuin e on "Fluid Dynamics", "Engineration student can not follow the legendation of the second student can not follow the legendation of the second second student can not follow the second second second second student second s	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plates n through the plat vective heat trans n pipes and over t the class. For t the class. For t the class. For	Tat plat ion rical co circula of finit es. fer. Tat plat the sak the sak	coordinate systems ar cylinders. te sizes. tes. tes. te of this, problem te of this, problem se of this, problem	ns for homework w ns for homework w ntics of differential	will be given
8th week, Convective heat 1st week, Principles of he 2nd week, Derivation of c 3rd week, One-dimension 4th week, Two-dimension 5th week, One-dimension 6th week, Principles of ca 7th week, Derivations of 8th week, Convective heat <b>Self Preparation and Rev</b> Pre and after homework every lecture. Pre and after homework every lecture. <b>Related subjects</b> Bachelor level knowledge pre-requisite.Otherwise,	governing equations for conv at transfer of laminar flows in eat conduction, Fourier's law conduction equations in recta- hal steady heat conduction the hal steady heat conduction onvective heat transfer. governing equations for conv at transfer of laminar flows in <b>riew</b> will be neccesary to persui will be neccesary to persui	n pipes and over v of heat conduct angular and cylind nrough plates and hrough the plates n through the plates n through the plat vective heat trans n pipes and over t the class. For t the class. For t the class. For	Tat plat ion rical co circula of finit es. fer. Tat plat the sak the sak	coordinate systems ar cylinders. te sizes. tes. tes. te of this, problem te of this, problem se of this, problem	ns for homework w ns for homework w ntics of differential	will be given

Reference2	Author Book title Author ate the heat	F.P. Incropera and D.P. DeWitt Heat Transfer, 6th J.P. Holman		John Wiley and Sons. McGraw-Hill	Publish year ISBN Publish year	
Notes for reference Goals to be achieved Able to calculate or estima Able to calculate or estima	Author	Heat Transfer, 6th	1			
Notes for reference Goals to be achieved Able to calculate or estima Able to calculate or estima	Author		1	McGraw-Hill		
Notes for reference Goals to be achieved Able to calculate or estima Able to calculate or estima		J.P. Holman	Publisher	McGraw-Hill	Publish year	
<b>Goals to be achieved</b> Able to calculate or estima Able to calculate or estima	ate the heat				· ·	
Able to calculate or estima Able to calculate or estima	ate the heat					
Able to calculate or estima	ate the heat					
		transfer rates by cor	nduction and cor	nvection for practical p	oroblems.	
Evaluation of achievement		transfer rates by cor	nduction and cor	nvection for practical p	oroblems.	
	•					
Evaluation will be based or						
Evaluation will be based or	n the scores	of test and final repo	ort.			
Examination						
レポートで実施						
By Report						
Details of examination						
Other information						
Room No.D3-201, E-mail:						
Room No.D3-201, E-mail:	: kitamura@	me.tut.ac.jp				
Reference URL						
Office hours						
Anytime from after lecture		•				
Anytime from after lecture Relations to attainment of						

# (M41630210)Advanced Mechanical Systems Design I[Advanced Mechanical Systems Design I]

Subject name[English]	Advanced Mech	nanical Systems Desig	gn I[Advanced Me	chanical Systems De	sign I]
Schedule number	M41630210	Subject area	Advanced	Required or	Elective
			Mechanical	elective	
			Engineering		
Time of starting a course	Fall term	Day of the	Mon.4~4	Credit(s)	2
		week,period			
Faculty	Graduate Progr	am for Master's Degr	ee	Subject grade	1~2
Department Offered	Mechanical Eng	ineering		Beggining	M1, M2
				grade	
Charge teacher name[Roman	Ⅰ S1系教務委員	1kei kyomu Iin-S			
alphabet mark]					
Numbering					
Objectives of class					
This lecture aims to provide a b	oroad understandin	g of the mechanical s	systems design av	vailable for the maste	r thesis research
work of a student.			systems acoign a		
This lecture aims to provide a b	oroad understandin	a of the mechanical	sveteme design av	vailable for the maste	r thesis research
work of a student.			systems design a		
Contents of class					
	ا انت المقدم معما	a af bia /barr marat	in a star was served	الحجيب وماتلا أمرمو بالبرم	
The class provides both of fund	-				
the related field by reading res		monographs. The co	ontents of the cl	ass depend on the s	supervisor. To be
announced by individual supervi					
The class provides both of fund	-				
the related field by reading res	search papers and	monographs. The c	ontents of the cl	ass depend on the s	supervisor. To be
announced by individual supervi	sors.				
Self Preparation and Review					
Related subjects					
Natao fan taathaala					
Notes for textbook					
Textbook or material will be made		•			
Textbook or material will be mad	de available from ti	ne supervisors.			
Notes for reference					
Goals to be achieved					
To acquire fundamental knowled	dge of individual res	search fields.			
To acquire the ability to find pro	oblems, the ability t	o solve the problems	and the presenta	ition skill.	
To acquire fundamental knowled	dge of individual res	search fields.			
To acquire the ability to find pro	0		and the presenta	tion skill	
	in ability				
Evaluation of ashievement					
Evaluation of achievement					
Coursework, presentation and/o	-				
Coursework, presentation and/o	or report.				
試験期間中には何も行わない					
None during exam period					
Details of examination					
Other information					
· · · · · · · · · · · · · · · · · · ·					
Reference URL					
Office hours					
Relations to attainment chiestin	ves of learning and	education			
Relations to attainment objectiv	ves of learning and	education			

# (M41630230)Advanced Materials and Manufacturing Process I[Advanced Materials and Manufacturing Process I]

(M41030230/Advanced Materials Subject name[English]		rials and Manufactu	_		
	Process I]				
Schedule number	M41630230	Subject area	Advanced Mechanical Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day of the week,period	Tue.4~4	Credit(s)	2
Faculty	Graduate Progra	am for Master's Degr		Subject grade	1~2
Department Offered	Mechanical Eng			Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	S1系教務委員	1kei kyomu Iin−S			
Numbering					
Objectives of class This lecture aims to provide a bra- research work of a student. This lecture aims to provide a bra- research work of a student. Contents of class		-			
The class provides both of funda the related field by reading rese announced by individual supervise The class provides both of funda the related field by reading rese announced by individual supervise Self Preparation and Review	earch papers and ors. Imental knowledge earch papers and	monographs. The co	ntents of the cla hesis research wo	ss depend on the s ork and the most ad	upervisor. To be vanced results in
Related subjects					
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference		•			
<b>Goals to be achieved</b> To acquire fundamental knowledg	e of individual res	earch fields.			
To acquire the ability to find prob	lems, the ability t	o solve the problems	and the presentat	ion skill.	
To acquire fundamental knowledg To acquire the ability to find prob			and the presentat	ion skill.	
<b>Evaluation of achievement</b> Coursework, presentation and/or					
Coursework, presentation and/or	report.				
Examination					
試験期間中には何も行わない None during exam period					
Details of examination					
Other information					
Reference URL					
Office hours					
Relations to attainment objective	s of learning and	education			

# (M41630250)Advanced System, Control and Robotics I[Advanced System, Control and Robotics I]

(M41030250)Advanced System, Subject name[English]				ystem, Control and I	Robotics I]
Schedule number	M41630250	Subject area	Advanced	Required or	Elective
			Mechanical	elective	
			Engineering		
Time of starting a course	Fall term	Day of the week,period	Thu.4~4	Credit(s)	2
Faculty	Graduate Program	n for Master's Degr	e	Subject grade	1~2
Department Offered	Mechanical Engin	eering		Beggining	M1, M2
Ohanna Aasahan aana [Daman	01 页	hailan ann tin C		grade	
Charge teacher name[Roman alphabet mark]	S1系教務委員1	kei kyomu lin-S			
Numbering					
Objectives of class					
This lecture aims to provide a bi	road understanding o	of the control and r	botics available f	or the master thesis	research work of
a student.					
This lecture aims to provide a br	oad understanding o	of the control and re	botics available f	or the master thesis	research work o
a student.	0				
Contents of class					
The class provides both of fund	amental knowledge	of his/her master t	hesis research w	ork and the most ac	lvanced results ir
the related field by reading res					
announced by individual supervis					
The class provides both of fund		of his/her master t	hesis research w	ork and the most ac	lvanced results ir
the related field by reading res					
announced by individual supervis					
Self Preparation and Review					
Related subjects					
Noiatou subjects					
Notes for textbook					
Textbook or material will be mad		•			
Textbook or material will be mad Notes for reference	e available from the	supervisors.			
Notes for reference					
Goals to be achieved					
To acquire fundamental knowled	-			41	
To acquire the ability to find pro	bients, the ability to	solve the problems,	and the presenta	LION SKIII.	
To a surface for demonstration and a					
To acquire fundamental knowled			and the presents	tion akill	
To acquire the ability to find pro	piems, the adulty to	solve the problems,	and the presenta	tion skill.	
Evaluation of achievement					
Coursework, presentation and/o	r report.				
Coursework, presentation and/o	•				
Examination					
試験期間中には何も行わない					
None during exam period					
Details of examination					
Other information					
Reference URL					
Office hours					
Billion and the state of					
Relations to attainment objectiv	es of learning and e	ducation			

# (M41630270)Advanced Energy and Environmental Engineering I[Advanced Energy and Environmental Engineering I]

	Advanced Energ Engineering I]	y and Environment	al Engineering IL	Advanced Energy ar	nd Environment
Schedule number	M41630270	Subject area	Advanced Mechanical Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day of the week,period	Fri.4~4	Credit(s)	2
Faculty Department Offered	Graduate Program Mechanical Engin	m for Master's Degree neering	e	Subject grade Beggining	1~2 M1, M2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1	kei kyomu Iin−S		grade	
Numbering					
Objectives of class					
This lecture aims to provide a br research work of a student. <b>Contents of class</b> The class provides both of fund the related field by reading rese announced by individual supervis The class provides both of fund the related field by reading rese announced by individual supervis <b>Self Preparation and Review</b>	amental knowledge earch papers and r ors. amental knowledge earch papers and r	of his/her master t monographs. The cc of his/her master t	hesis research w ontents of the cla hesis research w	ork and the most ad ass depend on the s ork and the most ad	vanced results supervisor. To b vanced results
Related subjects Notes for textbook Textbook or material will be made Textbook or material will be made		•			
<b>Notes for textbook</b> Textbook or material will be made		•			
<b>Notes for textbook</b> Textbook or material will be made Textbook or material will be made		•			
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference	e available from the	e supervisors.			
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference Goals to be achieved	e available from the	arch fields.	and the presenta	tion skill.	
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowledge	e available from the ge of individual rese plems, the ability to ge of individual rese	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prob To acquire fundamental knowledg To acquire the ability to find prob Evaluation of achievement	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire fundamental knowledg To acquire fundamental knowledg To acquire the ability to find prof Evaluation of achievement Coursework, presentation and/or	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prob To acquire fundamental knowledg To acquire the ability to find prob Evaluation of achievement	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be made Textbook or material will be made Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prob To acquire fundamental knowledg To acquire the ability to find prob Evaluation of achievement Coursework, presentation and/or Coursework, presentation and/or	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be madi Textbook or material will be madi Textbook or material will be madi Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prob To acquire fundamental knowledg To acquire the ability to find prob Evaluation of achievement Coursework, presentation and/or Coursework, presentation and/or Examination 試験期間中には何も行わない None during exam period	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prob To acquire fundamental knowledg To acquire the ability to find prob Evaluation of achievement Coursework, presentation and/or Coursework, presentation and/or Examination 試験期間中には何も行わない	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be madi Textbook or material will be madi Textbook or material will be madi Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prob To acquire fundamental knowledg To acquire the ability to find prob Evaluation of achievement Coursework, presentation and/or Coursework, presentation and/or Examination 試験期間中には何も行わない None during exam period	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be mad Textbook or material will be mad Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prol To acquire fundamental knowledg To acquire the ability to find prol Evaluation of achievement Coursework, presentation and/or Coursework, presentation and/or Examination 試験期間中には何も行わない None during exam period	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		
Notes for textbook Textbook or material will be madi Textbook or material will be madi Notes for reference Goals to be achieved To acquire fundamental knowledg To acquire the ability to find prob To acquire fundamental knowledg To acquire the ability to find prob Evaluation of achievement Coursework, presentation and/or Coursework, presentation and/or Examination 試験期間中には何も行わない None during exam period Details of examination Other information	e available from the ge of individual rese plems, the ability to ge of individual rese plems, the ability to	e supervisors. earch fields. solve the problems, earch fields.	·		

# (M41630290)Advanced Aeroacoustics[Advanced Aeroacoustics]

Subject name[English]	Advanced Aero	acoustics[Advanced /	Aeropopulation]		
Subject name[English] Schedule number	M41630290	Subject area	Advanced	Required or	Elective
	10171000200		Mechanical	elective	LIGOLIVE
			Engineering	000010	
Time of starting a course	Fall1 term	Day of the	Tue.2~2	Credit(s)	1
This of starting a course		week,period	100.2 2		
Faculty	Graduate Progr	am for Master's Degr	ee	Subject grade	1~2
Department Offered	Mechanical Eng			Beggining	M1, M2
				grade	,
Charge teacher name[Roman	飯田 明由 IIDA	Akivoshi		•	I
alphabet mark]		,			
Numbering					
Obiectives of class					
To get basic knowledge of aeroad	oustics and pois	roduction to obnique	for ocrodynamic n		
To get basic knowledge of aeroad			-		
Contents of class	oustics and noise	e reduction technique	for aerodynamic n		
Basic theory of the flow induced	l naisa will ha lar	turad and avaarim	ntal and numerica	l tachniqua far aara	acquistics will be
received.	i noise will be led	stured, and experime	and numerica	a technique for aero	acoustics will be
received.					
1. Principle of sound and noise(1)					
2. Principle of sound and noise(2)					
3. Lighthill Theory					
4. Curle's Theory					
5. Theory of vortex sound					
6. Prediction of aerodynamic sou		-			
7. Identification method of aerody		ce			
8. Measurement technique for ae	rodynamic sound				
Basic theory of the flow induced	I noise will be led	ctured, and experime	ental and numerica	al technique for aero	acoustics will be
received.					
1. Principle of sound and noise(1)					
2. Principle of sound and noise(2)					
3. Lighthill Theory					
4. Curle's Theory					
5. Theory of vortex sound					
6. Prediction of aerodynamic sour	nd from a bluff bo	dy			
7. Identification method of aerody	namic noise sour	ce			
8. Measurement technique for ae	rodynamic sound				
Self Preparation and Review					
Please read handouts before the	lecture.				
Please read your notes again for					
Please read handouts before the					
Please read your notes again for					
Related subjects					
Fluid dynamics					
Fluid dynamics					
Notes for textbook					
No Textbook is required					
No Textbook is required					
Notes for reference					
INOLOS TOR POTOPOLOS					
Goals to be achieved					
To understand the generation me	chanism of aeroa	dynamic noise.			

To understand the principle of Lighthill Theory.	
To understand the generation mechanism of aeroadynamic noise.	
To understand the principle of Lighthill Theory.	
Evaluation of achievement	
Report 100 %	
Report 100 %	
Examination	
レポートで実施	
By Report	
Details of examination	
Other information	
room D-410	
e-mail:iida@mech.tut.ac.jp	
room D-410	
e-mail:iida@mech.tut.ac.jp	
Reference URL	
http://aero.me.tut.ac.jp	
http://aero.me.tut.ac.jp	
Office hours	
Monday 13:00-15:00	
Monday 13:00-15:00	
Relations to attainment objectives of learning and education	
Key words	
Aeroacousitcs, Turbulence, Sound Wave	
Aeroacousitcs, Turbulence, Sound Wave	

#### (M41630330)Advances in Mechanical Design[Advances in Mechanical Design]

Subject name[English]	Advances in Me	Advances in Mechanical Design[Advances in Mechanical Design]						
Schedule number	M41630330	Subject area	Advanced Mechanical Engineering	Required or elective	Elective			
Time of starting a course	Year	Day of the week,period		Credit(s)	2			
Faculty	Graduate Progr	am for Master's Degre	ee	Subject grade	2~2			
Department Offered	Mechanical Eng	ineering		Beggining grade	M2			
Charge teacher name[Roman alphabet mark]	森 謙一郎, 足	立 忠晴 MORI Ken-Ic	hiro, ADACHI Tao	daharu	·			
Numbering								

#### **Objectives of class**

This class is separated into two parts:

#### Prof. Mori

With the recent development of computers, numerical methods tend to be used in the field of manufacturing processes. The finite element method is mainly explained in this lecture. The finite element method is widely applied to engineering problems such as solid mechanics, fluid mechanics, etc.

#### Prof. Adachi

To understand mechanical performances of structures, and mechanical behaviors of solid and structures, fundamental mechanics of solid and structure is lectured. Especially, mechanics of thin-walled structures which is useful for practical design of mechanical structures is explained in detail.

This class is separated into two parts:

#### Prof. Mori

With the recent development of computers, numerical methods tend to be used in the field of manufacturing processes. The finite element method is mainly explained in this lecture. The finite element method is widely applied to engineering problems such as solid mechanics, fluid mechanics, etc.

#### Prof. Adachi

To understand mechanical performances of structures, and mechanical behaviors of solid and structures, fundamental mechanics of solid and structure is lectured. Especially, mechanics of thin-walled structures which is useful for practical design of mechanical structures is explained in detail.

#### **Contents of class**

#### Prof. Mori

1st week: Numerical Methods: finite difference method, finite element method and boundary element method

2nd week: Finite difference method for heat conduction: discretizaton of differential equation governing heat conduction,

calculation of temperature distribution

3rd week: Basic equations in solid mechanics: three-dimensional stress and strain, equilibrium equations, constitutive equations in elasticity and plasticity, yield criteria, incompressibility condition, etc.

4th week: Finite element method for elastic deformation: triangular elements, distributions of displacement and strain

5th week: Equilibrium equations of nodal forces, stiffness matrix,

6th week: Treatment of boundary conditions

7th week: Plasticity, elastic-plastic finite element method 8th week: Summary

Prof. Adachi Chapter 1. Introduction Chapter 2. Automobile Structures from View of Solid Mechanics Purpose of automobile structure, Loading to automobile structure Deformation of automobile structure, Performance of automobile structure Chapter 3. Fundamentals of Structural Mechanics

Fundamental equations in solid mechanics Chapter 4. Forces and Moments Applying to Structures Normal force, shear force, bending moment, torsional moment Chapter 5. Elementary Mechanics of Structures Torsion and bending of thin-walled beams Chapter 6. Mechanics of Thin-Walled Structures Torsion and bending of thin-walled beams Chapter 7. Fundamentals of Dynamic Measurement Frequency response, Strain gage, Load cell, Accelerator Chapter 8. Summary Prof. Mori 1st week: Numerical Methods: finite difference method, finite element method and boundary element method 2nd week: Finite difference method for heat conduction: discretizaton of differential equation governing heat conduction, calculation of temperature distribution 3rd week: Basic equations in solid mechanics: three-dimensional stress and strain, equilibrium equations, constitutive equations in elasticity and plasticity, yield criteria, incompressibility condition, etc. 4th week: Finite element method for elastic deformation: triangular elements, distributions of displacement and strain 5th week: Equilibrium equations of nodal forces, stiffness matrix, 6th week: Treatment of boundary conditions 7th week: Plasticity, elastic-plastic finite element method 8th week: Summary Prof. Adachi Chapter 1. Introduction Chapter 2. Automobile Structures from View of Solid Mechanics Purpose of automobile structure. Loading to automobile structure Deformation of automobile structure, Performance of automobile structure Chapter 3. Fundamentals of Structural Mechanics Fundamental equations in solid mechanics Chapter 4. Forces and Moments Applying to Structures Normal force, shear force, bending moment, torsional moment Chapter 5. Elementary Mechanics of Structures Torsion and bending of thin-walled beams Chapter 6. Mechanics of Thin-Walled Structures Torsion and bending of thin-walled beams Chapter 7. Fundamentals of Dynamic Measurement Frequency response, Strain gage, Load cell, Accelerator Chapter 8. Summary Self Preparation and Review **Related subjects** Mechanics of Materials, Elasticity, Solid Mechanics Mechanics of Materials, Elasticity, Solid Mechanics Notes for textbook Part 1 (Prof. Mori): handout Text for Part (2) (Prof. Adachi) will be distributed in class. Part 1 (Prof. Mori): handout Text for Part (2) (Prof. Adachi) will be distributed in class. Notes for reference Goals to be achieved Part (1) (Prof. Mori) To understand the finite element method Part (2) (Prof. Adachi) To understand physical meaning fundamental equations in solid mechanics. To deeply understand elementary mechanics of materials (strength of materials); tension of bar, torsion of axis and bending of beam

	mechanics of thin-walled structures.
	pt of dynamic measurement of deformation.
To understand	the finite element method
Part (2) (Prof. /	Adachi)
To understand	physical meaning fundamental equations in solid mechanics.
To deeply unde	erstand elementary mechanics of materials (strength of materials); tension of bar, torsion of axis and bending o
beam.	
To understand	mechanics of thin-walled structures.
To know conce	pt of dynamic measurement of deformation.
Evaluation of a	chievement
Part 1 (Prof. M	ori): Reports of every week
Part 2 (Prof A	dachi): Examinations, 80 % and attendances, 20 %
	ori): Reports of every week
Part 2 (Prof. Ad	dachi): Examinations, 80 % and attendances, 20 %
Examination	
レポートで実施	
By Report	
Details of exam	ination
Other informati	
Prof. Mori: roon	n number: D-606, extension number: 6707
	oom D-305, Extension phone 6664, Email adachi@me.tut.ac.jp
Prof. Mori: roon	n number: D-606, extension number: 6707
Prof. Mori: roon Prof. Adachi: Re	oom D-305, Extension phone 6664, Email adachi@me.tut.ac.jp
Prof. Mori: room Prof. Adachi: Reference URL	oom D-305, Extension phone 6664, Email adachi@me.tut.ac.jp -
Prof. Mori: room Prof. Adachi: Reference URL Part(2) (Prof A	oom D-305, Extension phone 6664, Email adachi@me.tut.ac.jp - dachi) http://solid.me.tut.ac.jp/solid/
Prof. Mori: room Prof. Adachi: R Reference URL Part(2) (Prof A Part(2) (Prof A	oom D-305, Extension phone 6664, Email adachi@me.tut.ac.jp -
Prof. Mori: room Prof. Adachi: Reference URL Part(2) (Prof A	oom D-305, Extension phone 6664, Email adachi@me.tut.ac.jp - dachi) http://solid.me.tut.ac.jp/solid/
Prof. Mori: room Prof. Adachi: R Reference URL Part(2) (Prof A Part(2) (Prof A Office hours	oom D-305, Extension phone 6664, Email adachi@me.tut.ac.jp - dachi) http://solid.me.tut.ac.jp/solid/

Strength of materials, Mechanics of materials, solid mechanics, Structural mechanics, Thin-walled Structure, Numerical methods, Forming processes

Subject name[English]	Advances in Thermal and Fluid Mechanics[Advances in Thermal and Fluid Mechanics]					
Schedule number	M41630350	Subject area	Advanced	Required or	Elective	
			Mechanical	elective		
			Engineering			
Time of starting a	Fall1 term	Day of the	Tue.2 ~ 2,Thu.2	Credit(s)	2	
course		week,period	~2			
Faculty	Graduate Program for Master's	Subject	2~2			
				grade		
Department Offered	Mechanical Engineering			Beggining	M1, M2	
				grade		
Charge teacher	飯田 明由,北村 健三 IIDA A	kiyoshi, KITAMURA K	Cenzo			
name[Roman alphabet						
mark]						
Numbering						

# **Objectives of class**

The class aims to afford advanced knowledge on heat transfer. Particular concerns will be directed to the heat tansfer by conduction and by convection. In the former subject, one or two-dimensional, steady or unsteady conduction problems will be treated. While, in the latter subject, the forced convection from pipes, ducts and flat plates will be treated. Through the course of the lecture, we will furnish the ability to calculate practical problems concerned with the conduction and convection.

To get basic knowledge of aeroacoustics and noise reduction technique for aerodynamic noise.

The class aims to afford advanced knowledge on heat transfer. Particular concerns will be directed to the heat tansfer by conduction and by convection. In the former subject, one or two-dimensional, steady or unsteady conduction problems will be treated. While, in the latter subject, the forced convection from pipes, ducts and flat plates will be treated. Through the course of the lecture, we will furnish the ability to calculate practical problems concerned with the conduction and convection.

To get basic knowledge of aeroacoustics and noise reduction technique for aerodynamic noise.

# Contents of class

Prof. Kitamura

1st week, Principles of heat conduction, Fourier's law of heat conduction

2nd week, Derivation of conduction equations in rectangular and cylindrical coordinate systems.

3rd week, One-dimensional steady heat conduction through plates and circular cylinders.

4th week, Two-dimensional steady heat conduction through the plates of finite sizes.

5th week, One-dimensional unsteady heat conduction through the plates.

6th week. Principles of convective heat transfer.

7th week, Derivations of governing equations for convective heat transfer.

8th week, Convective heat transfer of laminar flows in pipes and over flat plates.

Prof.Iida

1st week, Principle of sound and noise(1) 2nd week, Principle of sound and noise(2) 3rd week, Lighthill Theory 4th week, Curle's Theory

5th week, Theory of vortex sound

6th week, Prediction of aerodynamic sound from a bluff body

7th week, Identification method of aerodynamic noise source

8th week, Measurement technique for aerodynamic sound

Prof. Kitamura

1st week, Principles of heat conduction, Fourier's law of heat conduction

2nd week, Derivation of conduction equations in rectangular and cylindrical coordinate systems.

 $\label{eq:started_st$ 

4th week, Two-dimensional steady heat conduction through the plates of finite sizes.

 $5 \mbox{th}$  week, One-dimensional unsteady heat conduction through the plates.

6th week, Principles of convective heat transfer.

7th week, Derivations of governing equations for convective heat transfer.

8th week, Convective heat transfer of laminar flows in pipes and over flat plates.

Prof.Iida

1st week, Principle of sound and noise(1) 2nd week, Principle of sound and noise(2) 3rd week, Lighthill Theory 4th week, Curle's Theory 5th week, Theory of vortex sound 6th week, Prediction of aerodynamic sound from a bluff body 7th week, Identification method of aerodynamic noise source 8th week, Measurement technique for aerodynamic sound

#### Self Preparation and Review

Pre and after homework will be neccesary to persuit the class. Homework problems will be given in every lecture. Pre and after homework will be neccesary to persuit the class. Homework problems will be given in every lecture.

#### **Related subjects**

Bachelor level knowledge on "Fluid Dynamics", "Engineering Thermodynamics" and "Mathematics of differential equation" are pre-requisite. Otherwise, student can not follow the lecture.

Bachelor level knowledge on "Fluid Dynamics", "Engineering Thermodynamics" and "Mathematics of differential equation" are pre-requisite.Otherwise, student can not follow the lecture.

# Notes for textbook

Reference1	Book title	Introduction to Hea	ISBN			
	Author	F.P. Incropera and D.P. DeWitt	Publisher	John Wiley and Sons.	Publish year	
Reference2	Book title	Heat Transfer, 6th	ed.		ISBN	
	Author	J.P. Holman	Publisher	McGraw-Hill	Publish year	
Reference3	Book title	Theory of Vortex S	ound	·	ISBN	
	Author	M.S Howe	Publisher	Cambridge Univ. Press	Publish year	

#### Notes for reference

#### Goals to be achieved

Able to calculate or estimate the heat transfer rates by conduction and convection for practical problems.

Able to calculate or estimate the aerodynamic saound for practical problems.

Able to calculate or estimate the heat transfer rates by conduction and convection for practical problems.

Able to calculate or estimate the aerodynamic saound for practical problems.

#### Evaluation of achievement

Evaluation will be based on the scores of test and final report.

Evaluation will be based on the scores of test and final report. **Examination** 

レポートで実施

By Report

Details of examination

# Other information

Room No.D3-201, E-mail: kitamura@me.tut.ac.jp

Room No.D410, E-mail: iida@me.tut.ac.jp

Room No.D3-201, E-mail: kitamura@me.tut.ac.jp Room No.D410, E-mail: iida@me.tut.ac.jp

# Reference URL

**Office hours** Anytime from after lecture to 6 PM on the days of lecture. Anytime from after lecture to 6 PM on the days of lecture.

Relations to attainment objectives of learning and education

Heat Transfer, Conduction, Convection, Aerocynamic Sound Heat Transfer, Conduction, Convection, Aerocynamic Sound

#### (M41630360)Modeling and Analysis of Dynamical Control Systems[Modeling and Analysis of Dynamical Control Systems]

Subject name[English]	Modeling and Analysis of Dynamical Control Systems[Modeling and Analysis of Dynamical Control Systems]						
Schedule number	M41630360	Subject area			Advanced Mechanical Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day week,	of period	the I	Tue.3~3	Credit(s)	2
Faculty	Graduate Program for Master's Degree					Subject grade	2~2
Department Offered	Mechanical Engineering					Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	寺嶋 一彦 TERASHIMA Kazuhiko						
Numbering							

# Objectives of class

Modeling and control of dynamical systems is lectured.In particular, physical modeling of various processes is explained and identification method is also explained by means of experiment data and information technique when physical modeling is impossible. Then, analysis of systems is lectured concerning state vector equation, solution, controllability, observability, staility and realization. Furthermore, modern control thory such as optimal control and state estimation is explained. Finally, robust control of H-infinity is lectured.

Modeling and control of dynamical systems is lectured.In particular, physical modeling of various processes is explained and identification method is also explained by means of experiment data and information technique when physical modeling is impossible. Then, analysis of systems is lectured concerning state vector equation, solution, controllability, observability, staility and realization. Furthermore, modern control thory such as optimal control and state estimation is explained. Finally, robust control of H-infinity is lectured.

#### **Contents of class**

1st week : 1.Physical Modeling (1)Process system (2)Mechanical system (3) Electric system 2nd: 2.System Identification of Linear Systems (1) Curve fitting method (2)Time series model such as ARMA model and ARX model by Least square method 3rd: 3. System Analysis (1)State space analysis and state variable diffrential equation 4th: (2)Controllability and Observability 5th: (3)Stability 6th: (4)Realizaion 7th: 4.Modern control theory (1)Optimal regulater(LQ control) 8th: (2)LQI control 9th: (3)Observer (4)Disturbance observer 10th: (5)Kalman filter 11th: (6)LTR 12th: 5.Robust control (1)Model uncertainty 13th-15th: (2)H-infinity robust control 1st week : 1.Physical Modeling

(1)Process system

(2)Mechanical system

(3) Electric system

2nd: 2.System Identification of Linear Systems (1) Curve fitting method (2)Time series model such as ARMA model and ARX model by Least square method 3rd: 3. System Analysis (1)State space analysis and state variable diffrential equation 4th: (2)Controllability and Observability 5th: (3)Stability 6th: (4)Realizaion 7th: 4.Modern control theory (1)Optimal regulater(LQ control) 8th: (2)LQI control 9th: (3)Observer (4)Disturbance observer 10th: (5)Kalman filter 11th: (6)LTR 12th: 5.Robust control (1)Model uncertainty 13th-15th: (2)H-infinity robust control Self Preparation and Review Please read text book Please read text book **Related subjects** Mathematical ability for Matrix theory and Laplace transformation Mathematical ability for Matrix theory and Laplace transformation Notes for textbook I will give a text book in the lesson of the first time. (Reference) 1.State variable methods in Automatic control; K.Furuta , A.Sano and D.Atherton, Wiley, 1988 2.Robust and Optimal control; Mi-Ching Ching Tsai and D-Wei Gu, Springer Modern control design with MATLAB and SIMLINK by Ashish Tewari, Wiley I will give a text book in the lesson of the first time. (Reference) 1.State variable methods in Automatic control; K.Furuta , A.Sano and D.Atherton, Wiley, 1988 2.Robust and Optimal control; Mi-Ching Ching Tsai and D-Wei Gu, Springer Modern control design with MATLAB and SIMLINK by Ashish Tewari, Wiley Notes for reference Goals to be achieved 1)We study and understand how to build the mathmatical model in order to predict and control the natural phenomena and the real processes. 2)We understand analysis of dynamical systems. 3)We understand modern control theory of LQ, LQI and LTR, and estimation theory of observer and Kalman filter. 4)We understand robust control theory of H-infinity. 1)We study and understand how to build the mathmatical model in order to predict and control the natural phenomena and the real processes. 2)We understand analysis of dynamical systems. 3)We understand modern control theory of LQ, LQI and LTR, and estimation theory of observer and Kalman filter. 4)We understand robust control theory of H-infinity.

### Evaluation of achievement

Test: 50%, Report 50%

Success: Grade A: 80-100 Grade B: 65-79 Grade C: 55-64 Failure: Grade D: 0-54

Test: 50%, Report 50%

Success: Grade A: 80-100 Grade B: 65-79 Grade C: 55-64 Failure: Grade D: 0-54

### Examination

定期試験を実施(対面) Examination(Face to Face)

### Details of examination

### Other information

Email address: terasima@me.tut.ac.jp Email address: terasima@me.tut.ac.jp

#### **Reference URL**

http://www.syscon.tut.ac.jp/ http://www.syscon.tut.ac.jp/

Office hours

Thurs.16:00-18:00

Thurs.16:00-18:00

### Relations to attainment objectives of learning and education

Key words

Control, Modern control theory, Regulator, Observer, Kalman filter, LQ, LQI, LTR, Robust control, H-infinity control Control, Modern control theory, Regulator, Observer, Kalman filter, LQ, LQI, LTR, Robust control, H-infinity control

### (M41630380)Robotics[Robotics]

Subject name[English]	Robotics[Robotics]					
Schedule number	M41630380	Subject area	Advanced Mechanical Engineering	Required or elective	Elective	
Time of starting a course	Fall term	Day of the week,period	Fri.2~2	Credit(s)	2	
Faculty	Faculty Graduate Program for Master's Degree					
Department Offered	Mechanical Engineering			Beggining grade	M1, M2	
Charge teacher name[Roman alphabet mark]	内山 直樹 UCHIYAMA Naoki	i				
Numbering						
with revolute or prismat	of robotics, i.e., kinematics, dy		-	-		
Contents of class						
<ul> <li>1-2. Transformation of p</li> <li>1-3. Properties of trans</li> <li>2. Kinematics</li> <li>2-1. Description of relat</li> <li>2-2. Transformation of r</li> <li>2-3. Inverse kinematics.</li> <li>3. Velocities and statici</li> <li>3-1. Linear and rotation</li> <li>3-2. Velocities of manip</li> <li>3-3. Static forces in ma</li> <li>4. Dynamics</li> <li>4-1. Review of rigid-boot</li> <li>4-2. Newton-Euler and</li> <li>5. Control</li> <li>5-2. Nonlinear control.</li> <li>5-2. Nonlinear control.</li> <li>1. Representation and tr</li> <li>1-1. Description of positination of p</li> <li>1-3. Properties of trans</li> <li>2. Kinematics</li> <li>2-1. Description of related</li> </ul>	ive positions and orientations of manipulator positions and orient forces al velocities of rigid-objects. ulator links. nipulators. ly dynamics. Lagrangian formulations of man ransformation of positions and o tions and orientations in 3-D sp positions and orientations of rig formation matrix. ive positions and orientations of	id-objects. of manipulator links. tations. ipulator dynamics. orientations in 3-D spac pace. id-objects.	56			
<ul> <li>2-3. Inverse kinematics.</li> <li>3. Velocities and static f</li> <li>3-1. Linear and rotation</li> <li>3-2. Velocities of manip</li> <li>3-3. Static forces in ma</li> <li>4. Dynamics</li> <li>4-1. Review of rigid-box</li> </ul>	forces al velocities of rigid-objects. ulator links. nipulators.					
5. Control 5-1. Linear control.						
5. Control	view					

	efore the lecture.					
Related subjects						
Fundamentals of line	ar algebra, mecha	nics and control theory	<i>.</i>			
Fundamentals of line	ar algebra, mecha	nics and control theory	<i>.</i>			
Notes for textbook						
Handouts will be prep	oared.					
Handouts will be prep	bared.					
Reference1	Book title	Introduction to Rob	otics: Mechani	cs and Control. 3rd	ISBN	
		Edition				
	Author	J. J. Craig	Publisher	Prentice Hall	Publish year	2005
Reference2	Book title	Robot Modeling and	Control	1	ISBN	
	Author	M. W. Spong, S.	Publisher	John Wilev &	Publish vear	2006
	Autrior	Hutchinson, M.	Fublisher	Sons	Publish year	2000
				30115		
N		Vidyasagar				
Notes for reference						
<u></u>						
Goals to be achieved	-					
	-	mics of robotic manipu				
		or robotic manipulators				
Be able to derive kin	ematics and dyna	mics of robotic manipu	lators.			
Be able to design mo	tion controllers f	or robotic manipulators				
Evaluation of achieve	ement					
Grade will be determ	ned only from the	e end-of-term exam sc	ore.			
Grade will be determ	ined only from the	e end-of-term exam sc	ore.			
Examination						
定期試験を実施(対)	面)					
Examination(Face to	Face)					
Details of examinatio	n					
Other information						
Office: Room D-406,	E-mail uchiyama	@tut.jp				
Office: Room D-406,	E-mail uchiyama	@tut.jp				
Reference URL	•					
Office hours						
	by e-mail first.					
Office hours	•					
<b>Office hours</b> Contact the lecturer Contact the lecturer	by e-mail first.	learning and education				
<b>Office hours</b> Contact the lecturer Contact the lecturer	by e-mail first.	learning and education				
<b>Office hours</b> Contact the lecturer Contact the lecturer	by e-mail first.	learning and education				
<b>Office hours</b> Contact the lecturer Contact the lecturer	by e-mail first.	learning and education				
<b>Office hours</b> Contact the lecturer Contact the lecturer	by e-mail first.	learning and education				
<b>Office hours</b> Contact the lecturer Contact the lecturer	by e-mail first.	learning and education				
<b>Office hours</b> Contact the lecturer Contact the lecturer	by e-mail first.	learning and education				

## (M42610020)Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]

Subject name[English]	Thesis Research	on Electrical and I	Electronic Informat	ion Engineering[Th	esis Research on
	Electrical and Ele	ctronic Information	Engineering]		
Schedule number	M42610020	Subject area	Advanced Electrical and	Required or elective	Required
			Electronic	0.00010	
			Information		
			Engineering		
Time of starting a course	2Years	Day of the	Intensive	Credit(s)	6
		week,period			
Faculty	Graduate Progran	n for Master's Degr	ee	Subject grade	1~2
Department Offered	Electrical and Ele	Electrical and Electronic Information Engineering			M1, M2
Charge teacher name[Roman alphabet mark]	S2系教務委員 2	kei kyomu Iin−S			·
Numbering					

#### **Objectives of class**

The thesis research aims to provide a practical experience of research work, and to acquire his/her research skill with deep understanding of the electrical and electronic information engineering.

The thesis research aims to provide a practical experience of research work, and to acquire his/her research skill with deep understanding of the electrical and electronic information engineering.

#### **Contents of class**

The research subject depends on the supervisor and the research group you belong to. Every student will have an individual research subject. For more details, please contact with your supervisor.

The research subject depends on the supervisor and the research group you belong to. Every student will have an individual research subject. For more details, please contact with your supervisor.

### Self Preparation and Review

### **Related subjects**

#### Notes for textbook

Reference and material will be available from the supervisor. Reference and material will be available from the supervisor.

#### Notes for reference

#### Goals to be achieved

To get something new on individual research fields.

To develop his/her research skill including the planning and the presentation.

To get something new on individual research fields.

To develop his/her research skill including the planning and the presentation.

### Evaluation of achievement

Presentation, Thesis, Coursework, and Outcomes are evaluated generally. Presentation, Thesis, Coursework, and Outcomes are evaluated generally.

## Examination

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

# (M42610020)Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]

Subject name[English]	Thesis Researc	h on Electrical and E	lectronic Informat	on Engineering[The	esis Research o
		lectronic Information	-		
Schedule number	M42610020	Subject area	Advanced Electrical and Electronic Information Engineering	Required or elective	Required
Time of starting a course	2Years	Day of the week,period	Intensive	Credit(s)	6
Faculty	Graduate Progra	am for Master's Degre	e	Subject grade	1~2
Department Offered	Electrical and E	lectronic Information	Engineering	Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark] Numbering	S2系教務委員,	2系各教員 2kei kyor	mu Iin−S, 2kei kakuł	-	
Objectives of class					
Contents of class The research subject depends or research subject. For more details Self Preparation and Review				ivery student will h	ave an individua
Related subjects					
Notes for textbook					
Reference and material will be ava	ailable from the s	upervisor.			
Notes for reference					
Goals to be achieved					
To get something new on individu					
To develop his/her research skill <b>Evaluation of achievement</b>	including the plan	ining and the presenta	ation.		
Presentation, Thesis,Coursework,	and Outcomposite	ra avaluated conorally	,		
Examination	and Outcomes a	re evaluated generally	/.		
その他					
None during exam period					
Details of examination					
Other information					
Reference URL					
Office hours					
	s of learning and	education			
Office hours Relations to attainment objective	s of learning and	education			

## (M4261002T)Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]

Subject name[English]	Thesis Research	on Electrical	and E	lectronic Inform	ation Engineering[Th	esis Research on
	Electrical and Ele	ctronic Inforr	nation	Engineering]		
Schedule number	M4261002T	Subject are	a	Advanced	Required or	Required
				Electrical and	elective	
				Electronic		
				Information		
				Engineering		
Time of starting a course	Year	Day of	the	Intensive	Credit(s)	6
		week,period	I			
Faculty	Graduate Progran	n for Master's	Degre	e	Subject grade	2~2
Department Offered	Electrical and Ele	ctronic Inform	nation	Engineering	Beggining	M2
					grade	
Charge teacher name[Roman	S2系教務委員 2	kei kyomu Iin-	-S			
alphabet mark]						
Numbering						

#### **Objectives of class**

The thesis research aims to provide a practical experience of research work, and to acquire his/her research skill with deep understanding of the electrical and electronic information engineering.

The thesis research aims to provide a practical experience of research work, and to acquire his/her research skill with deep understanding of the electrical and electronic information engineering.

#### **Contents of class**

The research subject depends on the supervisor and the research group you belong to. Every student will have an individual research subject. For more details, please contact with your supervisor.

The research subject depends on the supervisor and the research group you belong to. Every student will have an individual research subject. For more details, please contact with your supervisor.

### Self Preparation and Review

### **Related subjects**

#### Notes for textbook

Reference and material will be available from the supervisor. Reference and material will be available from the supervisor.

#### Notes for reference

#### Goals to be achieved

To get something new on individual research fields.

- To develop his/her research skill including the planning and the presentation.
- To get something new on individual research fields.

To develop his/her research skill including the planning and the presentation.

### Evaluation of achievement

Presentation, Thesis, Coursework, and Outcomes are evaluated generally.

Presentation, Thesis, Coursework, and Outcomes are evaluated generally. Examination

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

## (M42610040)Seminar on Electrical and Electronic Information Engineering[Seminar on Electrical and Electronic Information Engineering]

Subject name[English]	Seminar on Elect	rical and Electroni	c Information Eng	gineering[Seminar o	on Electrical and		
	Electronic Inform	Electronic Information Engineering]					
Schedule number	M42610040	Subject area	Advanced Electrical and Electronic Information Engineering	Required or elective	Required		
Time of starting a course	Year	Day of the	Intensive	Credit(s)	6		
		week,period					
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~2		
Department Offered	Electrical and Elec	ctronic Information	Engineering	Beggining	M2		
				grade			
Charge teacher name[Roman	S2系教務委員 2k	kei kyomu Iin−S					
alphabet mark]							
Numbering							

### **Objectives of class**

The seminar aims to provide a broad understanding of theoretical and experimental approaches related to the electrical and electronic information engineering for the research work of his/her master thesis.

The seminar aims to provide a broad understanding of theoretical and experimental approaches related to the electrical and electronic information engineering for the research work of his/her master thesis.

### Contents of class

The class provides both of fundamental knowledge on the research work of master thesis and the most advanced results in the related field by reading research papers and monographs. Contents of the class depend on the supervisor. To be announced by individual supervisors.

The class provides both of fundamental knowledge on the research work of master thesis and the most advanced results in the related field by reading research papers and monographs. Contents of the class depend on the supervisor. To be announced by individual supervisors.

### Self Preparation and Review

### Related subjects

### Notes for textbook

Textbook or material will be made available from the supervisor. To be announced by individual supervisors. Textbook or material will be made available from the supervisor. To be announced by individual supervisors.

### Notes for reference

#### Goals to be achieved

To acquire fundamental knowledge on individual research fields.

- To acquire the ability of finding a problem, the ability of solving the problem and the presentation skill.
- To acquire fundamental knowledge on individual research fields.

To acquire the ability of finding a problem, the ability of solving the problem and the presentation skill.

### Evaluation of achievement

 $\label{eq:coursework} Coursework, \ presentation \ and/or \ report.$ 

Coursework, presentation and/or report.

### Examination

試験期間中には何も行わない

None during exam period **Details of examination** 

### Other information

**Reference URL** 

#### Office hours

Relations to attainment objectives of learning and education

### (M42630100)Methodology of R & D 1[Methodology of R & D 1]

				/]		
Subject name[English]	Methodology of F	ע & D 1LMeth	odology	of R & D 1		
Schedule number	M42630100	Subject ar	ea	Advanced	Required or	Elective
				Electrical and	elective	
				Electronic		
				Information		
				Engineering		
Time of starting a course	Fall term	Day of	the	Tue.3~3	Credit(s)	2
	week,period			5, 5/	-	
Faculty	Graduate Program		Subject grade	1~2		
Department Offered	Electrical and Ele		-		Beggining	M1, M2
Department Offered			nation	Linginieering		1011, 1012
Ohanna taashar nama[Daman	CO 妥	leai la camar Tin	-6		grade	
Charge teacher name[Roman	S2系教務委員 2	kei kyönnu iir	-3			
alphabet mark]						
Numbering						
Objectives of class						
The class aims to provide a ba	sic understanding	of R&D met	hodolog	y related to the e	electrical and elect	ronic information
engineering for the research work	-			,,		
The class aims to provide a ba			hodolog	ry related to the e	ectrical and elect	ronic information
engineering for the research work	-		1040108			
Contents of class						
	ontol time to and	10+ D0	, ° <del>د</del> · · ·	woly Contacts f	the close demand	n the owner iter
The class provides some fundam		ICL R&D WOR	<ul> <li>eπect</li> </ul>	ivery. Contents of	une class depend o	in the supervisor.
To be announced by individual su						
The class provides some fundam	•	uct R&D wor	< effect	ively. Contents of	the class depend o	n the supervisor.
To be announced by individual su	pervisors					
Self Preparation and Review						
Related subjects						
· · · · · · · · · · · · · · · · · · ·						
Notes for textbook						
Reference and material will be av	•					
Reference and material will be av	ailable from the su	pervisor.				
Notes for reference						
Goals to be achieved						
To acquire the ability of identif	ving and formulati	ng research	probler	n. planning and im	plementing specific	research tasks.
troubleshooting and communicati				···, F·······		,
To acquire the ability of identif	-	ng research	nrohler	n planning and im	nlementing specific	research tasks
troubleshooting and communication		ing research	probler	n, planning and in	plementing specific	
Evaluation of achievement	is outcomes.					
Coursework and presentation are	evaluated general	у.				
Coursework and presentation are	evaluated general	у.				
Examination						
試験期間中には何も行わない						
None during exam period						
Details of examination						
Other information						
Reference URL						
0.55						
Office hours						
Relations to attainment objective	s of learning and e	ducation				
-	-					

### (M42630120)Material Science for Electronics 1[Material Science for Electronics 1]

Subject name[English]		e for Electronics 1LM			
Schedule number	M42630120	Subject area	Advanced	Required or	Elective
			Electrical and	elective	
			Electronic		
			Information		
Time of starting a second	<b>F</b> -II +	Davis of the	Engineering	Oue dit(a)	2
Time of starting a course	Fall term	Day of the week,period	Mon.5~5	Credit(s)	2
Faculty	Graduate Progra	m for Master's Degr	ee	Subject grade	1~2
Department Offered	Electrical and El	ectronic Information	Engineering	Beggining	M1, M2
ol		+ + + + +		grade	
Charge teacher name[Roman alphabet mark]	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	打雄一,武藤 浩行	FUKUDA Mitsuo, NA	KAMURA Yuichi, N	IUTO Hiroyuki
Numbering					
Objectives of class					
Objective of this subject is to	learn about the fr	refront recearch an	d development on	thermoelectronics	and photonics i
electronic materials, and and pov		renont research an	id development on	chermoelectronics	and photomes i
Objective of this subject is to		refront research an	d development on	thermoelectronics	and photonics i
electronic materials, and and pov			a development on	chermoeleet onles	
Contents of class					
1. Thermoelectronics.					
You will learn about advanced th	ermoelectronic ma	terials and area from	fundamentals to an	plications of therm	oelectronics
1) thermoelectronic materials, 2			-		
systems.		processing of them	issiegti onic materia		onic devices all
2. Photonics.					
You will learn about photonic ma	terials and devices				
1) photonic matreials and 2) (nar					
3. Powder processing technologi	es				
You will learn about powder proc		for electronic device	s.		
1) sintering, 2) micrstructute of	ceramics and 3) na	nocomposite			
1. Thermoelectronics.					
You will learn about advanced th	ermoelectronic ma	terials and area from	fundamentals to ap	plications of therm	oelectronics.
1) thermoelectronic materials, 2	) Applications and	processing of therm	oelectronic materia	ls, 3) Thermoelectr	onic devices an
systems.					
0 Dhatasiaa					
2. Photonics. You will learn about photonic ma	terials and devices				
1) photonic matreials and 2) (nar					
3. Powder processing technologi	es				
You will learn about powder proc		for electronic device	s.		
1) sintering, 2) micrstructute of					
Self Preparation and Review					
Related subjects					
Notes for textbook					
Lecture materials will be distribu	ted.				
Lecture materials will be distribu	ted.				
Notes for reference					
<u> </u>					
Goals to be achieved					
	nowledge of reces	arch and development	nt by learning about	the bases of reco	ont research an

development in various fields.
It aims at acquiring the broad knowledge of research and development by learning about the bases of recent research and
development in various fields.
Evaluation of achievement
The reports or tests will be set in each categories.
The result is evaluated from the sum of those marks.
Grades: A:80–100, B:65–79, C:55–64.
The reports or tests will be set in each categories.
The result is evaluated from the sum of those marks.
Grades: A:80-100, B:65-79, C:55-64.
Examination
レポートで実施
By Report
Details of examination
Other information
Reference URL
Office hours
Please make an appointment via e−mail.
Please make an appointment via e−mail.
Relations to attainment objectives of learning and education
Key words
photonics, thermelectronics, and powder processing.
photonics, thermelectronics, and powder processing.

### (M42630160)Electrical Energy Systems 1[Electrical Energy Systems 1]

Subject name[English]	Electrical Energy	Systems 1[E	ectrica	al Energy Systems	1]	
Schedule number	M42630160	Subject are	a	Advanced	Required or	Elective
		-		Electrical and	elective	
				Electronic		
				Information		
				Engineering		
Time of starting a course	Fall term	Day of	the	Mon.3~3	Credit(s)	2
		week,perio	ł			
Faculty	Graduate Program	n for Master's	Degre	e	Subject grade	1~2
Department Offered	Electrical and Elec	ctronic Inform	nation	Engineering	Beggining	M1, M2
					grade	
Charge teacher name[Roman	長尾 雅行, 滝川	浩史,櫻井	⊧ 庸言	司, 穗積 直裕 NAC	GAO Masayuki, TAł	KIKAWA Hirofumi,
alphabet mark]	SAKURAI Yoji, HC	ZUMI Naohii	ю			
Numbering						

### **Objectives of class**

This lecture is implemented as an introduction to electrical energy systems. In order to utilize electric energy in various fields, lectrues on the generation, transmission, distribution and control of electric energy, high voltage engineering, secondary batteries and fuel cells, discharge plasma are given. It is being useful as reference and self-study guide for the professional dealing with this important area. There are four sub courses to choose from.

This lecture is implemented as an introduction to electrical energy systems. In order to utilize electric energy in various fields, lectrues on the generation, transmission, distribution and control of electric energy, high voltage engineering, secondary batteries and fuel cells, discharge plasma are given. It is being useful as reference and self-study guide for the professional dealing with this important area. There are four sub courses to choose from.

### **Contents of class**

Sub Course 1

- 1. Introduction of Electric Energy Systems
- 2. High Voltage Engineering and Electrical Insulation
- 3. Fundamental Properties of Dielectrics and Electrical Insulating Materials.
- Sub Course 2
- 1. Introduction to Electrochemical Energy Conversion Devices
- 2. Lithium Secondary Batteries
- Fuel Cells
- Sub Course 3
- 1. Generation and control of discharge plasma
- 2. Characteristics and diagnostics of discharge plasma
- 3. Basic Plasma applications
- Sub Course 4
- 1. Ultrasonic techniques for medical use.
- 2. Diagnosing techniques for industrial use.
- 3. Assessment for high voltage insulation system.

### Sub Course 1

- 1. Introduction of Electric Energy Systems
- 2. High Voltage Engineering and Electrical Insulation
- 3. Fundamental Properties of Dielectrics and Electrical Insulating Materials.
- Sub Course 2
- 1. Introduction to Electrochemical Energy Conversion Devices
- 2. Lithium Secondary Batteries
- 3. Fuel Cells
- Sub Course 3
- 1. Generation and control of discharge plasma
- 2. Characteristics and diagnostics of discharge plasma
- 3. Basic Plasma applications
- Sub Course 4
- 1. Ultrasonic techniques for medical use.
- 2. Diagnosing techniques for industrial use.
- 3. Assessment for high voltage insulation system.

Self Preparation and Review

### **Related** subjects

Electric Power Systems, Dielectrics and Electrical Insulation, Energy Conversion, Plasma Science Electric Power Systems, Dielectrics and Electrical Insulation, Energy Conversion, Plasma Science

### Notes for textbook

Materials will be prepared by the lecturer. Materials will be prepared by the lecturer.

Notes for reference

### Goals to be achieved

To understand the basic knowledge of electric enrgy systems and related fields. To understand the basic knowledge of electric enrgy systems and related fields.

### Evaluation of achievement

Marks are based on the final examination or report (100%).

Marks are based on the final examination or report (100%).

### Examination

定期試験を実施(対面) Examination(Face to Face)

**Details of examination** 

### Other information

Office: C-309, TEL: 0532-44-6725, E-mail: nagao@tut.jp Office: C-309, TEL: 0532-44-6725, E-mail: nagao@tut.jp **Reference URL** 

### Office hours

Before and/or after the lecture and at any time after making the appointment based on e-mail. Before and/or after the lecture and at any time after making the appointment based on e-mail.

Relations to attainment objectives of learning and education

### Key words

Electric Energy, Electric Power. High Voltage, Secondary Battery, Fuel Cell, Plasma, Electrical Insulation Electric Energy, Electric Power. High Voltage, Secondary Battery, Fuel Cell, Plasma, Electrical Insulation

### (M42630200)Semiconductor Physics 1[Semiconductor Physics 1]

Subject name[English]	Semiconductor Physics	1[Semiconductor Physics	s 1]		
Schedule number	M42630200	Subject area	Advanced Electrical and Electronic Information Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day of the week,period	Tue.1~1	Credit(s)	2
Faculty	Graduate Program for M	1	L	Subject grade	1~2
Department Offered	Electrical and Electronic	Information Engineering		Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	若原 昭浩, SANDHU A	DARSHWAKAHARA Akihi	ro, Sandhu Adarsh	8	
Numbering					
Objectives of class	l				
-	deep understanding of s	semiconductor devices s	semiconductor phys	ics and theory	of operation o
fundamental devices are			pilyo	and anoony	
	deep understanding of s	semiconductor devices	semiconductor phys	ics and theory	of operation o
fundamental devices are			secondation phys		
Contents of class					
1. Physics and Propertie	as of Semiconductors				
Crystal structure					
Energy bands					
Carrier concentration	at Thermal equilibrium				
Carrier transport phenor					
	iiconductor device operati	on			
2. p-n junction diode Depletion region Current-Voltage charac Junction breakdown Transient behavior Terminal functions	teristics				
Heterojunction					
3.Metal-Semiconductor	Contacts				
Schottky barrier					
Current transport proce	sses				
Ohmic contact					
4.LED and Semiconduct	or Lasers				
radiative transitions LED					
Semiconductor laser					
1. Physics and Propertie Crystal structure Energy bands					
Carrier concentration	-				
Carrier transport phenor					
Basic equations for sem	iconductor device operati	on			

Depletion region						
Current-Voltage charac	teristics					
Junction breakdown						
Transient behavior						
Terminal functions						
Heterojunction						
3.Metal-Semiconductor	Contacts					
Schottky barrier						
Current transport proce	sses					
Ohmic contact						
4.LED and Semiconduct	or Lasers					
radiative transitions LED						
Semiconductor laser						
Self Preparation and Re	view					
Related subjects						
The basic knowledge on	the quantum n	nechanics, thermod	lynamics, and elec	tronics are desirable	э.	
The basic knowledge on	the quantum n	nechanics, thermod	lynamics, and elec	tronics are desirable	э.	
Notes for textbook						
Lecture notes and hand	outs will be dist	tributed				
Lecture notes and hand	outs will be dist	tributed				
Reference1	Book title	Physics of Semic	conducotr Devices		ISBN	0471143235
	Author	Simon M. Sze	Publisher	Wiley-	Publish year	2006
					-	
		and Kwok K.		Interscience	-	
N. 6 6		and Kwok K. Ng		•		
Notes for reference				•		
				•		
Goals to be achieved		Ng		Interscience		
<b>Goals to be achieved</b> To understand the funda		Ng semiconductor phy		Interscience		
<b>Goals to be achieved</b> To understand the funda To apply the knowledge	of design and a	Ng semiconductor phy analysis of semicon	nductor devices.	Interscience ductor devices.		
<b>Goals to be achieved</b> To understand the funda To apply the knowledge To understand the funda	of design and a amental of the s	Ng semiconductor phy analysis of semicon semiconductor phy	nductor devices. vsics and semicon	Interscience ductor devices.		
<b>Goals to be achieved</b> To understand the funda To apply the knowledge To understand the funda To apply the knowledge	of design and a amental of the a of design and a	Ng semiconductor phy analysis of semicon semiconductor phy	nductor devices. vsics and semicon	Interscience ductor devices.		
<b>Goals to be achieved</b> To understand the funda To apply the knowledge To understand the funda To apply the knowledge <b>Evaluation of achievement</b>	of design and a amental of the of design and a ont	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
<b>Goals to be achieved</b> To understand the funda To apply the knowledge To understand the funda To apply the knowledge	of design and a amental of the of design and a ont examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
<b>Goals to be achieved</b> To understand the funda To apply the knowledge To understand the funda To apply the knowledge <b>Evaluation of achievena</b> Reports (50%) and Final	of design and a amental of the of design and a ont examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achievement Reports (50%) and Final Reports (50%) and Final	of design and a amental of the of design and a ont examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination	of design and a amental of the s of design and a ont examination (50 examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面)	of design and a amental of the s of design and a ont examination (50 examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge <b>Evaluation of achieveme</b> Reports (50%) and Final Reports (50%) and Final <b>Examination</b> 定期試験を実施(対面) Examination(Face to Face <b>Details of examination</b>	of design and a amental of the s of design and a ont examination (50 examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Face	of design and a amental of the s of design and a ont examination (50 examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information	of design and a amental of the s of design and a ont examination (50 examination (50	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL	of design and a amental of the s of design and a ont examination (50 examination (50 ce)	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a	of design and a amental of the s of design and a ont examination (50 examination (50 ce)	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a http://www.int.eee.tut.a	of design and a amental of the s of design and a ont examination (50 examination (50 ce)	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a http://www.int.eee.tut.a	of design and a amental of the s of design and a ont examination (50 examination (50 ce)	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a http://www.int.eee.tut.a Office hours contact by e-mail	of design and a amental of the s of design and a ont examination (50 examination (50 ce)	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon	nductor devices. vsics and semicon	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a http://www.int.eee.tut.a Office hours contact by e-mail contact by e-mail	of design and a amental of the s of design and a ont examination (50 examination (50 cc)p/ c.jp/	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon 0%) 0%)	nductor devices. rsics and semicon nductor devices.	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a http://www.int.eee.tut.a Office hours contact by e-mail	of design and a amental of the s of design and a ont examination (50 examination (50 cc)p/ c.jp/	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon 0%) 0%)	nductor devices. rsics and semicon nductor devices.	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a http://www.int.eee.tut.a Office hours contact by e-mail contact by e-mail	of design and a amental of the s of design and a ont examination (50 examination (50 cc)p/ c.jp/	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon 0%) 0%)	nductor devices. rsics and semicon nductor devices.	Interscience ductor devices.		
Goals to be achieved To understand the funda To apply the knowledge To understand the funda To apply the knowledge Evaluation of achieveme Reports (50%) and Final Reports (50%) and Final Examination 定期試験を実施(対面) Examination(Face to Fac Details of examination Other information Reference URL http://www.int.eee.tut.a http://www.int.eee.tut.a Office hours contact by e-mail contact by e-mail	of design and a amental of the s of design and a ont examination (50 examination (50 cc)p/ c.jp/	Ng semiconductor phy analysis of semicon semiconductor phy analysis of semicon 0%) 0%)	nductor devices. rsics and semicon nductor devices.	Interscience ductor devices.		

### Key words

Solid-state electronics, semiconductor physics, photo diode, light-emitting diode, laser diode Solid-state electronics, semiconductor physics, photo diode, light-emitting diode, laser diode

### (M42630260)Advanced Electronic Information System 1[Advanced Electronic Information System 1]

Subject name[English]	Advanced Electronic Information System 1[Advanced Electronic Information System 1							n System 1]	
Schedule number	M42630260			Advanced		Required	or	Elective	
						nd	elective		
					Electronic				
					Information				
					Engineering				
Time of starting a course	Fall term	Day	of	the	Mon.4~4		Credit(s)		2
		week,	perioc	1					
Faculty	Graduate Program	for Ma	ster's	Degre	e		Subject gra	de	1~2
Department Offered	Electrical and Elec	tronic l	Inform	nation	Engineering		Beggining		M1, M2
							grade		
Charge teacher name[Roman alphabet mark]	市川 周一,田村	昌也 IC	CHIKA	WA SI	nuichi, TAMURA	Mas	ауа		
Numbering									

### Objectives of class

The aims of this lecture:

(1) To understand various hardware algorithms for computer arithmetic,

(2) To understand the role and design of microwave filter used in wireless communications.

The aims of this lecture:

- (1) To understand various hardware algorithms for computer arithmetic,
- (2) To understand the role and design of microwave filter used in wireless communications.

#### **Contents of class**

This lecture consists of two themes shown below.

(1) Algorithm is a procedure for solving a mathematical problem in a finite number of steps. The required calculation time and memory space depend on the algorithm, even for the same problem. Thus, it is essential to select the best algorithm for a given set of conditions.

In digital hardware, an algorithm is realized as a logic design. This lecture aims to understand various hardware algorithms for computer arithmetic, together with the corresponding designs of arithmetic hardware.

Week 1: Introduction Week 2, 3: Algorithms for addition Week 4,5: Algorithms for multiplication Week 6,7: Algorithms for division Week 8: Examination

(2) The aim of this course is to acquire the knowledge and design techniques of microwave filter used in wireless communications.

- 1. Introduction of microwave filter used in wireless communications
- 2. Image method and network synthesis method for filter design
- 3. Design of prototype filter and its Mapping
- 4. Inverter design
- 5. Resonator design
- 6. Coupled line design
- 7. Q factor and its evaluation
- 8. Examination

This lecture consists of two themes shown below.

(1) Algorithm is a procedure for solving a mathematical problem in a finite number of steps. The required calculation time and memory space depend on the algorithm, even for the same problem. Thus, it is essential to select the best algorithm for a

given set of conditions.

In digital hardware, an algorithm is realized as a logic design. This lecture aims to understand various hardware algorithms for computer arithmetic, together with the corresponding designs of arithmetic hardware.

Week 1: Introduction Week 2, 3: Algorithms for addition Week 4,5: Algorithms for multiplication Week 6,7: Algorithms for division Week 8: Examination

(2) The aim of this course is to acquire the knowledge and design techniques of microwave filter used in wireless communications.

1. Introduction of microwave filter used in wireless communications

- 2. Image method and network synthesis method for filter design
- 3. Design of prototype filter and its Mapping
- 4. Inverter design
- 5. Resonator design

6. Coupled line design

- 7. Q factor and its evaluation
- 8. Examination

### Self Preparation and Review

### **Related subjects**

Prerequisite (1): Fundamental knowledge and skills of logic design, algorithms, and computer structure.

Prerequisite (2): Fundamental Knowledge and skills of high-frequency circuit and electromagnetic engineering

Prerequisite (1): Fundamental knowledge and skills of logic design, algorithms, and computer structure.

Prerequisite (2): Fundamental Knowledge and skills of high-frequency circuit and electromagnetic engineering

### Notes for textbook

No textbooks are assigned.

No textbooks are assigned.

### Notes for reference

#### Goals to be achieved

(1) To understand various hardware algorithms for computer arithmetic,

- (2) To understand the role and design of microwave filter used in wireless communications.
- (1) To understand various hardware algorithms for computer arithmetic,
- (2) To understand the role and design of microwave filter used in wireless communications.

### **Evaluation of achievement**

Item (1) 50%, Item (2) 50%. Item (1) 50%, Item (2) 50%

Examination

定期試験を実施(対面)

Examination(Face to Face)

#### **Details of examination**

TBD TBD

### Other information

(1) Shuichi Ichikawa, Room C-404, ext. 6897, E-mail: ichikawa@tut.jp (2) Masaya Tamura, Room C-405, ext. 6754, E-mail: tamura@ee.tut.ac.jp

(1) Shuichi Ichikawa, Room C-404, ext. 6897, E-mail: ichikawa@tut.jp (2) Masaya Tamura, Room C-405, ext. 6754, E-mail: tamura@ee.tut.ac.jp

**Reference URL** 

http://www.ccs.ee.tut.ac.jp/~ichikawa/lecture/ http://www.comm.ee.tut.ac.jp/em/index\_en.html

http://www.ccs.ee.tut.ac.jp/~ichikawa/lecture/

http://www.comm.ee.tut.ac.jp/em/index\_en.html

### Office hours

Please make an appointment for consultation with the lecturer via e-mail or direct communication in classroom. Please make an appointment for consultation with the lecturer via e-mail or direct communication in classroom.

Relations to attainment objectives of learning and education

### Key words

(1) Logic design, computer arithmetic, hardware algorithm (2) Analog filter, microwave filter, high-frequency circuit design, distributed constant circuit, Electromagnetic Engineering

(1) Logic design, computer arithmetic, hardware algorithm (2) Analog filter, microwave filter, high-frequency circuit design, distributed constant circuit, Electromagnetic Engineering

#### (M43610010)Seminar on Computer Science and Engineering I[Seminar on Computer Science and Engineering I]

Subject name[English]	Seminar on Com Engineering I]	nputer Scie	nce ar	d Engineering I[S	Seminar on Compu	ter Science and
Schedule number	M43610010	Subject a	ea	Advanced Computer Science and Engineering	Required or elective	Required
Time of starting a course	Year	Day of week.perie	the od	Intensive	Credit(s)	4
Faculty	Graduate Program			ee	Subject grade	1~2
Department Offered	Computer Science	e and Engine	ering		Beggining grade	M1
Charge teacher name[Roman alphabet mark]	S3系教務委員 3k	kei kyomu Ii	n−S			
Numbering						

### **Objectives of class**

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.

It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.

It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

### Contents of class

While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own. While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own. **Self Preparation and Review** 

#### **Related** subjects

Consult with your advisor.

Consult with your advisor.

Notes for textbook

Consult with your advisor. Consult with your advisor. Notes for reference

Goals to be achieved

To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.

To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.

### Evaluation of achievement

Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.

Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.

Examination

試験期間中には何も行わない

None during exam period

Details of examination

### Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Subject name[English]	Ochinia on Oc	inputer oblerice an	a Engineering IILS	eminar on Compu	iter Scier
	Engineering II]			·	
Schedule number	M43610020	Subject area	Advanced	Required or	Require
		-	Computer	elective	
			Science and		
			Engineering		
Time of starting a course	Year	Day of the week,period	Intensive	Credit(s)	2
Faculty	Graduate Progra	am for Master's Degre	ee	Subject grade	2~2
Department Offered	Computer Scien	ice and Engineering		Beggining	M2
				grade	
Charge teacher name[Roman	S3系教務委員	3kei kyomu Iin−S			
alphabet mark]					
Numbering					
Objectives of class					
Contents of class					
Self Preparation and Review					
Self Preparation and Review					
Related subjects					
Notes for textbook					
Notes for reference					
Goals to be achieved					
Goals to be achieved					
Goals to be achieved Evaluation of achievement					
Goals to be achieved Evaluation of achievement Examination					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period Details of examination					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period Details of examination					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period Details of examination					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period Details of examination Other information					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period Details of examination Other information Reference URL					
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period Details of examination Other information					
Goals to be achieved         Evaluation of achievement         Examination         試験期間中には何も行わない         None during exam period         Details of examination         Other information         Reference URL         Office hours					
Goals to be achieved         Evaluation of achievement         Examination         試験期間中には何も行わない         None during exam period         Details of examination         Other information         Reference URL         Office hours	es of learning and	education			
Goals to be achieved Evaluation of achievement Examination 試験期間中には何も行わない None during exam period Details of examination Other information Reference URL	es of learning and	education			
Goals to be achieved         Evaluation of achievement         Examination         試験期間中には何も行わない         None during exam period         Details of examination         Other information         Reference URL         Office hours	es of learning and	education			
Goals to be achieved         Evaluation of achievement         Examination         試験期間中には何も行わない         None during exam period         Details of examination         Other information         Reference URL         Office hours	os of learning and	education			
Goals to be achieved         Evaluation of achievement         Examination         試験期間中には何も行わない         None during exam period         Details of examination         Other information         Reference URL         Office hours	os of learning and	education			

#### (M43610030)Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Comput						
	Science and Engir	neering]					
Schedule number	M43610030	Subject ar	Ba	Advanced Computer Science and	Required or elective	Required	
				Engineering			
Time of starting a course	2Years	Day of	the	Intensive	Credit(s)	6	
		week,perio	d				
Faculty	Graduate Program	n for Master'	s Degre	e	Subject grade	1~2	
Department Offered	Computer Science	e and Engine	Beggining grade	M1, M2			
Charge teacher name[Roman alphabet mark]	S3系教務委員 3k	kei kyomu Iin	-S				
Numbering							

### **Objectives of class**

The course is intended for students to foster their interests in research problems on computer science and engineering and to acquire ability for independent studies.

It is also aimed for students to acquire, through thesis research, cooperativeness, a sense of responsibility, abilities for problem solving, research planning, decision making, outcome presentation and subject investigation, and to enhance their creativity and persistency, among others.

The course is intended for students to foster their interests in research problems on computer science and engineering and to acquire ability for independent studies.

It is also aimed for students to acquire, through thesis research, cooperativeness, a sense of responsibility, abilities for problem solving, research planning, decision making, outcome presentation and subject investigation, and to enhance their creativity and persistency, among others.

#### Contents of class

It is usually the case that thesis research is carried out on individual bases with specific contents differing from one student to another.

Consult with your advisor for any further details.

It is usually the case that thesis research is carried out on individual bases with specific contents differing from one student to another.

Consult with your advisor for any further details.

### Self Preparation and Review

#### **Related subjects**

Consult with your advisor for them. Consult with your advisor for them.

#### Notes for textbook

Consult with your advisor for them.

Consult with your advisor for them.

### Notes for reference

#### Goals to be achieved

To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.

To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.

#### Evaluation of achievement

Three faculty members will be assigned to prepare the evaluation for your thesis research, based on publication records,
master thesis, and oral presentation. It will be then finalized by the faculty meeting.
Three faculty members will be assigned to prepare the evaluation for your thesis research, based on publication records,
master thesis, and oral presentation. It will be then finalized by the faculty meeting.
Examination
Details of examination
Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

l

### (M43610030)Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]

Subject name[English]	Thesis Research	on Computer Sci	ence and Engineer	ring[Thesis Resear	ch on Compute
	Science and Engi	neering]			
Schedule number	M43610030	Subject area	Advanced	Required or	Required
			Computer	elective	
			Science and		
			Engineering		
Time of starting a course	2Years	Day of the	Intensive	Credit(s)	6
		week,period			
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~2
Department Offered	Computer Scienc	e and Engineering		Beggining	M1, M2
				grade	
Charge teacher name[Roman	S3系教務委員, 3	3系各教員 3kei kyor	mu Iin−S, 3kei kakul	kyouin	
Charge teacher name[Roman alphabet mark]	S3系教務委員, 3	3系各教員 3kei kyor	mu Iin−S, 3kei kakul	kyouin	
	S3系教務委員, 3	3系各教員 3kei kyor	mu Iin−S, 3kei kakul	kyouin	
alphabet mark]	S3系教務委員, (	3系各教員 3kei kyor	mu Iin−S, 3kei kakul	kyouin	
alphabet mark] Numbering					engineering and t
alphabet mark] Numbering Objectives of class The course is intended for stude	nts to foster their i				engineering and t
alphabet mark] Numbering Objectives of class The course is intended for stude acquire ability for independent st	nts to foster their i udies.	interests in research	n problems on comp	buter science and e	
alphabet mark] Numbering Objectives of class The course is intended for stude acquire ability for independent st It is also aimed for students to a	ints to foster their i udies. cquire, through thes	interests in research	n problems on comp ativeness, a sense	outer science and e	ilities for proble
alphabet mark] Numbering Objectives of class The course is intended for stude acquire ability for independent st It is also aimed for students to a solving, research planning, decisi	ints to foster their i udies. cquire, through thes	interests in research	n problems on comp ativeness, a sense	outer science and e	ilities for proble
alphabet mark] Numbering Objectives of class The course is intended for stude acquire ability for independent st It is also aimed for students to a	ints to foster their i udies. cquire, through thes	interests in research	n problems on comp ativeness, a sense	outer science and e	ilities for proble
alphabet mark] Numbering Objectives of class The course is intended for stude acquire ability for independent st It is also aimed for students to a solving, research planning, decisi	ints to foster their i udies. cquire, through thes	interests in research	n problems on comp ativeness, a sense	outer science and e	ilities for proble
alphabet mark] Numbering Objectives of class The course is intended for stude acquire ability for independent si It is also aimed for students to a solving, research planning, decisi persistency, among others.	ents to foster their i cudies. cquire, through thes on making, outcome	interests in research sis research, cooper presentation and si	n problems on comp ativeness, a sense ubject investigation	outer science and e of responsibility, ab , and to enhance tl	ilities for proble neir creativity ar
alphabet mark] Numbering Objectives of class The course is intended for stude acquire ability for independent si It is also aimed for students to a solving, research planning, decisi persistency, among others. Contents of class	ents to foster their i cudies. cquire, through thes on making, outcome	interests in research sis research, cooper presentation and si	n problems on comp ativeness, a sense ubject investigation	outer science and e of responsibility, ab , and to enhance tl	ilities for proble neir creativity ar

Self Preparation and Review

### **Related subjects**

Consult with your advisor for them.

### Notes for textbook

Consult with your advisor for them.

### Notes for reference

### Goals to be achieved

To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.

### **Evaluation of achievement**

Three faculty members will be assigned to prepare the evaluation for your thesis research, based on publication records, master thesis, and oral presentation. It will be then finalized by the faculty meeting.

### Examination

その他

## None during exam period

**Details of examination** 

### Other information

**Reference URL** 

**Office hours** 

### Relations to attainment objectives of learning and education

### (M4361003T)Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Comput							ch on Computer	
	Science and Engineering]								
Schedule number	M4361003T	Subje	ct are	a	Advanced		Required	or	Required
					Computer		elective		
					Science	and			
					Engineering	g			
Time of starting a course	Year	Day	of	the	Intensive		Credit(s)		6
		week,	period	1					
Faculty	Graduate Program	n for Ma	ister's	Degre	e		Subject grad	de	2~2
Department Offered	Computer Science	Computer Science and Engineering							M2
							grade		
Charge teacher name[Roman	S3系教務委員 3	keikyon	nu Iin-	-S					
alphabet mark]									
Numbering									

### **Objectives of class**

The project is intended for students to foster their interests in research problems on computer science and engineering and to acquire ability for independent studies.

It is also aimed for students to acquire design ability for their thesis research such as the purpose, the background knowledge, the research topic, the plan/schedule and to present the progress.

The project is intended for students to foster their interests in research problems on computer science and engineering and to acquire ability for independent studies.

It is also aimed for students to acquire design ability for their thesis research such as the purpose, the background knowledge, the research topic, the plan/schedule and to present the progress.

### Contents of class

It is usually the case that the project is carried out on individual bases with specific contents differing from on student to another.

Consult with your advisor for any further details.

It is usually the case that the project is carried out on individual bases with specific contents differing from on student to another.

Consult with your advisor for any further details.

#### Self Preparation and Review

#### **Related subjects**

Consult with your advisor for them. Consult with your advisor for them.

#### Notes for textbook

Consult with your advisor.

Consult with your advisor.

### Notes for reference

#### Goals to be achieved

To acquire design abilities for doing research and development at technically high level and leading large scale research projects

To acquire design abilities for doing research and development at technically high level and leading large scale research projects

### Evaluation of achievement

Will be evaluated by the poster presentation and report including the research purpose, background knowledge, research topic, plan/scheduling and progress.

Will be evaluated by the poster presentation and report including the research purpose, background knowledge, research topic, plan/scheduling and progress.

Examination
試験期間中には何も行わない
None during exam period
Details of examination
Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

#### (M4361004T)Seminar on Computer Science and Engineering[Seminar on Computer Science and Engineering]

Seminar on Cor Engineering]	nputer	Scie	nce a	nd Engineering[Se	eminar on Comput	er Science a	and
M4361004T	Subje	ct are	a	Advanced Computer Science and Engineering	Required or elective	Required	
Year	Day week.	of perio	the 1	Intensive	Credit(s)	6	
Graduate Program	n for Ma	aster's	Degre	e	Subject grade	2~2	
Computer Science	e and E	ngine	ering		Beggining grade	M2	
S3系教務委員 3I	kei kyor	nu Iin <sup>.</sup>	-S				
	Engineering] M4361004T Year Graduate Program Computer Science	Engineering] M4361004T Year Qraduate Program for Ma Computer Science and E	Engineering]         M4361004T       Subject are         Year       Day of week,period         Graduate Program for Master's       Computer Science and Engined	Engineering]         M4361004T       Subject area         Year       Day of the week,period	Engineering]       M4361004T       Subject area       Advanced         M4361004T       Subject area       Advanced         Science       and         Engineering       Science         Year       Day of the week,period         Graduate Program for Master's Degree         Computer Science and Engineering	Engineering]       Advanced       Required or         M4361004T       Subject area       Advanced       Computer         Science       and       Engineering       elective         Year       Day of the week,period       Intensive       Credit(s)         Graduate Program for Master's Degree       Subject grade       Subject grade         Computer Science and Engineering       grade       grade	Engineering]     Advanced     Required     or       M4361004T     Subject area     Advanced     Computer       Science     and     Engineering       Year     Day of the week,period     Intensive       Graduate Program for Master's Degree     Subject grade     2~2       Computer Science and Engineering     M2

### **Objectives of class**

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.

It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.

It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

### Contents of class

While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own. While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own. **Self Preparation and Review** 

#### **Related** subjects

Consult with your advisor.

Consult with your advisor.

Notes for textbook

Consult with your advisor. Consult with your advisor.

# Notes for reference

### Goals to be achieved

To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.

To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.

### Evaluation of achievement

Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.

Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.

### Examination

試験期間中には何も行わない

None during exam period

### **Details of examination**

### Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

### (M43630100)Image Processing, Advanced[Image Processing, Advanced]

Time of starting a Faculty G Department Offered C Charge teacher a name[Roman alphabet mark]	omputer Sc	ogram for Master's De	Subject area Day of the week,period	Advanced Computer Science and	Required or				
course     G       Faculty     G       Department Offered     C       Charge     teacher       name[Roman alphabet       mark]	raduate Pro omputer Sc		-	Science and		Elective			
course Faculty G Department Offered C Charge teacher name[Roman alphabet mark]	raduate Pro omputer Sc		-		elective				
course     G       Faculty     G       Department Offered     C       Charge     teacher       name[Roman alphabet       mark]	raduate Pro omputer Sc		-	1					
course     G       Faculty     G       Department Offered     C       Charge     teacher       name[Roman alphabet       mark]	raduate Pro omputer Sc		-	Engineering					
Department Offered C Charge teacher name[Roman alphabet mark]	omputer Sc		week,period	Tue.2~2	Credit(s)	2			
Department Offered C Charge teacher name[Roman alphabet mark]	omputer Sc								
Charge teacher ame[Roman alphabet mark]			gree		Subject	1~2			
Charge teacher ame[Roman alphabet mark]					grade				
name[Roman alphabet mark]		eience and Engineering	Computer Science and Engineering						
name[Roman alphabet mark]	法律 喧 官 往	谷 保之 KANAZAWA	Yasushi, SUGAYA	Yasuvuki	grade				
mark]				· · · · · · · · · · · · · · · · · · ·					
-									
Numbering									
Objectives of class									
This course involves fundar	nentals and	advanced issues on i	mage processing a	and computer vision					
This course involves fundar	mentals and	advanced issues on i	mage processing	and computer vision					
	nontais anu	247411064 155065 011 1	mage processing a	and computer vision	•				
<b>•</b> • • • • •									
Contents of class									
1-2: Fundamentals on proje	ctive geome	etry							
3−4: Camera model									
5–7: Epipolar geometry									
8-10: 3-D reconstruction fr	rom two view	ws							
11-13: 3-D reconstruction	from manv	views							
14–15: Advanced issues									
1-2: Fundamentals on proje	ctive ream	etry							
3-4: Camera model	Serve goorne	,							
5-7: Epipolar geometry									
8-10: 3-D reconstruction fr									
11-13: 3-D reconstruction	from many	views							
14-15: Advanced issues									
Self Preparation and Review	W								
Related subjects									
Geometry, Linear Algebra, S	Statistics.								
Geometry, Linear Algebra, S	Statistics.								
Notes for textbook									
Handouts will be prepared.									
Handouts will be prepared.									
	ook title	Multiple View Geom	etry in Computer	Vision	ISBN				
D	uthor	R.I. Hartley and A.	Publisher	Cambridge	Publish year	2000			
	autor	-			Fublish year	2000			
		Zisserman	I	University Press	10001				
A			A Modern Appro	ach	ISBN				
A	ook title	Computer Vision		Prentice Hall	Publish year	2003			
A Reference2 B	ook title uthor	Computer Vision D.A. Forsyth and	Publisher		-				
A Reference2 B			Publisher						
Reference2 B		D.A. Forsyth and	Publisher						
A Reference2 B		D.A. Forsyth and	Publisher			1			
Reference2 B A Notes for reference		D.A. Forsyth and	Publisher			I			
Reference2 B		D.A. Forsyth and	Publisher						
Reference2 B A Notes for reference Goals to be achieved	uthor	D.A. Forsyth and J. Ponce		and computer visior	n including:				
Reference2 B A Notes for reference Goals to be achieved Understanding of the fundation	uthor	D.A. Forsyth and J. Ponce		and computer visior	n including:				
Reference2 B A Notes for reference	uthor	D.A. Forsyth and J. Ponce		and computer visior	n including:				
Reference2       B         Notes for reference       A         Goals to be achieved       Understanding of the fundar         – camera model,       –         – epipolar geometry,       A	<b>uthor</b> mentals and	D.A. Forsyth and J. Ponce		and computer visior	n including:				
Reference2       B         Notes for reference       A         Goals to be achieved       Understanding of the fundar         - camera model,       -         - epipolar geometry,       -         - 3-D reconstruction from	uthor mentals and images.	D.A. Forsyth and J. Ponce	mage processing		-				
Reference2       B         Notes for reference       A         Goals to be achieved       Understanding of the fundar         – camera model,       A	uthor mentals and images.	D.A. Forsyth and J. Ponce	mage processing		-				

### - 3-D reconstruction from images.

Evaluation of achievement

Grade will be determined by some reports for each area.

Grade will be determined by some reports for each area.

### Examination

レポートで実施

### By Report

Details of examination

### Other information

Room F-404, Ext. 6888, Email: kanazawa@cs.tut.ac.jp (Yasushi Kanazawa) Room C-507, Ext. 6760, Email: sugaya@iim.cs.tut.ac.jp (Yasuyuki Sugaya)

Room F-404, Ext. 6888, Email: kanazawa@cs.tut.ac.jp (Yasushi Kanazawa) Room C-507, Ext. 6760, Email: sugaya@iim.cs.tut.ac.jp (Yasuyuki Sugaya)

### Reference URL

http://www.img.cs.tut.ac.jp/ http://www.iim.cs.tut.ac.jp/ http://www.img.cs.tut.ac.jp/ http://www.iim.cs.tut.ac.jp/

Office hours

Relations to attainment objectives of learning and education

### Key words

image processing, computer vision image processing, computer vision

### (M43630140)Algorithm Engineering, Advanced[Algorithm Engineering, Advanced]

Subject name[English]		eering, Advanced[Alg		1	1
Schedule number	M43630140	Subject area	Advanced	Required or	or Elective
			Computer	elective	
			Science and		
<b>—</b>	<b>- - - -</b>		Engineering		
Time of starting a course	Fall term	Day of the week,period	Mon.3~3	Credit(s)	2
Faculty	Graduate Progra	m for Master's Degre	e	Subject grade	1~2
Department Offered	Computer Scien	ce and Engineering		Beggining grade	M1, M2
Charge teacher name[Romar	n 増山 繁 MASU	YAMA Shigeru		0	
alphabet mark]					
Numbering					
Objectives of class					
To learn knowledge and skill on	advanced compute	er science and engine	ering.		
To learn knowledge and skill on	advanced compute	er science and engine	ering.		
Contents of class					
Lectures are given 15 times.					
Each time a student is requested	ed to give a presenta	ation on selected top	ics in Advanced cor	mputer science and	engineering.
Lectures are given 15 times.	d to give a surrent t	ation on colored d	ion in Advanced	mutor	opaircoul
Each time a student is requeste Self Preparation and Review	eu to give a presenta	ation on selected top	ics in Advanced cor	inputer science and	engineering.
Son Freparauon and Review					
Delated and the					
Related subjects					
Notes for textbook					
No textbook is used.					
No textbook is used.					
Notes for reference					
Goals to be achieved					
Acquire knowledge on advanced	d computer ecience	and anginaaring			
Acquire knowledge on advanced					
Evaluation of achievement		and engineering			
Presentation:50%					
assignment (report): 50%					
Presentation:50%					
assignment (report): 50%					
Examination					
レポートで実施					
By Report					
Details of examination					
Other information					
F503, masuyama@tut.jp					
F503, masuyama@tut.jp					
Reference URL					
Office hours					
Please make an appointment in	-				
Please make an appointment in					
Relations to attainment objecti	ves of learning and o	education			

# Key words

computer science computer science

(M43630200)Advanced Topics in Brain and Cognitive Sciences[Advanced Topics in Brain and Cognitive S	ciences]
---	----------

A 11					
Subject name[English]		and Cognitive Sciences[A			
Schedule number	M43630200	Subject area	Advanced Computer Science and Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day of the week,period	Mon.4~4	Credit(s)	2
Faculty	Graduate Program for Ma			Subject grade	1~2
Department Offered	Computer Science and E	ngineering		Beggining grade	M1, M2
Charge teacher	北﨑 充晃,中内 茂樹 K	ITAZAKI Michiteru, NAKAU	ICHI Shigeki		1
name[Roman alphabet					
mark]					
Numbering					
Objectives of class					
-	human functions and mech	anisms for sensation, perce	eption and cognition	(cognitive neu	roscience). We
	ceive objects and environm			-	
	a few of them has not be				-
-	sensation, perception and				
· · · · · · · · · · · · · · · · · · ·	e technological method or	product utilizing numan co	gnitive processing	in prairi to enha	ance salety o
pleasure in our everyday		anisms for consistion never	ntion and comition	(compitive new	roscience) M
	human functions and mech			-	
	ceive objects and environm				-
	a few of them has not be				
	sensation, perception and				
	e technological method or	product utilizing human co	gnitive processing	in brain to enha	ance safety o
pleasure in our everyday	/ life.				
Contents of class					
Lecture 1:(Kitazaki)					
Introduction					
(Kitazaki,Nakauchi)					
Lecture 2-4:					
Problem and theory of p Lecture 5–7:	perception, Psychophysical	and physiological research	methods		
	tion, Depth perception, Mot				
Lecture 8-10:		tion perception			
Lecture 8-10: Mid-level vision, High-le	tion, Depth perception, Mot evel vision, Object recognition	tion perception			
Lecture 8-10: Mid-level vision, High-le Lecture 11-13:		tion perception on, Development			
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15:	evel vision, Object recognitions, Problem solving, Embodi	tion perception on, Development ed perception			
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15:	evel vision, Object recognition	tion perception on, Development ed perception			
Lecture 8–10: Mid-level vision, High-le Lecture 11–13: Attention, Consciousnes Lecture 14–15: Ergonomics, Human-ma Lecture 1:(Kitazaki)	evel vision, Object recognitions, Problem solving, Embodi	tion perception on, Development ed perception			
Lecture 8–10: Mid-level vision, High-le Lecture 11–13: Attention, Consciousnes Lecture 14–15: Ergonomics, Human-ma	evel vision, Object recognitions, Problem solving, Embodi	tion perception on, Development ed perception			
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi)	evel vision, Object recognitions, Problem solving, Embodi	tion perception on, Development ed perception			
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4:	evel vision, Object recogniti ss, Problem solving, Embodi chine interface, Virtual real	tion perception on, Development red perception ity, Brain-machine interface	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p	evel vision, Object recognitions, Problem solving, Embodi	tion perception on, Development red perception ity, Brain-machine interface	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p Lecture 5-7:	evel vision, Object recogniti ss, Problem solving, Embodi chine interface, Virtual real perception, Psychophysical	tion perception on, Development red perception ity, Brain-machine interface and physiological research	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p Lecture 5-7: Spatio-temporal percep	evel vision, Object recogniti ss, Problem solving, Embodi chine interface, Virtual real	tion perception on, Development red perception ity, Brain-machine interface and physiological research	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p Lecture 5-7: Spatio-temporal percep Lecture 8-10:	evel vision, Object recogniti ss, Problem solving, Embodi chine interface, Virtual real perception, Psychophysical tion, Depth perception, Mot	tion perception on, Development ed perception ity, Brain-machine interface and physiological research tion perception	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p Lecture 5-7: Spatio-temporal percep Lecture 8-10: Mid-level vision, High-le	evel vision, Object recogniti ss, Problem solving, Embodi chine interface, Virtual real perception, Psychophysical	tion perception on, Development ed perception ity, Brain-machine interface and physiological research tion perception	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p Lecture 5-7: Spatio-temporal percep Lecture 8-10: Mid-level vision, High-le Lecture 11-13:	evel vision, Object recognitions, Problem solving, Embodi chine interface, Virtual real perception, Psychophysical tion, Depth perception, Mot	tion perception on, Development ed perception ity, Brain-machine interface and physiological research tion perception on, Development	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p Lecture 5-7: Spatio-temporal percep Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes	evel vision, Object recogniti ss, Problem solving, Embodi chine interface, Virtual real perception, Psychophysical tion, Depth perception, Mot	tion perception on, Development ed perception ity, Brain-machine interface and physiological research tion perception on, Development	3		
Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15: Ergonomics, Human-ma Lecture 1:(Kitazaki) Introduction (Kitazaki,Nakauchi) Lecture 2-4: Problem and theory of p Lecture 5-7: Spatio-temporal percep Lecture 8-10: Mid-level vision, High-le Lecture 11-13: Attention, Consciousnes Lecture 14-15:	evel vision, Object recognitions, Problem solving, Embodi chine interface, Virtual real perception, Psychophysical tion, Depth perception, Mot	tion perception on, Development ed perception ity, Brain-machine interface and physiological research tion perception on, Development ed perception	e		

<b>B</b> 1 1 1 1 1 1						
Related subjects						
Notes for textbook						
No textbook is requ	ired.					
Printed slides or ele	ctrical data will be	provided.				
No textbook is requ	ired					
Printed slides or ele		provided				
Reference1	Book title	Comitive Neurope	iones (2nd Int.	ernational student	ISBN	
Reference I	BOOK UTIE	edition)	lience (3rd Inte	ernational student	1981	
	Author	,	Publisher	1404/ No.4	Dublich un en	
	Author	Gazzaniga, Davies,	Publisher	WW Norton &	Publish year	
		Ivry, and Mangun		Co		
Notes for reference	)					
Goals to be achieve	d					
To understand func	tions and mechanis	sms for human sensati	on, perception ar	nd cognition.		
		entific findings on cogr		-		
		methods or products			in brain to enh	ance safetv
pleasure in our ever	0 0			eginare pressenig		
	yddy me.					
To understand func	tions and mechanis	sms for human sensati	on, perception ar	nd cognition.		
To understand and	discuss recent sci	entific findings on cogr	nitive neuroscien	ces.		
To propose and de	sign technological	methods or products	utilizing human o	cognitive processing	in brain to enh	ance safety
pleasure in our ever	yday life.					
Evaluation of achiev	/ement					
Presentation and di	scussion					
Presentation and di A (100–80), B (79–6	scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di	scussion 5), C (64–55) scussion					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6	scussion 5), C (64–55) scussion					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b>	scussion 5), C (64–55) scussion					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施	scussion 5), C (64–55) scussion					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b>	scussion 5), C (64–55) scussion					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinat</b>	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinat</b> Other information	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinat</b> <b>Other information</b> mich@cs.tut.ac.jp	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinat</b> <b>Other information</b> mich@cs.tut.ac.jp mich@cs.tut.ac.jp	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinat</b> <b>Other information</b> mich@cs.tut.ac.jp	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinat</b> <b>Other information</b> mich@cs.tut.ac.jp mich@cs.tut.ac.jp	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp <b>Reference URL</b>	scussion 5), C (64–55) scussion 5), C (64–55)					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp mich@cs.tut.ac.jp <b>Reference URL</b> <b>Office hours</b>	scussion (5), C (64–55) (5), C (64–55) (00) (00) (10) (10) (10) (10) (10) (10					
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp <b>mich@cs.tut.ac.jp</b> <b>Reference URL</b> <b>Office hours</b> Mon, 1 hour after th Mon, 1 hour after th	scussion (5), C (64–55) scussion (5), C (64–55) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	learning and education				
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp <b>mich@cs.tut.ac.jp</b> <b>Reference URL</b> <b>Office hours</b> Mon, 1 hour after th Mon, 1 hour after th	scussion (5), C (64–55) scussion (5), C (64–55) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	learning and education	1			
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp <b>mich@cs.tut.ac.jp</b> <b>Reference URL</b> <b>Office hours</b> Mon, 1 hour after th Mon, 1 hour after th	scussion (5), C (64–55) scussion (5), C (64–55) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	learning and education				
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp <b>mich@cs.tut.ac.jp</b> <b>Reference URL</b> <b>Office hours</b> Mon, 1 hour after th Mon, 1 hour after th	scussion (5), C (64–55) scussion (5), C (64–55) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	learning and educatior				
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp <b>mich@cs.tut.ac.jp</b> <b>Reference URL</b> <b>Office hours</b> Mon, 1 hour after th Mon, 1 hour after th	scussion (5), C (64–55) scussion (5), C (64–55) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	learning and educatior				
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp <b>mich@cs.tut.ac.jp</b> <b>Reference URL</b> <b>Office hours</b> Mon, 1 hour after th Mon, 1 hour after th	scussion (5), C (64–55) scussion (5), C (64–55) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	learning and educatior				
Presentation and di A (100-80), B (79-6 Presentation and di A (100-80), B (79-6 <b>Examination</b> レポートで実施 By Report <b>Details of examinati</b> <b>Other information</b> mich@cs.tut.ac.jp mich@cs.tut.ac.jp <b>Reference URL</b> <b>Office hours</b> Mon, 1 hour after th Mon, 1 hour after th	scussion (5), C (64–55) scussion (5), C (64–55) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	learning and education	1			

# (M43630260)Advanced Robotics and Informatics 1[Advanced Robotics and Informatics 1]

Schedule number			Advanced Robotics		T
	M43630260	Subject area	Advanced	Required or	Elective
			Computer	elective	
			Science and		
			Engineering		
Time of starting a course	Fall1 term	Day of the	Tue.3~3	Credit(s)	1
		week,period			
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~2
Department Offered	Computer Scienc	e and Engineering		Beggining	M1, M2
Ohanna taaahan nama[Daman		lum		grade	
Charge teacher name[Roman alphabet mark]	三浦 純 MIURA	Jun			
alphabet mark					
Objectives of class					
Fundamental and advanced issu	-			ded are probabilis	tic sensor fusio
techniques (e.g., Kalman filter) an					
Fundamental and advanced issu	-			ded are probabilis	tic sensor fusio
techniques (e.g., Kalman filter) an	d its application to	mobile robot localiza	ation and mapping.		
Contents of class		c :			
Week 1: Introduction to scene red	-	r iusion.			
Week 2: Probability basic and Bay					
Week 3: Kalman filter and its exte	INSIONS.				
Week 4: Nonparametric filters. Week 5: Mobile robot localization.					
Week 6: Mobile robot localization. Week 6: Mobile robot mapping.					
Week 7: SLAM (Simultaneous Loc	alization and Mann	:			
Week 8: Presentations of student		0			
Week 1: Introduction to scene red	-				
Week 2: Probability basic and Bay	-	r rusion.			
Week 3: Kalman filter and its exte					
Week 4: Nonparametric filters.					
Week 5: Mobile robot localization.					
Week 6: Mobile robot mapping.					
Week 7: SLAM (Simultaneous Loc	alization and Mann	ing)			
Week 8: Presentations of student		-			
Self Preparation and Review					
•					
Related subjects					
Noiatou subjects					
-	algebra and probab	ility theory are usef	ul.		
Fundamental knowledge of linear Fundamental knowledge of linear					
Fundamental knowledge of linear					
Fundamental knowledge of linear Fundamental knowledge of linear					
Fundamental knowledge of linear Fundamental knowledge of linear <b>Notes for textbook</b>					
Fundamental knowledge of linear Fundamental knowledge of linear <b>Notes for textbook</b>					
Fundamental knowledge of linear Fundamental knowledge of linear <b>Notes for textbook</b> Handouts will be prepared.	algebra and probab	ility theory are usef			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference)	algebra and probab	ility theory are usef			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference) – S. Thrun, W. Burgard, D. Fox, Pr	algebra and probab	ility theory are usef			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference)	algebra and probab	ility theory are usef			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference) – S. Thrun, W. Burgard, D. Fox, Pr	algebra and probab	ility theory are usef			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference) - S. Thrun, W. Burgard, D. Fox, Pr Handouts will be prepared.	algebra and probab	s, MIT Press, 2005.			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference) - S. Thrun, W. Burgard, D. Fox, Pr Handouts will be prepared. (Reference)	algebra and probab	s, MIT Press, 2005.			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference) - S. Thrun, W. Burgard, D. Fox, Pr Handouts will be prepared. (Reference)	algebra and probab	s, MIT Press, 2005.			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference) - S. Thrun, W. Burgard, D. Fox, Pr Handouts will be prepared. (Reference) - S. Thrun, W. Burgard, D. Fox, Pr	algebra and probab	s, MIT Press, 2005.			
Fundamental knowledge of linear Fundamental knowledge of linear Notes for textbook Handouts will be prepared. (Reference) - S. Thrun, W. Burgard, D. Fox, Pr Handouts will be prepared. (Reference) - S. Thrun, W. Burgard, D. Fox, Pr Notes for reference	algebra and probab robabilistic Robotic robabilistic Robotic	s, MIT Press, 2005.	<u>иI.</u>		

Grade will be determined by the report.

Grade will be determined by the report.

# Examination

授業を実施 Regular Class

# Details of examination

### Other information

Room C-604, Ext. 6773, Email: jun.miura@tut.jp (Jun Miura)

Room C-604, Ext. 6773, Email: jun.miura@tut.jp (Jun Miura)

# Reference URL

 $\label{eq:http://www.aisl.cs.tut.ac.jp/classes/robotics-and-informatics/ID and password will be given at the class.$ 

http://www.aisl.cs.tut.ac.jp/classes/robotics-and-informatics/

 $\ensuremath{\text{ID}}$  and password will be given at the class.

# Office hours

Make an appointment beforehand by email.

Make an appointment beforehand by email.

## Relations to attainment objectives of learning and education

## Key words Robotics

Robotics

# (M43630290)Web Data Engineering 2[Web Data Engineering 2]

Subject name[English]	Web Data En	gineering 2[Web Da	ata Engineering 2			
Schedule number	M43630290		Subject area	Advanced	Required or	Elective
				Computer	elective	
				Science and		
				Engineering		
Time of starting a course	Fall1 term		Day of the week,period	Mon.2~2	Credit(s)	1
Faculty	Graduate Pro	ogram for Master's	Degree		Subject grade	1~2
Department Offered	Computer So	ience and Enginee	ering		Beggining grade	M1, M2
Charge teacher	栗山 繁 KUI	RIYAMA Shigeru				
name[Roman alphabet						
mark]						
Numbering						
Objectives of class	1					
The information visualize	ation technique	c for analyzing ma	nccive data will be	discussed		
	-				avetam of Wal	
This lecture aims at tr		-	-	for implementing a	system of we	b-services, using
widely-used programmir				r 1		
The information visualiz	-					
This lecture aims at tr	- · ·	-		tor implementing a	system of Wel	o-services, using
widely-used programmir	ng API for comp	outer graphics and	visualization.			
Contents of class						
This lecture mainly focu	uses on graphic	al models and visu	ualization method	s for handling multi-	variable data, v	which consists of
the 3 topics below:						
1. Correlation visualizati	on of multivaria	ate data				
2. Relation visualization			recontation			
3. Visualization of semai	ntics and time-	variation with text	ual representation	1		
including exercises of de	eveloping actua	l visualization appl	lications.			
This lecture mainly focu	uses on graphic	al models and visu	ualization method	s for handling multi-	variable data, v	which consists of
the 3 topics below:						
1. Correlation visualizati	on of multivaria	ate data				
2. Relation visualization			recentation			
3. Visualization of semai						
5. VISUAIIZATION OF Seman	nucs and time-	variation with text	ual representation	1		
including exercises of de	eveloping actua	l visualization appl	lications.			
Self Preparation and Re	view					
All participants should s	tudy by themse	elves about Proces	ssing ( https://ww	w.processing.org ).		
All participants should s	tudy by themse	elves about Proces	ssing ( https://ww	w.processing.org ).		
Related subjects						
Web Data Engineering 1						
Web Data Engineering 1						
Notes for textbook						
Materials will be prepare	ed by lecturers	as a Web documer	nt.			
Materials will be prepare	ed by lecturers	as a Web documer	nt.			
Deferencet	Beek ala	Information View	ulization: Dava+	ion for Docim	ISBN	978-
Reference1	Book title	mormation Visu	ualization: Percept	ion for Design	ISDIN	
					<b></b>	0123814647
	Author	Colin Ware	Publisher	Morgan	Publish year	2012
				Kaufmann		
Notes for reference						
Goals to be achieved						

Obtain the capabilities that implement visualization tools for massive multi-variable data according to the	
design methodology related to the domain and features of the data.	
Obtain the capabilities that implement visualization tools for massive multi-variable data according to the	
design methodology related to the domain and features of the data.	
Evaluation of achievement	
Exercise & presentation (100%)	
Exercise & presentation (100%)	
Examination	
レポートで実施	
By Report	
Details of examination	
Other information	
Kuriyama,Shigeru(C-504)sk@tut.jp	
Kuriyama,Shigeru(C-504)sk@tut.jp	
Reference URL	
https://moodle2.imc.tut.acjp/course/view.php?id=159	
https://moodle2.imc.tut.ac.jp/course/view.php?id=159	
Office hours	
Anytime, but a priori email appointment is definitely preferable.	
Anytime, but a priori email appointment is definitely preferable.	
Relations to attainment objectives of learning and education	
Capability of designing Web application systems.	
Capability of designing Web application systems.	
Key words	
Information Visualization, Visual Data Mining, Computer Graphics, Massive Data Analysis	
Information Visualization, Visual Data Mining, Computer Graphics, Massive Data Analysis	

# (M43630300)Complex Systems and Intelligent Informatics 1[Complex Systems and Intelligent Informatics 1]

Computer solution         Science and Engineering         Cordit(a)         1           Faulty         Cradute Program for Master's Degree         Subject grade         1~2           Department Offered         Computer Science and Engineering         Beggining         M1, M2           Otherse teacher name[Toman         村道臣 一支 MURAKOSHI Kazushi         grade         1~2           Objectives of class         To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.         To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.         To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.         To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           To achieve the aim, this class offers knowledge and skills for mathematical Models         Mint is computational Neuroscience and Application—oriented Mathematical Models           Mist is computational Neuroscience and Application—oriented Mathematical Models         Simulation for morents         Simulatis for mathematical Models	Subject name[English]	Complex System 1]	s and Intelligent Info	ormatics 1[Complex	Systems and Intel	ligent Informatics
Yeauby         Craduate Program for Master's Degree         Subject grade         1~2           Department Offered         Computer Science and Engineering         Beggining grade         M1, M2           Dharge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name[Roman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name(Boroman diphabet mark]         M1, M2         grade         M1, M2           Diarge teacher name(Boroman diphabet mark]         M1, M2         Graduate program         M1, M2           Diarge teacher team, this class offers knowledge and skills for mathematical modeling and simulation methods.         Contextor of feas         M1, M2           D. Leaming	Schedule number	M43630300	Subject area	Computer Science and	-	Elective
Department Offered         Computer Science and Engineering         Beggining grade         M1, M2           Charge teacher name(Roman lighthabet mark)         村地 一支 MURAKOSHI Kazushi         M1, M2           Disjectives of class         Image: Science and Engineering         Beggining         M1, M2           Objectives of class         Image: Science and Application-oriented Mathematical Models         Mint is computational Neuroscience and Application-oriented Mathematical Models           What is computational Neuroscience and Application-oriented Mathematical Models         Mint is computational Neuroscience and Application-oriented Mathematical Models           What is computational Neuroscience and Application-oriented Mathematical Models         Mint is science and Scie	Time of starting a course	Fall1 term	-	Wed.3~3	Credit(s)	1
grade           Charge teacher name[Reman jaylabet mark]         村地 一支 MURAKOSHI Kazushi           Dipictives of class         The advector of this class is to understand complex and intelligent systems.           To achieve the aim, this class is to understand complex and intelligent systems.         To achieve the aim, this class is to understand complex and intelligent systems.           To achieve the aim, this class is to understand complex and intelligent systems.         To achieve the aim, this class is to understand complex and intelligent systems.           To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.         The aim of this class is to understand complex and intelligent systems.           To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.         The aim of this complex and intelligent systems? Outline of the brain system.           3. Computational Neuroscience and Application-oriented Mathematical Models         What is computational Neuroscience and Application oriented Mathematical Models           What is complication methods for single neuron.         E. Simulation Methods         Simulation for formeration such as NEURON and GENESIS.           S. Self-organizing         Simulation environments such as NEURON and GENESIS.         Simulation freinforcement learning reinforcement learning in the brain. demonstration of reinforcement learning for controlling obot           Summary         Ist week: A free dimensional Mathematical Models           Nita is complicationa	Faculty	Graduate Progra	m for Master's Degre	e	Subject grade	1~2
Charge teacher name(Roman alphabet mar()         村越 一支 MURAKOSHI Kazushi           abhabet mar()         Mumbering           Dijectives of class         The aim of this class is to understand complex and intelligent systems. To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. The aim of this class is to understand complex and intelligent systems. To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           Contents of class         A Introduction           What is complex and intelligent systems? Outline of the brain system.         3. Computational Neuroscience and Artificial neural networks?           3. Omputational Neuroscience and artificial neural networks?         3. Computational Neuroscience and artificial neural networks?           5. Jumarity at connected part of neurons (synapse)         Synaptic plasticity, spike-timing-dependent plasticity (STDP).           5. Simulation Environments         Suplanation and demonstration of simulation environments such as NEURON and GENESIS.           6. Self-organizing?         Winer Takes All, Self-organizing map (SOM)           1. Reinforcement Learning. reinforcement learning in the brain, demonstration of reinforcement learning for controlling obst           1. Summary         Self-organizing           1. Structure         Self-organizing           Nat is complex and intelligent systems? Outline of the brain system.           3. Computational Neuroscience and Artificial neural networks?	Department Offered	Computer Science	ce and Engineering		Beggining	M1, M2
bibbbet mark]           Winnbering           Objectives of class           The aim off this class is to understand complex and intelligent systems.           To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           The aim off this class is to understand complex and intelligent systems.           To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           Contents of class           3. Introduction           What is computational Neuroscience and Application-oriented Mathematical Models           What is computational Neuroscience and artificial neural networks?           2. Model Neurons           Structure of neurons, synapse, model neurons.           9. Learning at connected part of neurons (synapse)           Synaptic plasticity, spike-timing-dependent plasticity (STDP).           2. Simulation Methods           Numerical calculation methods for single neuron, neural network from single neuron.           4. Simulation Environments           Explanation and demonstration of simulation environments such as NEURON and GENESIS.           3. Self-organizing           What is reinforcement Learning           What is reinforcement Learning in the brain, demonstration of reinforcement learning for controlling robot           3. Ummutational Neuroscience and Application-oriented Mathematical Models					grade	
Numbering         Objectives of class           The aim of this class is to understand complex and intelligent systems.         To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           The aim of this class is to understand complex and intelligent systems.         To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.           To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods.         Contents of class           A. Introduction         Nihat is complex and intelligent systems?         Outline of the brain system.           B. Computational Neuroscience and artificial neural network?         Output systems?           D. Learning at connected part of neurons (synapse)         Dystemational Neuroscience and artificial neural network?           D. Learning at connected part of neurons (synapse)         Synaptic plasticity, spike-timing-dependent plasticity (STDP).           D. Simulation Methods         Ymmer Takes All, Self-organizing map (SOM)           Mist is self-organizing?         Winner Takes All, Self-organizing map (SOM)           Ha kis self-organizing?         Nist is self-organizing map (SOM)           Mist is self-organizing?         Nist self-organizing map (SOM)           Mist is self-organizing?         Nist is complex and intelligent systems? Outline of the brain system.           Summary         Summary <td< td=""><td>Charge teacher name[Roman</td><td>村越 一支 MUR</td><td>AKOSHI Kazushi</td><td></td><td></td><td></td></td<>	Charge teacher name[Roman	村越 一支 MUR	AKOSHI Kazushi			
Delectives of class The aim of this class is to understand complex and intelligent systems. To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. The aim of this class is to understand complex and intelligent systems. To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. Contents of class A. Introduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? 3. Model Neurons Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods Vamerical calculation methods for single neuron, neural network from single neuron. 5. Solid Structure of reurons synapse, model neuron, neural network from single neuron. 5. Simulation and demonstration of simulation environments such as NEURON and GENESIS. 3. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot S. Sumation and kenostration of simulation environments such as NEURON and GENESIS. 3. Summary List week: A 2nd week: B 3rd week: C 4th week: D 3. Antroduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and Application-oriented Mathematical Models What is computational N	alphabet mark]					
The aim of this class is to understand complex and intelligent systems. To achieve the aim, this class is to understand complex and intelligent systems. To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. <b>Contents of class</b> A Introduction Nat is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computed Neuroscience and Application-oriented Mathematical Model Neurons 5. Computational Neuroscience and Application-oriented Mathematical Model Neurons 5. Structure of neurons, synapse, model neurons. 9. Learning at connected part of neurons (synapse) 5. Simulation Methods Sumerical calculation methods for single neuron, neural network from single neuron. 5. Simulation Authods Sumerical calculation methods for single neuron, neural network from single neuron. 5. Simulation and demonstration of simulation environments such as NEURON and GENESIS. 3. Self-organizing? Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot 5. Summary 1st week: A And week: B 3. Antroduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? 5. Loadel Neurons 5. Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Nethods 5. Sy	Numbering					
To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. The aim of this class is to understand complex and intelligent systems. To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. <b>Contracts of class</b> A. Introduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is connected part of neurons (synapse) D. Learning at connected part of neurons (synapse) Synaptic plasticity. spike-timing-dependent plasticity (STDP). 5. Simulation Methods Vumerical calculation methods for single neuron, neural network from single neuron. 7. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. 6. Self-organizing What is reinforcement Learning What is reinforcement Learning What is reinforcement Learning Nat is self-organizing? Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning What is reinforcement Learning Nat is reinforcement Learning Nat is reinforcement learning. reinforcement learning in the brain, demonstration of reinforcement learning for controlling obot 4. Summary Ist week: A And week: B 3rd week: C 1th week: I I 4. Introduction Nat is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models Nhat is complex and intelligent systems? 0. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods Vumerical calculation methods for single neuron, neural network from single neuron. 5. Simulation and metonscience and Application-oriented Mathematical Models Nhat is computational Neuroscience and artificial neural network from single neuron. 5. Simulation Methods Vumerical calculation methods for single neuron, neural network from single neuron. 5. Simulatio	Objectives of class					
The aim of this class is to understand complex and intelligent systems. To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. <b>Contents of class</b> A. Introduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Vumerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Suppartic plasticity, spike-timing-dependent plasticity (STDP). S. Simulation and demonstration of simulation environments such as NEURON and GENESIS. 3. Self-organizing What is self-organizing Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot 1. Summary Ist week: A 2nd week: B 3rd week: C 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Succure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). S. Simulation Methods Vumerical calculation methods for single neuron, neural network from single neuron. 5. Simulation Entrivonments Simulation Entrivonments Simulation Entrivonments Simulation Entrivonments Simulation Entrivonments Simulation Entrivonments Simulation Entrivonments Simulation Entrivonments Si	The aim of this class is to underst	tand complex and	intelligent systems.			
To achieve the aim, this class offers knowledge and skills for mathematical modeling and simulation methods. Contents of class A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is complexitional Neuroscience and artificial neural networks? D. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation demonstration of simulation environments such as NEURON and GENESIS. G. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) I. Reinforcement Learning What is reinforcement Learning What is complex and intelligent systems? Outline of the brain, demonstration of reinforcement learning for controlling robot S. G. Self-organizing What is complex and intelligent systems? Outline of the brain system. S. Gomputational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. S. Gomputational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. S. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. S. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? S. Model Neurons S. Surder Neurons S. Surder S. Self-organizing Neurons S. Self-organizing Mat is complex and intelligent systems? S. Model Neurons S. Surder S. Self-organize Neurons, Senses, S. Self-organize Neurons S. Self-organize Neurons, Senses, model neurons, Senses, Self-organize Neurons, Senses, Self-organize Neuroscience and Application-oriented Mathematical Models Net is computational Neuroscience	To achieve the aim, this class offe	ers knowledge and	skills for mathemati	cal modeling and sin	nulation methods.	
Contents of class A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Ware is composited of simulation environments such as NEURON and GENESIS. G. Self-organizing What is reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling obot I. Summary Ist week: A And week: B Bard week: C	The aim of this class is to unders	tand complex and	intelligent systems.			
A Introduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? 2. Model Neurons Structure of neurons, synapse, model neurons. 3. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. 3. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning What is self-organizing. reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot 1. Summary Ist week: A 2rd week: D 2rd week: C 2rth week: H I 4. Introduction Nata is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models Nhat is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models Nhat is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models Nhat is complex and intelligent systems? 5. Model Neurons Structure of neurons, synapse, model neurons. 3. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods Sumerical calculation methods for single neuron, neural network from single neuron. 5. Simulation Addemonstration of simulation environments such as NEURON and GENESIS.	To achieve the aim, this class offe	ers knowledge and	skills for mathemati	cal modeling and sin	nulation methods.	
What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? 2. Model Neurons Structure of neurons, synapse, model neurons. 3. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods Yumerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. 3. Self-organizing What is self-organizing Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot 5. Summary Ist week: A And week: B 3rd week: C 5th week: F 5th week: C 5th week: H I 4. Introduction Mata is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models Mhat is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and artificial neural networks? 5. Model Neurons Structure of neurons, synapse, model neurons. 5. Laarning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods Sumerical calculation methods for single neuron, neural network from single neuron. 5. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	Contents of class					
<ul> <li>3. Computational Neuroscience and Application-oriented Mathematical Models</li> <li>What is computational Neuroscience and artificial neural networks?</li> <li>2. Model Neurons</li> <li>Structure of neurons, synapse, model neurons.</li> <li>3. Learning at connected part of neurons (synapse)</li> <li>Synaptic plasticity, spike-timing-dependent plasticity (STDP).</li> <li>5. Simulation Methods</li> <li>Vumerical calculation methods for single neuron, neural network from single neuron.</li> <li>F. Simulation and demonstration of simulation environments such as NEURON and GENESIS.</li> <li>3. Self-organizing</li> <li>What is self-organizing? Winner Takes All, Self-organizing map (SOM)</li> <li>4. Reinforcement Learning.</li> <li>Hai is self-organizing.</li> <li>Notat is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot.</li> <li>Summary</li> <li>Ist week: A</li> <li>2. A veek: B</li> <li>3. Self-organizing? Outline of the brain system.</li> <li>3. Computational Neuroscience and artificial neural networks?</li> <li>3. Model Neurons</li> <li>3. Computational Neuroscience and artificial neural networks?</li> <li>4. Introduction</li> <li>What is complex and intelligent systems? Outline of the brain system.</li> <li>3. Computational Neuroscience and artificial neural networks?</li> <li>5. Model Neurons</li> <li>5. Model Neurons</li> <li>5. Model Neurons</li> <li>5. Learning at connected part of neurons (synapse)</li> <li>Synaptic plasticity, spike-timing-dependent plasticity (STDP).</li> <li>5. Simulation Methods</li> <li>Numerical calculation methods for single neuron, neural network from single neuron.</li> <li>7. Simulation Synapse, model neurons, even and entificial neural network from single neuron.</li> <li>7. Simulation technods for single neuron, neural network from single neuron.</li> <li>7. Simulation Environments</li> <li>8. Simulation methods for single neuron, neural network from single neuron.</li> <li>7. Simulation Methods<!--</td--><td>A. Introduction</td><td></td><td></td><td></td><td></td><td></td></li></ul>	A. Introduction					
What is computational Neuroscience and artificial neural networks? 2. Model Neurons Structure of neurons, synapse, model neurons. 3. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods Vumerical calculation methods for single neuron, neural network from single neuron. 7. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. 3. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot 5. Summary Ist week: A 2nd week: B 3rd week: C 4th week: C 4th week: C 4th week: C 7th week: F 5th week: F 5th week: F 5th week: G 7th week: M 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and Application-oriented Mathematical Models What is computed on the origon oriented part neurons. 5. Learning at connected part of neurons. 5. Simulation Methods 5. Simulation Methods for single neuron, neural network from single neuron. 7. Simulation methods for single neuron, neural network from single neuron. 5. Simulation methods for single neuron, neural network from single neuron. 5. Simulation methods for single neurons, neural network from single neuron. 5. Simulation methods for single neuron, neural network from single neuron. 5. Simulation fervionments 5. Simulation and demonstration of simulation environments such as NEURON and GENESIS.	What is complex and intelligent sy	stems? Outline of	the brain system.			
<ul> <li>C. Model Neurons</li> <li>Structure of neurons, synapse, model neurons.</li> <li>J. Learning at connected part of neurons (synapse)</li> <li>Synaptic plasticity, spike-timing-dependent plasticity (STDP).</li> <li>Simulation Methods</li> <li>Numerical calculation methods for single neuron, neural network from single neuron.</li> <li>Simulation Environments</li> <li>Explanation and demonstration of simulation environments such as NEURON and GENESIS.</li> <li>G. Self-organizing Winner Takes All, Self-organizing map (SOM)</li> <li>H. Reinforcement Learning</li> <li>What is self-organizing, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot</li> <li>Summary</li> </ul> Ist week: A 2nd week: B 3rd week: C 3rd week: C 3rd week: F Sth week: F Sth week: F Sth week: G A. Introduction Mhat is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models Mhat is computational Neuroscience and Application-oriented Mathematical Models Must is computational Neuroscience and Application-oriented Mathematical Models Mhat is computational Neuroscience and Application-oriented Mathematical Models Mhat is computational Neuroscience and Application-oriented Mathematical Models Mhat is complex and intelligent systems? Structure of neurons, synapse, model neurons. O. Model Neurons Structure of neurons (synapse) Synaptic plasticity, spike-timing-				Models		
Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. G. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot I. Summary Ist week: A 2nd week: B 3rd week: C Sth week: C Sth week: C A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent organizing neurons. D. Learning to connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Methods for single neuron, neural network from single neuron. F. Simulation Methods for single neuron, neural network from single neuron. F. Simulation and demonstration of simulation environments such as NEURON and GENESIS.	•	ice and artificial ne	eural networks?			
<ul> <li>D. Learning at connected part of neurons (synapse)</li> <li>Synaptic plasticity, spike-timing-dependent plasticity (STDP).</li> <li>E. Simulation Methods</li> <li>Vumerical calculation methods for single neuron, neural network from single neuron.</li> <li>F. Simulation Environments</li> <li>Explanation and demonstration of simulation environments such as NEURON and GENESIS.</li> <li>G. Self-organizing</li> <li>What is self-organizing? Winner Takes All, Self-organizing map (SOM)</li> <li>4. Reinforcement Learning</li> <li>What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot</li> <li>Summary</li> <li>Ist week: A</li> <li>2nd week: B</li> <li>3rd week: C</li> <li>4th week: D</li> <li>5th week: F F</li> <li>5th week: F F</li> <li>5th week: I I</li> <li>A. Introduction</li> <li>Neat is complex and intelligent systems? Outline of the brain system.</li> <li>3. Computational Neuroscience and Application-oriented Mathematical Models</li> <li>What is complex do intelligent of neurons.</li> <li>D. Learning at connected part of neurons.</li> <li>Simulation Methods</li> <li>Sumation flation methods for single neuron, neural network from single neuron.</li> <li>F. Simulation methods for single neuron neural network from single neuron.</li> <li>F. Simulation methods for single neuron neural network from single neuron.</li> <li>F. Simulation methods for single neuron neural network from single neuron.</li> <li>F. Simulation methods for single neuron neuron such as NEURON and GENESIS.</li> </ul>						
Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. G. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) 4. Reinforcement Learning What is reinforcement learning. reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot 5. Summary Summary Ist week: A 2nd week: C 4th week: D 5th week: F 5th week: H A. Introduction What is complex and intelligent systems? Outline of the brain system. 8. Computational Neuroscience and Application-oriented Mathematical Models Mhat is complex and intelligent systems? Outline of the brain system. 8. Computational Neuroscience and Application-oriented Mathematical Models Mhat is complex and intelligent systems? Outline of the brain system. 9. Computational Neuroscience and Application-oriented Mathematical Models Mhat is complex and intelligent systems? Outline of the brain system. 9. Learning at connected part of neurons. 9. Learning at connected part of neurons. 9. Learning at connected part of neurons. 9. Junation Albertods 10. Learning at connected part of neurons (synapse) 5. Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods 10. Learning at connected part of neurons (synapse) 5. Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods 10. Diversion Methods 10. Sumation Albertods for single neuron, neural network from single neuron. 5. Simulation Addition methods for single neuron neuron and GENESIS.						
<ul> <li>E. Simulation Methods</li> <li>Sumerical calculation methods for single neuron, neural network from single neuron.</li> <li>F. Simulation Environments</li> <li>Explanation and demonstration of simulation environments such as NEURON and GENESIS.</li> <li>G. Self-organizing</li> <li>What is self-organizing? Winner Takes All, Self-organizing map (SOM)</li> <li>H. Reinforcement Learning</li> <li>What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot</li> <li>Summary</li> </ul> Ist week: A 2nd week: B 3rd week: C 3rd week: C 3rd week: G 7th week: H I 4. Introduction A. Introduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? 2. Model Neurons Structure of neurons, synapse, model neurons. 3. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). 5. Simulation Methods Kumerical calculation methods for single neuron, neural network from single neuron. F. Simulation and demonstration of simulation environments such as NEURON and GENESIS.						
Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. G. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot Summary Ist week: A 2nd week: B 3rd week: C 3rd week: C 3rd week: F 3th week: F 3th week: G 7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. D. Computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Addensition of simulation environments such as NEURON and GENESIS.		dependent plasticit	ty (STDP).			
F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS. G. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling obot I. Summary Ist week: A 2nd week: B 3rd week: C 4th week: D 5th week: E F 8th week: E F 8th week: G 7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.						
Explanation and demonstration of simulation environments such as NEURON and GENESIS. G. Self-organizing What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot . Summary Ist week: A 2nd week: B 3rd week: C 4th week: D 5th week: F 5th week: F 5th week: F 5th week: H A. Introduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and publication-oriented Mathematical Models What is computational Neuroscience and publication oriented Neuroscience Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.		r single neuron, ne	ural network from sil	ngle neuron.		
<ul> <li>G. Self-organizing</li> <li>What is self-organizing? Winner Takes All, Self-organizing map (SOM)</li> <li>4. Reinforcement Learning</li> <li>What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot</li> <li>i. Summary</li> <li>Ist week: A</li> <li>2nd week: B</li> <li>3rd week: C</li> <li>4th week: C</li> <li>5th week: F</li> <li>5th week: F</li> <li>5th week: G</li> <li>7th week: H I</li> <li>A. Introduction</li> <li>Nhat is complex and intelligent systems? Outline of the brain system.</li> <li>B. Computational Neuroscience and Application-oriented Mathematical Models</li> <li>Nhat is computed on a connected part of neurons.</li> <li>C. Model Neurons</li> <li>Structure of neurons, synapse, model neurons.</li> <li>D. Learning at connected part of neurons (synapse)</li> <li>Synaptic plasticity, spike-timing-dependent plasticity (STDP).</li> <li>E. Simulation Methods</li> <li>Numerical calculation methods for single neuron, neural network from single neuron.</li> <li>F. Simulation Environments</li> <li>Explanation and demonstration of simulation environments such as NEURON and GENESIS.</li> </ul>		aine dation and ince	mente queb es NELL			
What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot . Summary Ist week: A 2nd week: B 3rd week: C 4th week: D 5th week: G 7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? D. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.		simulation enviror	iments such as NEU	ROM and GENESIS.		
H. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot . Summary Hist week: A 2nd week: B 3rd week: C 4th week: D 5th week: E F 5th week: G 7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. 8. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.		akac All Salf-orga	nizing man (SOM)			
What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot . Summary 1st week: A 2nd week: B 3rd week: C 4th week: D 5th week: C 5th week: F 8th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.		akes All, Gell Olga				
robot i. Summary Ist week: A 2nd week: B 3rd week: C 4th week: D 5th week: C 5th week: E F 5th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. 3. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? 0. Model Neurons Structure of neurons, synapse, model neurons. 0. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	-	reinforcement lear	ming in the brain, d	emonstration of re	inforcement learni	ng for controlling
I summary I st week: A 2nd week: B 3rd week: C 4th week: D 5th week: E 5th week: E 5th week: E 6 7th week: H 1 A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is complex and intelligent systems? Outline of the brain system. C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	robot					
2nd week: B 3rd week: C 4th week: D 5th week: E F 6th week: G 7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	I. Summary					
2nd week: B 3rd week: C 4th week: D 5th week: E F 6th week: G 7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	1st week: A					
Brd week: C         4th week: D         5th week: E F         6th week: G         7th week: H I         A. Introduction         What is complex and intelligent systems? Outline of the brain system.         B. Computational Neuroscience and Application-oriented Mathematical Models         What is computational Neuroscience and artificial neural networks?         C. Model Neurons         Structure of neurons, synapse, model neurons.         D. Learning at connected part of neurons (synapse)         Synaptic plasticity, spike-timing-dependent plasticity (STDP).         E. Simulation Methods         Numerical calculation methods for single neuron, neural network from single neuron.         F. Simulation Environments         Explanation and demonstration of simulation environments such as NEURON and GENESIS.	2nd week: B					
5th week: E F         6th week: G         7th week: H I         A. Introduction         What is complex and intelligent systems? Outline of the brain system.         B. Computational Neuroscience and Application-oriented Mathematical Models         What is computational Neuroscience and artificial neural networks?         C. Model Neurons         Structure of neurons, synapse, model neurons.         D. Learning at connected part of neurons (synapse)         Synaptic plasticity, spike-timing-dependent plasticity (STDP).         E. Simulation Methods         Numerical calculation methods for single neuron, neural network from single neuron.         F. Simulation Environments         Explanation and demonstration of simulation environments such as NEURON and GENESIS.	3rd week: C					
Sth week: G 7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	4th week: D					
7th week: H I A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	5th week: E F					
A. Introduction What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	6th week: G					
What is complex and intelligent systems? Outline of the brain system. B. Computational Neuroscience and Application-oriented Mathematical Models What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	7th week: H I					
<ul> <li>B. Computational Neuroscience and Application-oriented Mathematical Models</li> <li>What is computational Neuroscience and artificial neural networks?</li> <li>C. Model Neurons</li> <li>Structure of neurons, synapse, model neurons.</li> <li>D. Learning at connected part of neurons (synapse)</li> <li>Synaptic plasticity, spike-timing-dependent plasticity (STDP).</li> <li>E. Simulation Methods</li> <li>Numerical calculation methods for single neuron, neural network from single neuron.</li> <li>F. Simulation Environments</li> <li>Explanation and demonstration of simulation environments such as NEURON and GENESIS.</li> </ul>	A. Introduction					
What is computational Neuroscience and artificial neural networks? C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.			-			
C. Model Neurons Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	•			Models		
Structure of neurons, synapse, model neurons. D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.	•	ice and artificial ne	eural networks?			
D. Learning at connected part of neurons (synapse) Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.		adal				
Synaptic plasticity, spike-timing-dependent plasticity (STDP). E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.						
E. Simulation Methods Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.						
Numerical calculation methods for single neuron, neural network from single neuron. F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.		ependent plasticit	y (STDP).			
F. Simulation Environments Explanation and demonstration of simulation environments such as NEURON and GENESIS.		oingle neuron	ural potwork from -:-	arla naurar		
Explanation and demonstration of simulation environments such as NEURON and GENESIS.		single neuron, ne	ural network from SI	igie neuron.		
		simulation environ	ments such as NELL	RON and GENESIS		
	G. Self-organizing	simulation enviror	ments such as NEU	NON ANU GENESIS.		

What is self-organizing? Winner Takes All, Self-organizing map (SOM) H. Reinforcement Learning What is reinforcement learning, reinforcement learning in the brain, demonstration of reinforcement learning for controlling robot I. Summary 1st week: A 2nd week: B 3rd week: C 4th week: D 5th week: E F 6th week: G 7th week: H I Self Preparation and Review **Related subjects** Notes for textbook Handouts are distributed. Handouts are distributed. Notes for reference Goals to be achieved - Know complex and intelligent mathematical models, and understand them at the degree which you can simulte them by your programming or by using simulation environment. - Can explain technical terms of complex and intelligent mathematical models. - Master numerical calculation methods that are used in complex and intelligent mathematical models. - Know complex and intelligent mathematical models, and understand them at the degree which you can simulte them by your programming or by using simulation environment. - Can explain technical terms of complex and intelligent mathematical models. - Master numerical calculation methods that are used in complex and intelligent mathematical models. Evaluation of achievement Examination 100% + alpha (Consideration, comment, and opinion in each content (A-H)) Examination 100% + alpha (Consideration, comment, and opinion in each content (A-H)) Examination 定期試験を実施(対面) Examination(Face to Face) **Details of examination** Other information Even school year: Murakoshi, F-507, ext. 6899, mura [at] tut.jp Even school year: Murakoshi, F-507, ext. 6899, mura [at] tut.jp **Reference URL** http://www.ci.cs.tut.ac.jp/~mura/ http://www.ci.cs.tut.ac.jp/~mura/ Office hours After this class After this class Relations to attainment objectives of learning and education

Key words

# (M43630310)Complex Systems and Intelligent Informatics 2[Complex Systems and Intelligent Informatics 2]

	2]	s and intelligent	Informatics 2[Comple>	c Systems and	Intell	igent Informatio
Schedule number	M43630310	Subject area	Advanced Computer Science and Engineering	Required elective	or	Elective
Time of starting a course	Fall2 term	Day of t week,period	<b>he</b> Wed.3∼3	Credit(s)		1
Faculty	Graduate Progra	m for Master's D	egree	Subject grad	le	1~2
Department Offered	Computer Science	ce and Engineerir	ıg	Beggining grade		M1, M2
Charge teacher name[Roman alphabet mark]	石田 好輝 ISHI	DA Yoshiteru		8.000		
Numbering						
Objectives of class						
This course provides opportunitie	s to learn the follo	wings:				
* Modeling and analysis on compl						
* System theoretic analysis on co	omplex systems an	d learning syster	ns,			
* Computer simulations and implie		-				
* Implementation of complex syst		systems.				
Recent topics on complex system			discussed in the cours	se.		
<b></b>						
This course provides opportunitie		-				
* Modeling and analysis on compl	•					
* System theoretic analysis on co		id learning syster	ns,			
* Computer simulations and implie						
* Implementation of complex syst	-	-				
Recent topics on complex system	ns and learning sys	tems will be also	discussed in the cours	se.		
Contents of class						
1. Introduction on complex dynam	lical systems					
<ol> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> </ol>	lical systems					
2. Dynamical systems	ions					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> </ol>	ions etworks					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural neura</li></ol>	ions etworks plex systems					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> </ol>	ions etworks plex systems					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in automatical systems</li> </ol>	ions etworks plex systems utonomous agents					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> </ol>	ions etworks plex systems utonomous agents nts					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> </ol>	ions etworks plex systems utonomous agents nts tion processing					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and information</li> </ol>	ions etworks plex systems utonomous agents nts tion processing					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informational</li> <li>Introduction on complex dynamical</li> </ol>	ions etworks plex systems utonomous agents nts tion processing ical systems					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural netriation Processing by com</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informar</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> </ol>	ions etworks plex systems utonomous agents nts tion processing iical systems iions					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informar</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> </ol>	ions etworks plex systems utonomous agents nts tion processing iical systems iions etworks					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Introduction on complex dynamt</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> </ol>	ions etworks plex systems utonomous agents nts tion processing nical systems ions etworks plex systems					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and information</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> </ol>	ions etworks plex systems utonomous agents nts tion processing nical systems ions etworks plex systems					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Introduction on complex dynamt</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> </ol>	ions etworks plex systems utonomous agents nts tion processing nical systems ions etworks plex systems utonomous agents					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Introduction on complex dynamt</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> </ol>	ions etworks plex systems utonomous agents nts tion processing iical systems etworks plex systems utonomous agents nts					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for agents</li> </ol>	ions etworks plex systems utonomous agents nts tion processing iical systems etworks plex systems utonomous agents nts					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Biological systems and information</li> </ol>	ions etworks plex systems utonomous agents nts tion processing iical systems etworks plex systems utonomous agents nts					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for agent</li> <li>Biological systems and informat</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural nets</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Biological systems and informat</li> </ol>	ions etworks plex systems utonomous agents nts tion processing iical systems etworks plex systems utonomous agents nts					
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Biological systems and informat</li> <li>Biological systems and informat</li> <li>Related subjects</li> <li>Notes for textbook</li> </ol>	ions etworks plex systems utonomous agents nts tion processing nical systems etworks plex systems utonomous agents nts tion processing	uggested at the f	irst class.			
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Cellular automata and neural networks</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Cellular automata and neural networks and interact</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informat</li> <li>Related subjects</li> <li>Notes for textbook</li> <li>No textbook. References other the</li> </ol>	ions etworks plex systems utonomous agents nts tion processing nical systems etworks plex systems utonomous agents nts tion processing		irst class.			
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural netrigons</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informar</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural netriation Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informar</li> <li>Self Preparation and Review</li> <li>Related subjects</li> <li>Notes for textbook</li> <li>No textbook. References other the Ishida, Y.: Immunity-Based System</li> </ol>	ions etworks plex systems utonomous agents nts tion processing nical systems etworks plex systems utonomous agents nts tion processing		irst class.			
<ol> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural netrigons</li> <li>Information Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informar</li> <li>Introduction on complex dynam</li> <li>Dynamical systems</li> <li>Complex networks and interact</li> <li>Cellular automata and neural netriation Processing by com</li> <li>Emergence of cooperation in au</li> <li>Learning algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for agents</li> <li>Evolutionary algorithms for age</li> <li>Biological systems and informar</li> <li>Self Preparation and Review</li> <li>Related subjects</li> <li>Notes for textbook</li> <li>No textbook. References other the</li> </ol>	ions etworks plex systems utonomous agents nts tion processing nical systems etworks plex systems utonomous agents nts tion processing		irst class.			

Ishida, Y.: Immunity-Based Systems, Springer (2004); Barabasi, A.L.: Linked, Perseus, (2002) Strogatz, S. H. Sync, Hyperion (2003)

Notes for reference

# Goals to be achieved

# Evaluation of achievement

Class performance (50%) and term-end report (50%) Class performance (50%) and term-end report (50%) **Examination** レポートで実施 By Report

# Details of examination

Other information Room F-504, Ext. 6895 Room F-504, Ext. 6895 Reference URL

# -----

**Office hours** Wednesday 16:30-17:00

Wednesday 16:30-17:00

Relations to attainment objectives of learning and education

## Key words

complex systems, cellular automaton, artificial life, immuno intelligence, neural networks, evolutionary game theory complex systems, cellular automaton, artificial life, immuno intelligence, neural networks, evolutionary game theory

# (M44610010)Seminar on Environmental and Life Science I[Seminar on Environmental and Life Science I]

<u> </u>		ironmental and Life S	1	1	1
Schedule number	M44610010	Subject area	Advanced Environmental and Life Sciences	Required or elective	Required
Time of starting a course	Year	Day of the week,period	Intensive	Credit(s)	3
Faculty	Graduate Progra	am for Master's Degr	ee	Subject grade	1~2
Department Offered	Environmental a	nd Life Sciences		Beggining grade	M1
Charge teacher name[Roman alphabet mark] Numbering	S4系教務委員	4kei kyomu Iin−S		Brado	
Objectives of class					
This course will provide the stu sciences by reading textbooks a students is to learn knowledge ar understanding of environmental a This course will provide the stu sciences by reading textbooks a students is to learn knowledge ar understanding of environmental a	nd scientific pape nd presentation sl nd life sciences. Jdents with oppo nd scientific pape nd presentation sl	ers under the guidand kills required for his/h rtunities to study of ers under the guidand	ce of his/her superv ner research in the s n his/her research ce of his/her superv	visor. The aim of the eminar as well as the subjects on enviro visor. The aim of the	ne lessen for th o deepen his/he onmental and lif ne lessen for th
Contents of class					
are suggested by his/her supervi The students will be required to are suggested by his/her supervi Self Preparation and Review Related subjects Seminar on Environmental and Li Thesis Research on Environment All other relevant subjects in Adv Seminar on Environmental and Li Thesis Research on Environment All other relevant subjects in Adv Notes for textbook Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference	read textbooks and sor, and to report fe Science II al and Life Science vanced Environme fe Science II al and Life Science vanced Environme cooks, papers, and	nd papers written by and discuss deeply of the intal and Life Science research materials to	other language than on his/her research ss ss o students.	Japanese, especia	Illy English, whic
Gaala to be ashieved					
Goals to be achieved To acquire basic knowledge on er	nvironmental and	life sciences			
To understand the contents of so To be able to make oral and post To acquire basic knowledge on en To understand the contents of so	cientific papers in er presentations nvironmental and cientific papers in	a given field of envir relevant to papers he life sciences a given field of envir	/she has read. onmental and life sci		
To be able to make oral and post Evaluation of achievement	er presentations	relevant to papers he	she has read.		
The evaluation is based on the	His/her supervise	or evaluates the score	es.		
his/her research in the seminar. The evaluation is based on the his/her research in the seminar.					presentations (
his/her research in the seminar. The evaluation is based on the					presentations

Environmental science and technology, life science, materials science and engineering, applied chemistry

# (M44610020)Seminar on Environmental and Life Science II[Seminar on Environmental and Life Science II]

Environmental and         Life Sciences         Environmental and         Life sciences         Iterative         Credit(s)         3           Faulty         Graduate Program for Master's Degree         Subject grad         2~2           Department Offered         Environmental and Life Sciences         Beggring grade         M2           Ohargs teacher name[Roman shubct mark]         S4乘教歌委員. 後藤 尚弘 4kei kyomu lin-S, GOTOH Naohiro shubct mark]         Numbering           Objectives of class         Beggring grade         M2           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and tife sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Otartis of class         Oradiscus deply on his/her research subject in the seminar.           The students will be required to read textbooks and papers written by other language than Japanese, especially English, wil are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Seminar on Environmental and Life Science I host durating will be required to read textbooks and papers written by other language than Japanese, especially English, wil are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Seminar on Environmental and Life Science I host oher subenese.	Environmental and         Environmental Sciences         elective Sciences         olscitive Sciences           Time of starting a course         Year         Day of the week,period         Intensive         Credit(s)         3           Faculty         Graduate Program for Master's Degree         Subject prade         2~~2           Department Offered         Environmental and Life Sciences         Begeing grade         M2           Charge tascher name[Roman alphabet mark]         S4系教務委員.後藤 尚弘 4kei kyomu lin–S, GOTOH Naohiro alphabet mark]         S4系教務委員.後藤 尚弘 4kei kyomu lin–S, GOTOH Naohiro alphabet mark]           Numbering         Objectives of lass         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research seminar.           Contents of class         The students will learn the knowledge and the presentation skills required for his/her research subject in the supervisor, and to report and discuss deeply on his/her research subject in the seminar.           The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Seff Preparation and Roview         Related subjects           Related subjects	Seminar or M44610020
Time of starting a course         Year         Day of the weekperiod         Intensive         Credit(a)         3           Faculty         Graduate Program for Master's Degree         Subject grade         2~2           Department Offered         Environmental and Life Sciences         Beggining grade         M2           Charge tacher name[Roman alphabet mat]         S4系教務委員.後藤 尚弘 4kei kyomu lin~S, GOTOH Naohiro alphabet mat]         M2           Objectives of class         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and the research subject in his/her research in seminar.           Cortents of class         The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Cortents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially English, wir are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Review         Nather set Staboks and papers, written by other language than Japanese, especially English, wir are	Time of starting a course         Year         Day of the weak-priod         Intensive         Oredit(s)         3           Faculty         Graduate Program for Master's Degree         Subject grade         2~2           Department Offered         Environmental and Life Sciences         Beggining         M2           Amage tascher name[Roman alphabet mark]         S4系教務委員.後藤 尚弘 4kei kyomu En-S. GOTOH Nachiro         Beggining         M2           Mumbering         Objectives of clase         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researc seminar.         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Seminar on Environmental and Life Science I         The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Seminar on Environmental and Life Science I	WI44010020
Faculty         Caraduate Program for Master's Degree         Subject grade         2~2           Department Offered         Environmental and Life Sciences         Begrining grade         M2           Charge tascher name[Roman Japhabet matk]         S4乘敏豫委員, 後藤 尚弘 4kei kyomu lin-S, GOTOH Naohiro         M2           Objectives of class         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially English, wir are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Sef Preparation and Review         Selence 1 Thesis Research on Environmental and Life Science 1 Thesis Research on Environmental and Life Science 1 Al other relevant subjects in Advanced Environmental and Life Sciences         Supervisor will recommend textbooks, papers, and research materials to students.           Subser for Koood	Faculty         Graduate Program for Master's Degree         Subject grade         2~2           Department Offered         Environmental and Life Sciences         Begining         M2           Charge teacher name[Roman japhabet mark]         S4素教務委員.後藤 尚弘 4kei kyomu lin-S, GOTOH Naohiro alphabet mark]         S4素教務委員.後藤 尚弘 4kei kyomu lin-S, GOTOH Naohiro alphabet mark]           Numbering         Objectives of class         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research subject in the seminar.           Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Sef Proparation and Roview         Thesis Research on Environmental and Life Science I           Thesis Research on Environmental and Life Science I         Thesis Research on Environmental and Life Science I           All other relevant subject	e Year
Department Offered         Environmental and Life Sciences         Begging grade         M2           Charge teacher name[Roman alphabet mark]         S4系教務委員、後藤 尚弘 4kei kyomu lin-S, GOTOH Naohiro alphabet mark]         S4系教務委員、後藤 尚弘 4kei kyomu lin-S, GOTOH Naohiro           Objectives of class         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance. his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Ontents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially English, wi are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Review         Thesis Research on Environmental and Life Science I Thesis Research on Environme	Department Offered         Environmental and Life Sciences         Beggining grade         M2           Charge teacher name[Roman alphabet mark]         S4系教務委員、後藤 尚弘 4kei kyomu lin~S, GOTOH Naohiro         M2           Objectives of class         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opt to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researce seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opt to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researc seminar.           Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Roview         Self Preparation and Roview           Related subjects         Senior           Supervisor will recommental and Life Science I           All other relevant subjects in Advanced Environmental and Life Sciences           Source sone towironmental and Life Science           All other relevant subjects in Advanced Environmental and Life Sciences           Notes for	Graduate F
Charge teacher name[Roman alphabet mark]         S4系教務委員.後藤 尚弘 4kei kyomu lin-S. GOTOH Nachiro alphabet mark]           Numbering         Chijectives of class           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportun to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research is/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research is/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Contents of class         Contents of class           The students will be required to read textbooks and papers written by other language than Japanese, especially English, wh are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Seminar on Environmental and Life Science I         The students will be required to read textbooks and papers written by other language than Japanese, especially English, wh are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Seminar on Environmental and Life Science I         Thesis Research on Environmental and Life Science I           Thesis Research on Environmental and Life Science I         Thesis Research on Environmental and Life Science I           Thesis Research on Environmental and Life Science I         Thesis Research on Environmental and Life Science I <t< td=""><td>Charge teacher name[Roman]         S4系教務委員.後藤 尚弘 4kei kyomu lin~S, GOTOH Naohiro           alphabet mark]         Numbering           Objectives of class         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researcs seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui bis/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researcs seminar.           Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Review         Self Preparation and Review           Related subjects         Self Preparation and Life Science I           Seminar on Environmental and Life Science I         Thesis Research on Environmental and Life Science I           All other relevant subjects in Advanced Environmental and Life Sciences         Seminar on Environmental and Life Science I           Notes for textbook         Supervisor will recommend textbooks, papers, and research materials to students.</td><td>Environmer</td></t<>	Charge teacher name[Roman]         S4系教務委員.後藤 尚弘 4kei kyomu lin~S, GOTOH Naohiro           alphabet mark]         Numbering           Objectives of class         Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researcs seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui bis/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researcs seminar.           Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Review         Self Preparation and Review           Related subjects         Self Preparation and Life Science I           Seminar on Environmental and Life Science I         Thesis Research on Environmental and Life Science I           All other relevant subjects in Advanced Environmental and Life Sciences         Seminar on Environmental and Life Science I           Notes for textbook         Supervisor will recommend textbooks, papers, and research materials to students.	Environmer
Numbering           Objectives of class           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportul to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportul to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar.           Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially English, wf are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           The students will be required to read textbooks and papers written by other language than Japanese, especially English, wf are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Review         The students will be required to read textbooks and papers written by other language than Japanese, especially English, wf are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Related subjects         Self Preparation and Life Science I           Thesis Research on Environmental and Life Science         Seminar O	Numbering           Objectives of class           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researcs seminar.           Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researc seminar.           Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Review         Related subjects           Related subjects         Seminar on Environmental and Life Science I           Thesis Research on Environmental and Life Science I         Thesis Research on Environmental and Life Science A           All other relevant subjects in Advanced Environmental and Life Sciences         Seminar on Environmental and Life Science B           Supervisor will recom	Roman S4系教務
Notes of class Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportur to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar. Contents of class The students will learn the knowledge and the presentation skills required for his/her research in seminar. Contents of class The students will be required to read textbooks and papers written by other language than Japanese, especially English, wh are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. The students will be required to read textbooks and papers written by other language than Japanese, especially English, wh are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. Self Preparation and Review Related subjects Seminar on Environmental and Life Science I Thesis Research on Environment and Life Science I Thesis Research on Environmental and Life Science I Thesis Research on Environmental and Life Science I Al other relevant subjects in Advanced Environmental and Life Sciences Notes for reforence Coals to be abie to make oral and poster presentations relevant to papers he'she has read. Supervisor will recommend textbooks, papers, and research materials to students. Notes for reforence To understand the contents of scientific papers in a given f	Dejectives of class Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researce seminar. Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researce seminar. Contents of class The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. Self Preparation and Review Related subjects Seminar on Environmental and Life Science I Thesis Research on Environmental and Life Sciences Soto for toxtbook Supervisor will recomment textbooks, papers, and research materials to students. Notes for reference Goals to be achieved To acquire basic knowledge on environmental and Life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. Evaluation is	
Besed on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportuu to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar. Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opportuu to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in seminar. <b>Concent of class</b> The students will be required to read textbooks and papers written by other language than Japanese, especially English, wh are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. <b>Self Preparation and Review</b> <b>Relead subjects</b> Seminar on Environmental and Life Science I Thesis Research on Environmental and Life Science I Notes for textbook Bupervisor will recommend textbooks, papers, and research materials to students. <b>Notes for reference</b> <b>Colast to schewold</b> To acquire basis knowledge on environmental and Life Sciences To understand the contents of scientific papers in a given field of environmental and life sciences To ouderstand the contents of scientific papers in a given field of environmental and life sciences To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To acquire basic knowledge on environmental and life sciences To acquir	Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researce seminar. Based on the Seminar on Environmental and Life Science I, this course will further provide the students with the opp to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the gui his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her researce seminar. <b>Contents of class</b> The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. <b>The</b> students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. <b>Self Preparation and Review</b> <b>Related subjects</b> <b>Seminar on</b> Environmental and Life Science I Thesis Research on Environmental and Life Science I Thesis Research on Environmental and Life Science I All other relevant subjects in Advanced Environmental and Life Sciences <b>Notes for textbook</b> Supervisor will recomment textbooks, papers, and research materials to students. <b>Notes for reference</b> <b>Coals to be achieved</b> To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation</b> is based on the scores of reading textbooks and scientific papers, discussions, reports and presents his/her research in the seminar. His/her supervisor evaluates	
Contents of class           The students will be required to read textbooks and papers written by other language than Japanese, especially English, whare suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           The students will be required to read textbooks and papers written by other language than Japanese, especially English, whare suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.           Self Preparation and Review           Related subjects           Seminar on Environmental and Life Science I           Thesis Research on Environmental and Life Science AII other relevant subjects in Advanced Environmental and Life Sciences           Seminar on Environmental and Life Science I           Thesis Research on Environmental and Life Science I           Thesis Research on Environmental and Life Science I           Notes for textbook           Supervisor will recommend textbooks, papers, and research materials to students.           Notes for textbook           Supervisor will recommend textbooks, papers, and research materials to students.           Notes for reference           Coals to be achieved           To acquire basic knowledge on environmental and life sciences           To acquire basic knowledge on environmental and life sciences           To understand the contents of scientific papers in a given field of environmental and life sciences           To understand the conte	Contents of class         The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.         Self Preparation and Review         Related subjects         Seminar on Environmental and Life Science I         Thesis Research on Environmental and Life Science         Seminar on Environmental and Life Science I         Thesis Research on Environmental and Life Science         All other relevant subjects in Advanced Environmental and Life Sciences         Notes for textbook         Supervisor will recommend textbooks, papers, and research materials to students.         Supervisor will recommend textbooks, papers, and research materials to students.         Notes for reference         Goals to be achieved         To acquire basic knowledge on environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To understand the contents of scientific p	arch subject in enviro students will learn n Environmental and arch subject in enviro
The students will be required to read textbooks and papers written by other language than Japanese, especially English, wh are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. The students will be required to read textbooks and papers written by other language than Japanese, especially English, wh are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. <b>Self Preparation and Review</b> <b>Related subjects</b> Seminar on Environmental and Life Science I Thesis Research on Environmental and Life Science All other relevant subjects in Advanced Environmental and Life Sciences Seminar on Environmental and Life Science I Thesis Research on Environmental and Life Science All other relevant subjects in Advanced Environmental and Life Sciences Notes for textbook Supervisor will recommend textbooks, papers, and research materials to students. Supervisor will recommend textbooks, papers, and research materials to students. Notes for reference <b>Goals to be achieved</b> To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation</b> is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar, His/her supervisor evaluates the scores. Th	The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. The students will be required to read textbooks and papers written by other language than Japanese, especially Englis are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar. Self Preparation and Review Related subjects Seminar on Environmental and Life Science 1 Thesis Research on Environmental and Life Science All other relevant subjects in Advanced Environmental and Life Sciences Seminar on Environmental and Life Science 1 Thesis Research on Environmental and Life Science All other relevant subjects in Advanced Environmental and Life Sciences Motes for textbook All other relevant subjects in Advanced Environmental and Life Sciences Notes for textbook Supervisor will recommend textbooks, papers, and research materials to students. Supervisor will recommend textbooks, papers, and research materials to students. Notes for reference Coals to be achieved To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. Evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evalua	
Goals to be achieved         To acquire basic knowledge on environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To be able to make oral and poster presentations relevant to papers he/she has read.         To acquire basic knowledge on environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To be able to make oral and poster presentations relevant to papers he/she has read.         Evaluation of achievement         The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores.         The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores.         Examination         試験期間中には何も行わない	Goals to be achieved         To acquire basic knowledge on environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To be able to make oral and poster presentations relevant to papers he/she has read.         To acquire basic knowledge on environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To understand the contents of scientific papers in a given field of environmental and life sciences         To be able to make oral and poster presentations relevant to papers he/she has read.         Evaluation of achievement         The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores.         The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores.         The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores.         Examination	r supervisor, and to r view al and Life Science I ironmental and Life S ts in Advanced Envir al and Life Science I ironmental and Life S ts in Advanced Envir nd textbooks, papers,
To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	
To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	
To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The research in the seminar. His/her supervisor evaluates the scores. The research in the seminar. His/her supervisor evaluates the scores. The research in the seminar. His/her supervisor evaluates the scores. Tis/her research in the seminar. His/her supervisor evaluates the scores. Tis/her research in the seminar. His/her supervisor evaluates the scores. Examination Tis發期間中には何も行わない	To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	dge on environmental
To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	To be able to make oral and poster presentations relevant to papers he/she has read. To acquire basic knowledge on environmental and life sciences To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	-
To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	To understand the contents of scientific papers in a given field of environmental and life sciences To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	
To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	To be able to make oral and poster presentations relevant to papers he/she has read. <b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	dge on environmental
Evaluation of achievement The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. Examination 試験期間中には何も行わない	<b>Evaluation of achievement</b> The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	
The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	
his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	his/her research in the seminar. His/her supervisor evaluates the scores. The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	
The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presenta his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	
his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b> 試験期間中には何も行わない	his/her research in the seminar. His/her supervisor evaluates the scores. <b>Examination</b>	-
Examination 試験期間中には何も行わない	Examination	
試験期間中には何も行わない		second r no/ nor oupe
	試験期間中には何も行わない	っない
None during exam period	None during exam period	

Environmental science and technology, life science, materials science and engineering, applied chemistry

### (M44610030)Thesis Research on Environmental and Life Science[Thesis Research on Environmental and Life Science]

Subject name[English]	Thesis Research Life Science]	Thesis Research on Environmental and Life Science[Thesis Research on Environmental an Life Science]						
Schedule number	M44610030	Subject area		Advanced Environmental and Life Sciences	Required or elective	Required		
Time of starting a course	2Years Day of the Intensiv week.period		Intensive	Credit(s)	6			
Faculty	Graduate Program			e	Subject grade	1~2		
Department Offered	Environmental and	d Life Scienc	es		Beggining grade	M1, M2		
Charge teacher name[Roman alphabet mark]	S4系教務委員 4	kei kyomu Iin						
Numbering								

#### **Objectives of class**

In the course, the students will perform advanced researches on the environmental and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a Master's Thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master's Thesis.

In the course, the students will perform advanced researches on the environmental and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a Master's Thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master's Thesis.

#### Contents of class

The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a Master's Thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense. The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a Master's Thesis. The students must also present the results from his/her research must be described as a Master's Thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense. **Self Preparation and Review** 

#### **Related subjects**

Seminar on Environmental and Life Science I Seminar on Environmental and Life Science II Seminar on Environmental and Life Science I Seminar on Environmental and Life Science II

#### Notes for textbook

Supervisor will recommend textbooks, papers, and research materials to students. Supervisor will recommend textbooks, papers, and research materials to students.

Notes for reference

#### Goals to be achieved

To acquire basic knowledge on environmental and life sciences

To master experimental techniques and analytical skills required for research on a given field of environmental and life sciences To be able to present and discuss on the results of his/her research

To be able to make safety control in experimental work

To acquire basic knowledge on environmental and life sciences

To master experimental techniques and analytical skills required for research on a given field of environmental and life sciences To be able to present and discuss on the results of his/her research

To be able to make safety control in experimental work

#### Evaluation of achievement

The score of the course is based on his/her Master's Thesis and the presentation in the final review of his/her Master's Thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation etc).

The score of the course is based on his/her Master's Thesis and the presentation in the final review of his/her Master's Thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation etc).

#### Examination

## Details of examination

#### Other information

Supervisor

# Supervisor

Reference URL

http://ens.tut.ac.jp/en/ http://ens.tut.ac.jp/en/

### Office hours

Students are encouraged visiting by appointment.

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

## Key words

Environmental science and technology, life science, materials science and engineering, applied chemistry Environmental science and technology, life science, materials science and engineering, applied chemistry

#### (M44610030)Thesis Research on Environmental and Life Science[Thesis Research on Environmental and Life Science]

Subject name[English]	Thesis Research Life Science]	Thesis Research on Environmental and Life Science[Thesis Research o						
Schedule number	M44610030			Advanced Environmental and Life Sciences	Required or elective	Required		
Time of starting a course	2Years	Day of	the	Intensive	Credit(s)	6		
		week,period						
Faculty	Graduate Program	n for Master's	Degre	e	Subject grade	1~2		
Department Offered	Environmental and	d Life Science	s		Beggining	M1, M2		
					grade			
Charge teacher name[Roman	S4系教務委員, 4	4系各教員 4k	ei kyo	mu Iin−S, 4kei kakuk	youin	·		
alphabet mark]								
Numbering								

### **Objectives of class**

In the course, the students will perform advanced researches on the environmental and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a Master's Thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master's Thesis.

#### **Contents of class**

The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a Master's Thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense. **Self Preparation and Review** 

#### Related subjects

Seminar on Environmental and Life Science I

Seminar on Environmental and Life Science II

Notes for textbook

Supervisor will recommend textbooks, papers, and research materials to students.

Notes for reference

## Goals to be achieved

To acquire basic knowledge on environmental and life sciences

To master experimental techniques and analytical skills required for research on a given field of environmental and life sciences To be able to present and discuss on the results of his/her research

To be able to make safety control in experimental work

### Evaluation of achievement

The score of the course is based on his/her Master's Thesis and the presentation in the final review of his/her Master's Thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation

#### etc). Examination

その他

None during exam period

#### **Details of examination**

Other information

Supervisor

Reference URL

http://ens.tut.ac.jp/en/

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

# Key words

Environmental science and technology, life science, materials science and engineering, applied chemistry

#### (M4461003T)Thesis Research on Environmental and Life Science[Thesis Research on Environmental and Life Science]

Subject name[English]	Thesis Research Life Science]	Thesis Research on Environmental and Life Science[Thesis Research on Environmental and Life Science]							mental and
Schedule number	M4461003T	Subject area		Advanced Environmer and Sciences	ntal Life	Required c elective	n <b>r</b> Requ	Jired	
Time of starting a course	Year	Day	of	the .	Intensive		Credit(s)	6	
		week,	period						
Faculty	Graduate Progran	n for Ma	ster's	Degre	e		Subject grade	2~2	)
Department Offered	Environmental and	d Life S	cience	es			Beggining grade	M2	
Charge teacher name[Roman alphabet mark]	S4系教務委員 4I	kei kyon	nu Iin-	-S					
Numbering									

## **Objectives of class**

In the course, the students will perform advanced researches on the environmental and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a Master's Thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master's Thesis.

In the course, the students will perform advanced researches on the environmental and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a Master's Thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master's Thesis.

#### Contents of class

The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a Master's Thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense. The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a Master's Thesis. The students must also present the results from his/her research must be described as a Master's Thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense. **Self Preparation and Review** 

#### **Related subjects**

Seminar on Environmental and Life Science I Seminar on Environmental and Life Science II Seminar on Environmental and Life Science I Seminar on Environmental and Life Science II

#### Notes for textbook

Supervisor will recommend textbooks, papers, and research materials to students. Supervisor will recommend textbooks, papers, and research materials to students.

Notes for reference

#### Goals to be achieved

To acquire basic knowledge on environmental and life sciences

To master experimental techniques and analytical skills required for research on a given field of environmental and life sciences To be able to present and discuss on the results of his/her research

To be able to make safety control in experimental work

To acquire basic knowledge on environmental and life sciences

To master experimental techniques and analytical skills required for research on a given field of environmental and life sciences To be able to present and discuss on the results of his/her research

To be able to make safety control in experimental work

#### Evaluation of achievement

The score of the course is based on his/her Master's Thesis and the presentation in the final review of his/her Master's Thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation etc).

The score of the course is based on his/her Master's Thesis and the presentation in the final review of his/her Master's Thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation etc).

# Examination

試験期間中には何も行わない None during exam period

# Details of examination

## Other information

Supervisor(s) Supervisor(s)

# Reference URL

http://ens.tut.ac.jp/en/ http://ens.tut.ac.jp/en/

#### Office hours

Students are encouraged visiting by appointment.

Students are encouraged visiting by appointment.

### Relations to attainment objectives of learning and education

## Key words

Environmental science and technology, life science, materials science and engineering, applied chemistry Environmental science and technology, life science, materials science and engineering, applied chemistry

#### (M44610040)Seminar on Environmental and Life Science[Seminar on Environmental and Life Science]

Subject name[English]	Seminar on Enviro	Seminar on Environmental and Life Science[Seminar on Environmental and Life Science]							Life Science]
Schedule number	M44610040	Subje	ct are	a	Advanced		Required	or	Required
					Environmer	ntal	elective		
					and	Life			
					Sciences				
Time of starting a course	Year	Day	of	the	Intensive		Credit(s)		6
		week,	period	I					
Faculty	Graduate Program	n for Ma	aster's	Degre	e		Subject gra	de	2~2
Department Offered	Environmental and	d Life S	cience	es			Beggining		M2
							grade		
Charge teacher name[Roman	S4系教務委員 4	kei kyor	nu Iin-	-S					
alphabet mark]									
Numbering									

#### Objectives of class

This course will provide the students with the opportunity to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance of his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in the seminar.

This course will provide the students with the opportunity to study on his/her research subject in environmental and life sciences by reading textbooks and papers under the guidance of his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in the seminar.

#### **Contents of class**

The students will be expected to read textbooks and papers written by foreign language that are indicated by his/her supervisor, and report and discuss deeply on his/her research subject in the seminar.

The students will be expected to read textbooks and papers written by foreign language that are indicated by his/her supervisor, and report and discuss deeply on his/her research subject in the seminar.

#### Self Preparation and Review

### **Related subjects**

Thesis Research on Environmental and Life Science

All other relevant subjects in Advanced Environmental and Life Sciences

Thesis Research on Environmental and Life Science

All other relevant subjects in Advanced Environmental and Life Sciences

#### Notes for textbook

Supervisor will recommend textbooks and papers to students.

Supervisor will recommend textbooks and papers to students.

### Notes for reference

#### Goals to be achieved

To acquire basic knowledge on environmental and life sciences

To understand the contents of scientific papers in a given field of environmental and life sciences

To be able to make oral and poster presentations relevant to papers he/she has read.

To acquire basic knowledge on environmental and life sciences

- To understand the contents of scientific papers in a given field of environmental and life sciences
- To be able to make oral and poster presentations relevant to papers he/she has read.

#### **Evaluation of achievement**

The evaluation is based on the scores of reading papers, discussions, reports and presentations of his/her research in the seminar. His/her supervisor evaluates the scores.

The evaluation is based on the scores of reading papers, discussions, reports and presentations of his/her research in the seminar. His/her supervisor evaluates the scores.

Examination

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Supervisor

 Supervisor

 Reference URL

 http://ens.tut.ac.jp/en/

 Office hours

 Students are encouraged visiting by appointment.

 Students are encouraged visiting by appointment.

 Relations to attainment objectives of learning and education

 Key words

### (M44630010)Advanced Separation Chemistry I Advanced Separation Chemistry I

Subject name[English]	Advanced Separ	ation Chemistr	y I[Ad	vanced Separation	Chemistry I]	
Schedule number	M44630010	Subject are	a	Advanced	Required or	<ul> <li>Elective</li> </ul>
				Environmental	elective	
				and Life		
				Sciences		
Time of starting a course	Fall1 term	Day of	the	Mon.3~3	Credit(s)	1
		week,period	I			
Faculty	Graduate Progra	m for Master's	Degre	e	Subject grade	1~2
Department Offered	Environmental a	nd Life Science	es		Beggining	M1, M2
					grade	
Charge teacher name[Roman	齊戸 美弘 SAIT	O Yoshihiro			- <b>.</b>	
alphabet mark]						
Numbering						

### Objectives of class

Due to the recent requirements for stationary phases in chromatography such as higher selectivity, various novel stationary phases have been developed by the systematic analysis of the retention behavior of sample solutes. Miniaturization and automation of the whole separation instruments have been regarded as additional important projects in separation science, because of the increasing requirements for recent separation systems, such as selective/specific detection with high sensitivities, high throughput processing, as well as an environmentally-friendly feature of the systems. In this course, novel technologies of sample preparation and chromatographic separations will be provided along with the miniaturization of the hyphenated analytical systems.

Due to the recent requirements for stationary phases in chromatography such as higher selectivity, various novel stationary phases have been developed by the systematic analysis of the retention behavior of sample solutes. Miniaturization and automation of the whole separation instruments have been regarded as additional important projects in separation science, because of the increasing requirements for recent separation systems, such as selective/specific detection with high sensitivities, high throughput processing, as well as an environmentally-friendly feature of the systems. In this course, novel technologies of sample preparation and chromatographic separations will be provided along with the miniaturization of the hyphenated analytical systems.

### Contents of class

1. Development of novel stationary phases in liquid chromatography based on the systematic analysis of retention behavior.

2. Development of novel sample preparation media and the applications to real sample analysis in various chromatographic methods.

3. Miniaturization of analytical systems and the hyphenation.

1. Development of novel stationary phases in liquid chromatography based on the systematic analysis of retention behavior.

2. Development of novel sample preparation media and the applications to real sample analysis in various chromatographic methods.

3. Miniaturization of analytical systems and the hyphenation.

#### Self Preparation and Review

#### **Related subjects**

Advanced Separation Chemistry II.

Advanced Separation Chemistry II.

## Notes for textbook

No text book is required, however, basic knowledge of chromatography is desirable.

No text book is required, however, basic knowledge of chromatography is desirable.

Notes for reference

### Goals to be achieved

#### **Evaluation of achievement**

The evaluation will be made based on the score of the report and presentation. The evaluation will be made based on the score of the report and presentation. **Examination** 

レポートで実施

By Report

#### Details of examination

# Other information

Y. Saito; Room# B-404; Phone 6803; E-mail: saito@ens.tut.ac.jp Y. Saito; Room# B-404; Phone 6803; E-mail: saito@ens.tut.ac.jp **Reference URL** 

## Office hours

Anytime if available, however, an appointment by e-mail is strongly recommended. Anytime if available, however, an appointment by e-mail is strongly recommended. **Relations to attainment objectives of learning and education** 

Key words

### (M44630020)Advanced Separation Chemistry II[Advanced Separation Chemistry II]

Subject name[English]	Advanced Separation Chemis	try II[Advanced Sep	aration Chemistry II]		
Schedule number	M44630020	Subject area	Advanced Environmental and Life Sciences	Required or elective	Elective
Time of starting a course	Fall2 term	Day of the week,period	Mon.3~3	Credit(s)	1
Faculty	Graduate Program for Master	's Degree		Subject grade	1~2
Department Offered	Environmental and Life Scien	ces		Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	平田 幸夫 HIRATA Yukio				
Numbering					

## **Objectives of class**

Chromatography is one of the most widely applied methods for the analysis of mixtures, because of its high resolving power. Purpose of this course is to learn the basic theory of chromatography. To obtain the in-depth understanding, the emphasis is also placed on practice and reports on the related topics.

Chromatography is one of the most widely applied methods for the analysis of mixtures, because of its high resolving power. Purpose of this course is to learn the basic theory of chromatography. To obtain the in-depth understanding, the emphasis is also placed on practice and reports on the related topics.

#### **Contents of class**

- 1. Basic theory of chromatography
- distribution equilibrium
- plate theory
- rate theory
- resolution
- mobile and stationary phases
- 2. Practice and Repots for various simulation using Excel and Excel-VBA
- chromatographic separation process
- effect of various parameters on the separation efficiency
- effect of temperature in GC
- effect of mobile phase composition in LC
- analysis of chromatographic data
- 1. Basic theory of chromatography
- distribution equilibrium
- plate theory
- rate theory
- resolution
- mobile and stationary phases
- 2. Practice and Repots for various simulation using Excel and Excel-VBA
- chromatographic separation process
- effect of various parameters on the separation efficiency
- effect of temperature in GC
- effect of mobile phase composition in LC
- analysis of chromatographic data

## Self Preparation and Review

## Related subjects

### Notes for textbook

#### Textbook

No textbook is required. Related materials will be provided. Elementary knowledge of Basic Language is required to use Excel-VBA.

Textbook

Reference 1	Book title	Chromatograph	ny: Concepts and	Contrasts			ISBN	
	Author	J. M. Miller	Publisher	John Sons	Wiley	&	Publish year	
Notes for reference	•						·	
Goals to be achieve	ed							
To undersatnd the		tography.						
To undersatnd the	principle of chroma	tography.						
Evaluation of achie	vement							
Based on reports re		ual chromatograph	nic topic of intere	st during tl	ne course	e of o	class.	
Based on reports re	equested on individ	ual chromatograph	nic topic of intere	st during tl	ne course	e of o	class.	
Examination								
レポートで実施 By Report								
Details of examinat	ion							
Other information	<b>/</b>							
Yukio Hirata: room	(B-402), e-mail (hir	ata@ens.tut.ac.jp)	, phone: 6804					
Yukio Hirata: room	(B-402), e-mail (hir	ata@ens.tut.ac.jp)	, phone: 6804					
Reference URL								
Office hours								
As needed.								
As needed.								
	nent objectives of	earning and educ	ation					

# (M44630070)Advanced Polymer Chemistry[Advanced Polymer Chemistry]

Schedule number		-	ced Polymer Chemis		T.
	M44630070	Subject area	Advanced	Required or	Elective
			Environmental	elective	
			and Life		
			Sciences		
Time of starting a course	Fall1 term	Day of the	Thu.3~3	Credit(s)	1
<b>FI</b>	Que durate Due mus	week,period		Outlinet much	1 0
Faculty Department Offered	Graduate Progra Environmental ar	m for Master's Degre	e	Subject grade Beggining	1~2 M1, M2
Department Offered		Id Life Sciences		grade	
Charge teacher name[Roman	伊津野 真一,原	口 直樹 ITSUNO S	hinichi, HARAGUCHI		
alphabet mark]					
Numbering					
Objectives of class					
This course focuses on the synth	etic aspects of po	olymer-supported ch	emistry. Several app	lications of solid-s	upported orgar
chemistry will be discussed.			, , , ,		
This course focuses on the synth	etic aspects of pr	lymer-supported ch	emistry. Several and	lications of solid-s	upported organ
chemistry will be discussed.					
-					
Contents of class					
(1) Preparation of functionalized r	nonomers				
(2) Preparation method of polyme	r-support				
(3) Preparation of functional polyr	mers by polymer re	eaction method			
(4) Preparation of functional polyr					
(5) Nucleophilic reactions on the					
(6) Electrophhilic reactions on the					
(7) Polymer-supported reagents					
(8) Polymer-supported catalysts					
(9) Asymmetric reaction using pol	ymer-supported c	atalyst			
(10) Solid phase peptide synthe		-			
(1) Preparation of functionalized r	monomers				
(0) Dura suchten aus the state of a shares	r-support				
(2) Preparation method of polyme					
<ul><li>(2) Preparation method of polyme</li><li>(3) Preparation of functional polyme</li></ul>	mers by polymer re	eaction method			
<ul><li>(3) Preparation of functional polyr</li><li>(4) Preparation of functional polyr</li></ul>	mers by polymeriza	ation method			
<ul><li>(3) Preparation of functional polyn</li><li>(4) Preparation of functional polyn</li><li>(5) Nucleophilic reactions on the</li></ul>	mers by polymeriza functional polymer	ation method			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> </ul>	mers by polymeriza functional polymer	ation method			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> </ul>	mers by polymeriza functional polymer	ation method			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> </ul>	ners by polymeriza functional polymer e functional polyme	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using polyner</li> </ul>	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using polyner</li> </ul>	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul>	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul>	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthes</li> </ul> Self Preparation and Review	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophhilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry Organic Chemistry	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry Polymer chemistry Polymer chemistry Polymer chemistry	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry Polymer chemistry Polymer chemistry Polymer chemistry	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry Polymer chemistry Polymer chemistry Notes for textbook	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry Polymer chemistry Polymer chemistry Notes for textbook No textbook will be used.	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry Polymer chemistry Notes for textbook No textbook will be used. No textbook will be used.	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			
<ul> <li>(3) Preparation of functional polyn</li> <li>(4) Preparation of functional polyn</li> <li>(5) Nucleophilic reactions on the</li> <li>(6) Electrophilic reactions on the</li> <li>(7) Polymer-supported reagents</li> <li>(8) Polymer-supported catalysts</li> <li>(9) Asymmetric reaction using pol</li> <li>(10) Solid phase peptide synthe</li> </ul> Self Preparation and Review Related subjects Organic Chemistry Polymer chemistry Polymer chemistry Notes for textbook No textbook will be used. No textbook will be used.	ners by polymeriza functional polymer a functional polyme lymer-supported c	ation method ers			

2)To understand reactions of polymers

3)To understand the synthesis of optically active polymers

4) To understand the structure formation of peptides and proteins

1) To understand radical polymerization of vinyl monomers

2)To understand reactions of polymers

3) To understand the synthesis of optically active polymers

4) To understand the structure formation of peptides and proteins

## Evaluation of achievement

The report on selected topics will be imposed.

The report on selected topics will be imposed.

# Examination

レポートで実施 By Report

### Details of examination

### Other information

B-502 6813 itsuno@ens.tut.ac.jp

B-502 6813 itsuno@ens.tut.ac.jp

#### **Reference URL**

http://ens.tut.ac.jp/chiral/index.html http://ens.tut.ac.jp/chiral/index.html

# Office hours

Any time

Any time

Relations to attainment objectives of learning and education

# Key words

Polymer reaction, Optically active polymers, Polymeric catalyst, Asymmetric reactions, Peptide Polymer reaction, Optically active polymers, Polymeric catalyst, Asymmetric reactions, Peptide

# (M44630080)Advanced Polymer Engineering[Advanced Polymer Engineering]

Subject name[English]		er Engineering[Adva			
Schedule number	M44630080	Subject area	Advanced	Required or	Elective
			Environmental	elective	
			and Life		
			Sciences		
Time of starting a course	Fall2 term	Day of the	Tue.2~2	Credit(s)	1
		week,period			
Faculty	-	m for Master's Degr	ee	Subject grade	1~2
Department Offered	Environmental a	nd Life Sciences		Beggining	M1, M2
Channe teachar	吉田 絵里 YOS			grade	<u> </u>
Charge teacher name[Roman	百田 祐里 103				
alphabet mark] Numbering					
Numbering					
Objectives of class					
1.To acquire knowledge of ad		syntheses including	g well-controlled po	olymerizations and	heterogeneou
polymerizations in supercritical fl					
2.To understand molecular self-a	•				
1.To acquire knowledge of ad		syntheses including	g well-controlled po	olymerizations and	heterogeneous
polymerizations in supercritical fl					
2.To understand molecular self-a	ssembly in vivo ar	nd in vitro.			
Contents of class					
1. Advanced polymer syntheses					
1) Controlled radical polymerizati					
2) Controlled radical polymerizati					
<ol><li>Molecular design through living</li></ol>	radical polymeriz، و	ation			
4) Heterogeneous polymerization	S				
5) Polymerization in supercritical	carbon dioxide				
2. Molecular self-assembly					
1) Theory of molecular self-asse	mbly 1: Surfactnat				
2) Theory of molecular self-asse	mbly 2: Vital tissue	e			
3) Artificial supramolecules					
1. Advanced polymer syntheses					
1) Controlled radical polymerizati	ion 1				
2) Controlled radical polymerizati					
3) Molecular design through living		ation			
4) Heterogeneous polymerization					
5) Polymerization in supercritical					
2. Molecular self-assembly					
<ol> <li>Molecular self-assembly</li> <li>Theory of molecular self-asse</li> </ol>	mbly 1: Surfactat				
<ol> <li>Theory of molecular self-asse</li> <li>Theory of molecular self-asse</li> </ol>	-				
<ul><li>3) Artificial supramolecules</li></ul>	mbry 2. Vital tissue	5			
Self Preparation and Review					
Related subjects					
Basic knowledge of polymer cher	nistry is desirable.				
Basic knowledge of polymer cher	•				
Notes for textbook	,				
No textbook is needed.					
NO TEXTDOOK IS needed					
No textbook is needed.					

## Goals to be achieved

To understand cutting-edge technology based on well-defined polymers. To understand cutting-edge technology based on well-defined polymers.

# Evaluation of achievement

An examination and term-end report

An examination and term-end report

Examination

定期試験を実施(対面) Examination(Face to Face)

Details of examination

### Other information

Eri Yoshida; room: B-503, Tel: 6814, e-mail: eyoshida@ens.tut.ac.jp Eri Yoshida; room: B-503, Tel: 6814, e-mail: eyoshida@ens.tut.ac.jp

# Reference URL

Office hours

Anytime

Anytime

Relations to attainment objectives of learning and education

## Key words

Free-radical polymerization, Living radical polymerization, Molecular self-assembly Free-radical polymerization, Living radical polymerization, Molecular self-assembly

#### (M44630120)Advanced Molecular Life Science[Advanced Molecular Life Science]

Subject name[English]	Advanced Molecu	lar Life Science[Ad	vanced Molecular Lit	fe Science]	
Schedule number	M44630120	Subject area	Advanced	Required or	Elective
			Environmental	elective	
			and Life		
			Sciences		
Time of starting a course	Fall1 term	Day of the	Thu.2~2	Credit(s)	1
		week,period			
Faculty	Graduate Program	n for Master's Degre	Subject grade	1~2	
Department Offered	Environmental an	d Life Sciences		Beggining	M1, M2
				grade	
Charge teacher name[Roman	田中 照通,梅影	創 TANAKA Terun	nichi, UMEKAGE So		
alphabet mark]					
Numbering					
Objectives of class					
This course will provide students	s with the opportur	ity to read excellen	t research papers o	n molecular life sci	ence. Therefore
the knowledge of basic biochemi		-			

# vou are not qualified for this course.

The papers used in the Class are important papers from that current molecular life science were originated. The students will be required to read, summarize and present two or more research papers.

This course will provide students with the opportunity to read excellent research papers on molecular life science. Therefore, the knowledge of basic biochemistry and molecular biology is absolutely necessary. If you have not completed these subjects, you are not qualified for this course.

The papers used in the Class are important papers from that current molecular life science were originated. The students will be required to read, summarize and present two or more research papers.

#### **Contents of class**

This Class goes with the "Original Papers" of the "Nobel Prize Laureates".

At first, students must access the HP of Nobel Prize Organization: http://nobelprize.org//

Next, choose two "Nobel Prize Awards" after 1970 in the field of "Physiology and Medicine" or "Chemistry", and Get and Read carefully "original papers" of the Laureates. ("Nobel Prize Awards" must be strongly related to biology if you choose from "Chemistry")

After that, every student will have presentation for the chosen "Award". In the presentation, student must explain plainly the background of the research, the content of the research, and the effects of the research.

Note: Each of two teachers will have the Class, eg. Dr. Tanaka will have the Class in 2014, and Dr. Umekage will have in 2015. This Class goes with the "Original Papers" of the "Nobel Prize Laureates".

At first, students must access the HP of Nobel Prize Organization: http://nobelprize.org//

Next, choose two "Nobel Prize Awards" after 1970 in the field of "Physiology and Medicine" or "Chemistry", and Get and Read carefully "original papers" of the Laureates. ("Nobel Prize Awards" must be strongly related to biology if you choose from "Chemistry")

After that, every student will have presentation for the chosen "Award". In the presentation, student must explain plainly the background of the research, the content of the research, and the effects of the research.

Note: Each of two teachers will have the Class, eg. Dr. Tanaka will have the Class in 2014, and Dr. Umekage will have in 2015. Self Preparation and Review

Process:

(1) Visit the HP of "Nobel Prize" Organization. http://nobelprize.org/

(2) Choose two "Nobel Prize Awards" in the List described below, (Limited from "Chemistry" and "Physiology or Medicine") and Get and Read carefully "original papers" of the Laureates.

(the information of Original Paper(s) may appear in the HP or not.

So you have to Find the Original Paper(s) which is/are strongly related with the Award.)

\*Note:

You cannot choose the "Award" which was already chosen by other Student.

 $(3) \ {\rm Send} \ {\rm me} \ {\rm e-mail}({\rm s}) \ {\rm which} \ ``{\rm Awards}" \ {\rm you} \ {\rm have} \ {\rm chosen}. \ \ ({\rm deadline} \ {\rm will} \ {\rm be} \ {\rm informed} \ {\rm in} \ {\rm advance})$ 

in the e-mail, you have to describe: (i) your name, (ii) your student ID,

(iii) the name of Laboratory to which you belong,

(iv) the year of each Award which you have chosen, (for two "Awards")

(v) all name(s) of Laureates of the Award, and

(vi) information of the Original papers of the Laureates (journal name, year, volume, pages, authors' name, and title)

(4) Make a presentation to the Audience (Students and me) for each "Award".

Process:

(1) Visit the HP of "Nobel Prize" Organization. http://nobelprize.org/

(2) Choose two "Nobel Prize Awards" in the List described below, (Limited from "Chemistry" and "Physiology or Medicine") and Get and Read carefully "original papers" of the Laureates.
(the information of Original Paper(s) may appear in the HP or not.
So you have to Find the Original Paper(s) which is/are strongly related with the Award.)

\*Note:

You cannot choose the "Award" which was already chosen by other Student.

(3) Send me e-mail(s) which "Awards" you have chosen. (deadline will be informed in advance)

in the e-mail, you have to describe:

(i) your name, (ii) your student ID,

(iii) the name of Laboratory to which you belong,

(iv) the year of each Award which you have chosen, (for two "Awards")

 $(v) \mbox{ all name}(s) \mbox{ of Laureates of the Award, and }$ 

(vi) information of the Original papers of the Laureates (journal name, year, volume, pages, authors' name, and title)

(4) Make a presentation to the Audience (Students and me) for each "Award".

## Related subjects

Advanced Applied Biochemistry and Biotechnology

Advanced Applied Biochemistry and Biotechnology

# Notes for textbook

see the HP of "Nobel Prize" Organization: http://nobelprize.org/

you can get the (list of) Original Papers in the Web site.

see the HP of "Nobel Prize" Organization: http://nobelprize.org/

you can get the (list of) Original Papers in the Web site.

# Notes for reference

## Goals to be achieved

The goal is to be able to deeply understand excellent papers and modern history of molecular life science. The goal is to be able to deeply understand excellent papers and modern history of molecular life science.

## Evaluation of achievement

Grades for the course will be based on the test score or the report and presentation score. Grades for the course will be based on the test score or the report and presentation score.

## Examination

試験期間中には何も行わない

# None during exam period

# Details of examination

## Other information

Terumichi TANAKA: Room: G-506, Phone: 6920, E-mail: terumichi-tanaka@tut.jp

Terumichi TANAKA: Room: G-506, Phone: 6920, E-mail: terumichi-tanaka@tut.jp

## Reference URL

none

## none

Office hours

Any time, but e-mail is required in advance. Any time, but e-mail is required in advance.

Relations to attainment objectives of learning and education

**Key words** Molecular Biology, RNA, DNA, gene Molecular Biology, RNA, DNA, gene

## (M44630130)Advanced Applied Biochemistry and Biotechnology[Advanced Applied Biochemistry and Biotechnology]

Subject name[English]	Advanced Appli Biotechnology]	ed Biochemistry an	d Biotechnology[Ac	Ivanced Applied E	Biochemistry an
Schedule number	M44630130	Subject area	Advanced Environmental and Life Sciences	Required or elective	Elective
Time of starting a course	Fall2 term	Day of the week,period	Thu.2~2	Credit(s)	1
Faculty	Graduate Progra	m for Master's Degr	e	Subject grade	1~2
Department Offered	Environmental a	nd Life Sciences		Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	平石明,浴俊	彦 HIRAISHI Akira, E	KI Toshihiko	Braze	
Numbering					
Objectives of class					
<ol> <li>Applied Microbiology and E fermentation technology and env</li> <li>Molecular Biology and Genomi</li> <li>Applied Microbiology and E fermentation technology and env</li> <li>Molecular Biology and Genomi</li> </ol>	ironmental biotech cs: Principle and c Biochemistry: Fun ironmental biotech	nnology urrent progress in ge damentals of micro nnology	nome sciences will b biology and bioene	be discussed. Argetics and their	
Contents of class					
1. Applied Microbiology and Bioc	hemistry				
1) Introduction of microbiology –	•	nomy and physiology	of microorganisms		
2) Fundamentals of bioenergetics			-		
3) Modes of microbial energy-yie	lding systems				
4) Industrial microbiology and en	vironmental biotec	hnology			
2. Molecular Biology and Genomi	cs				
1) Introduction of genome resear	rch				
2) Mapping and Sequencing tech	nology				
3) Functional genomics					
1. Applied Microbiology and Bioc	-		с. ·		
<ol> <li>Introduction of microbiology -</li> <li>Fundamentals of his anomatics</li> </ol>		nomy and physiology	ot microorganisms		
2) Fundamentals of bioenergetics					
<ol> <li>Modes of microbial energy-yie</li> <li>Industrial microbialogy and en</li> </ol>		halom			
<ol> <li>Industrial microbiology and en</li> <li>Molecular Biology and Genomi</li> </ol>		nnology			
<ol> <li>Introduction of genome resear</li> <li>Mapping and Sequencing tech</li> </ol>					
3) Functional genomics	liology				
Self Preparation and Review					
Related subjects					
The knowledge of basic microbio		-			
The knowledge of basic microbio	iogy, diochemistry	and molecular biolog	y is apsolutely requi	reā.	
Notes for textbook	abamiatra "				
For Applied Microbiology and Bio M. T. Madigan et al."Brock Biolog	-	no" Prontino Hall			
For Molecular Biology and Genor					
S. B. Primrose and R. M. Twymar		nome Analysis and C	enomics" 3rd Ed R	lackwell Science	
For Applied Microbiology and Bio			Constitutes of a Ed. D		
M. T. Madigan et al."Brock Biolog		ns" Prentice Hall			
For Molecular Biology and Genor					
S. B. Primrose and R. M. Twymar		nome Analysis and C	enomics" 3rd Ed. B	lackwell Science	
Notes for reference					
Goals to be achieved			-		
The aims of the lesson are to ge	et basic knowledge	of applied microbiol	ogy, genomics and r	nolecular biology a	nd to understar

the current technology in the field of these researches.
The aims of the lesson are to get basic knowledge of applied microbiology, genomics and molecular biology and to understand
the current technology in the field of these researches.
Evaluation of achievement
Grades for the course will be based on the average of the subjects score (Hiraishi and Eki).
Interim report (30%) and term-end report (70%) for Applied Microbiology and Biochemistry (Hiraishi).
Presentation (30%) and term-end report (70%) for Molecular Biology and Genomics (Eki).
Grades for the course will be based on the average of the subjects score (Hiraishi and Eki).
Interim report (30%) and term-end report (70%) for Applied Microbiology and Biochemistry (Hiraishi).
Presentation (30%) and term-end report (70%) for Molecular Biology and Genomics (Eki).
Examination
試験期間中には何も行わない
None during exam period
Details of examination
Other information
Prof. Akira Hiraishi (G503) Tel: 6913, e-mail: hiraishi@ens.tut.ac.jp
Prof. Toshihiko Eki (G505) Tel: 6907, e-mail: eki@ens.tut.ac.jp
Prof. Akira Hiraishi (G503) Tel: 6913, e-mail: hiraishi@ens.tut.ac.jp
Prof. Toshihiko Eki (G505) Tel: 6907, e-mail: eki@ens.tut.ac.jp
Reference URL
Office hours
Please make an appointment.
Please make an appointment.
Relations to attainment objectives of learning and education
Key words
microbiology, applied biochemistry, molecular biology, genomics
microbiology, applied biochemistry, molecular biology, genomics

# (M44630210)Advanced Life Science and Biotechnology I[Advanced Life Science and Biotechnology I]

Subject name[English]	Advanced Life	Science and Bio	techn	ology I[Advanced Lif	e Science and B	iotechnology I
	M44630210	Subject are		Advanced	Required o	
				Environmental	elective	-
				and Life	0.000.000	
				Sciences		
Time of starting a course	Fall term	Day of week,period	the	Intensive	Credit(s)	2
Faculty	Graduate Progr	am for Master's		e .	Subject grade	1~2
Department Offered	-	and Life Science	-		Beggining	M1, M2
					grade	,
Charge teacher name[Roman	S4系教務委員	4kei kyomu Iin-	S		0	
alphabet mark]		-				
Numbering						
Objectives of class						
-					4	
This course will provide the stud	ents with the opp	portunity to stud	ay on	selected subjects in	the realm of ad	vanced life sciend
and biotechnology.						
This course will provide the stud	ents with the op	portunity to stu	dy on	selected subjects in	the realm of ad	vanced life sciend
and biotechnology.						
Contents of class						
The classes will be given by his/	her supervisor. ]	The students wi	ll be r	equired to read text	books and paper	s but the type ar
contents of this course depend o						
<b>T</b> I I III I I I I I						
The classes will be given by his/			ll be r	equired to read text	books and paper	's but the type ar
contents of this course depend o	n his/her superv	isor.				
Self Preparation and Review						
Related subjects						
Advanced Life Science and Biote	chnology II					
Advanced Life Science and Biote	chnology II					
Notes for textbook						
	ooks and papers	to students.				
Supervisor will recommend textbo	ooks and papers	to students.				
Supervisor will recommend textbo						
Supervisor will recommend textbo						
Supervisor will recommend textbo Supervisor will recommend textbo						
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference						
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved	ooks and papers	to students.				
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge of	ooks and papers	to students. d biotechnology		he∕she has read		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference	ooks and papers	to students. d biotechnology		he∕she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss	ooks and papers on life science an the contents of t	to students. d biotechnology textbooks and pa	apers	he∕she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss To acquire advanced knowledge o	ooks and papers on life science an the contents of t	to students. d biotechnology textbooks and p d biotechnology	apers			
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss To acquire advanced knowledge o	ooks and papers on life science an the contents of t	to students. d biotechnology textbooks and p d biotechnology	apers			
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss To acquire advanced knowledge o To be able to report and discuss	ooks and papers on life science an the contents of t	to students. d biotechnology textbooks and p d biotechnology	apers			
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge of To be able to report and discuss To acquire advanced knowledge of To be able to report and discuss Evaluation of achievement	ooks and papers of on life science an the contents of t on life science an the contents of t	to students. d biotechnology textbooks and pa d biotechnology textbooks and pa	apers	he∕she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss To acquire advanced knowledge o To be able to report and discuss Evaluation of achievement The evaluation is based on the so	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss To acquire advanced knowledge o To be able to report and discuss Evaluation of achievement The evaluation is based on the so	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss To acquire advanced knowledge o To be able to report and discuss Evaluation of achievement The evaluation is based on the so The evaluation is based on the so Examination	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge o To be able to report and discuss To acquire advanced knowledge o To be able to report and discuss Evaluation of achievement The evaluation is based on the so The evaluation is based on the so Examination	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge of To be able to report and discuss To acquire advanced knowledge of To be able to report and discuss Evaluation of achievement The evaluation is based on the so The evaluation is based on the so Examination 試験期間中には何も行わない	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge of To be able to report and discuss To acquire advanced knowledge of To be able to report and discuss Evaluation of achievement The evaluation is based on the so The evaluation is based on the so The evaluation is based on the so Examination 試験期間中には何も行わない None during exam period	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge of To be able to report and discuss To acquire advanced knowledge of To be able to report and discuss To acquire advanced knowledge of To be able to report and discuss Evaluation of achievement The evaluation is based on the so Examination 試験期間中には何も行わない None during exam period	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		
Supervisor will recommend textbo Supervisor will recommend textbo Notes for reference Goals to be achieved To acquire advanced knowledge of	ooks and papers of on life science an the contents of t on life science an the contents of t cores of reports,	to students. d biotechnology textbooks and p d biotechnology textbooks and p presentations, a	apers apers nd exa	he/she has read.		

Supervisor

Reference URL

# Office hours

Students are encouraged visiting by appointment.

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

Key words

 $\label{eq:life_science} \mbox{Life science, biotechnology, bioengineering, molecular biology, microbiology, genomics}$ 

Life science, biotechnology, bioengineering, molecular biology, microbiology, genomics

# (M44630230)Advanced Environmental Technology I[Advanced Environmental Technology I]

Subject name[English]			I[Advanced Environ		
Schedule number	M44630230	Subject area	Advanced	Required or	Elective
			Environmental	elective	
			and Life		
_			Sciences		-
Time of starting a course	Fall term	Day of the	Intensive	Credit(s)	2
Faculty	Graduata Bragna	week,period m for Master's Degre		Subject grade	1~2
Department Offered	Environmental ar			Beggining	M1, M2
		la Elle ociences		grade	1011, 1012
Charge teacher name[Roman	S4系教務委員4	4kei kyomu Iin−S		0	I
alphabet mark]					
Numbering					
Objectives of class					
This course will provide the st	udents with the	opportunity to stud	v on the selected	subject in the rea	alm of advance
environmental science and techn		opportunity to stud			
This course will provide the st		opportunity to stud	v on the selected	subiect in the rea	alm of advance
environmental science and techn		,		J	
Contents of class					
The classes will be given by his/	her supervisor. Th	ne students will be n	equired to read text	books and papers	but the type an
contents of this course depend of					
The classes will be given by his/			equired to read text	books and papers	but the type an
contents of this course depend of				- •	- •
Self Preparation and Review					
Related subjects					
Advanced Environmental Techno	logy II				
Advanced Environmental Techno	logy II				
Notes for textbook					
Supervisor will recommend textb	ooks and papers to	o students.			
Supervisor will recommend textb	ooks and papers to	o students.			
Notes for reference					
Goals to be achieved					
To acquire advanced knowledge of	on environmental s	cience and technolo	gy		
To be able to report and discuss	the contents of te	extbooks and papers	he∕she has read.		
To acquire advanced knowledge	on environmental s	cience and technolo	gy		
To be able to report and discuss	the contents of te	extbooks and papers	he∕she has read.		
Evaluation of achievement					
The evaluation is based on the se					
The evaluation is based on the se The evaluation is based on the se					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b>					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period <b>Details of examination</b>					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period <b>Details of examination</b> <b>Other information</b>					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period <b>Details of examination</b> <b>Other information</b> Supervisor					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period <b>Details of examination</b> <b>Other information</b> Supervisor Supervisor <b>Reference URL</b>					
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period <b>Details of examination</b> <b>Other information</b> Supervisor Supervisor <b>Reference URL</b> <b>Office hours</b>	cores of reports, p				
The evaluation is based on the so The evaluation is based on the so <b>Examination</b> 試験期間中には何も行わない None during exam period <b>Details of examination</b> <b>Other information</b> Supervisor Supervisor <b>Reference URL</b>	cores of reports, p				

# Key words

Environmental science, environmental technology, eco-technology, environmental engineering Environmental science, environmental technology, eco-technology, environmental engineering

### (M44630250)Advanced Environmental and Ecological Systems I[Advanced Environmental and Ecological Systems I]

Subject name[English] Advanced Environmental and Ecological Systems I[Advanced Environmental and Eco Systems I]						
Schedule number	M44630250	Subject area	Advanced Environmental and Life Sciences	Required or elective	Elective	
Time of starting a course	Fall term	Day of the week,period	Intensive	Credit(s)	2	
Faculty	Graduate Progra	m for Master's Degr	ee	Subject grade	1~2	
Department Offered	Environmental a	nd Life Sciences		Beggining grade	M1, M2	
Charge teacher name[Roman	S4系教務委員	4kei kyomu Iin-S				
alphabet mark]		-				
Numbering						
Objectives of class						
This course will provide the stu environmental and ecological syst This course will provide the stu environmental and ecological syst <b>Contents of class</b>	ems. Idents with the					
The classes will be given by his/I	ner supervisor. T	he students will be r	equired to read text	books and papers	but the type an	
contents of this course depend or	n his/her supervis	sor.				
The classes will be given by his/I	ner supervisor. T	he students will be r	equired to read text	books and papers	but the type an	
contents of this course depend or	n his/her supervis	sor.				
Self Preparation and Review						
Related subjects Notes for textbook Supervisor will recommend textbo	oks and papers to	o students.				
Supervisor will recommend textbo Notes for reference	oks and papers to	o students.				
Goals to be achieved						
To acquire advanced knowledge o				stems		
To be able to report and discuss t						
To acquire advanced knowledge o				stems		
To be able to report and discuss t	the contents of te	extbook and papers h	ne/she has read.			
Evaluation of achievement	c .					
The evaluation is based on the sc						
The evaluation is based on the sc	ores of reports, p	resentations, and ex	amination.			
<b>Examination</b> 試験期間中には何も行わない						
None during exam period Details of examination						
Other information						
Supervisor						
Supervisor						
Deference LIDI						
Reference URL						
Office hours						
<b>Office hours</b> Students are encouraged visiting						
<b>Office hours</b> Students are encouraged visiting Students are encouraged visiting	by appointment.					
<b>Office hours</b> Students are encouraged visiting	by appointment.	education				

# Key words

Ecological systems, industrial ecology, environmental technology, materials flows Ecological systems, industrial ecology, environmental technology, materials flows

# (M44630270)Special Topics in Inorganic Chemistry[Special Topics in Inorganic Chemistry]

Subject name[English]		Inorganic Chemistry			1
Schedule number	M44630270	Subject area	Advanced	Required or	Elective
			Environmental	elective	
			and Life		
			Sciences		
Time of starting a course	Fall2 term	Day of the	Fri.2~2	Credit(s)	1
		week,period			
Faculty	_	m for Master's Degre	ee	Subject grade	1~2
Department Offered	Environmental a	nd Life Sciences		Beggining	M1, M2
Charge teacher name[Roman	角田 範義 KAK	ITA Nariwashi		grade	
alphabet mark]	月山 軋我 (八)				
Numbering					
Numbering					
Objectives of class					
The chemistry and physics of s	urfaces is an incre	asingly important su	bject. Because of t	nis, there is a need	for chemists
become familiar with the basic	concepts and prin	nciples governing int	erfacial phenomena	for understanding	"Heterogeneo
Catalysis".					
The chemistry and physics of s	urfaces is an incre	asingly important su	bject. Because of th	nis, there is a need	for chemists
become familiar with the basic	concepts and prin	nciples governing int	erfacial phenomena	for understanding	"Heterogeneo
Catalysis".					
Contents of class					
I. What is catalysis?					
The reactive interface					
II. What is catalyst?					
Catalytic materials and their pre	naration				
•	paration				
Catalytic activity and selectivity	<b>4</b> <sup>1</sup>				
Measurement of catalytic proper	ties				
III. Catalysis for benefit of huma	าร				
Raw materials and their convers					
Catalysis for environmental prot					
	ection				
Catalysis in everyday life					
Catalysis for the future					
I. What is catalysis?					
The reactive interface					
II. What is catalyst?					
	paration				
II. What is catalyst? Catalytic materials and their pre	paration				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity	-				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity	-				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper	ties				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human	ties				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers	ties ns ion				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot	ties ns ion				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot Catalysis in everyday life	ties ns ion				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot	ties ns ion				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot Catalysis in everyday life	ties ns ion				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot Catalysis in everyday life	ties ns ion				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot Catalysis in everyday life Catalysis for the future Self Preparation and Review	ties ns ion				
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot Catalysis in everyday life Catalysis for the future Self Preparation and Review Related subjects	ties ns ion ection	in chomistry			
II. What is catalyst? Catalytic materials and their pre Catalytic activity and selectivity Measurement of catalytic proper III. Catalysis for benefit of human Raw materials and their convers Catalysis for environmental prot Catalysis in everyday life Catalysis for the future Self Preparation and Review	ties ns ion ection emistry and inorgan				

No official textbook is used.	
Hand out materials accordingly.	
No official textbook is used.	
Hand out materials accordingly.	
Notes for reference	
Goals to be achieved	
To understand basics of heterogeneous catalysis and catalyst	
To understand basics of heterogeneous catalysis and catalyst	
Evaluation of achievement	
30% Homework report, 70% Final examination or report	
30% Homework report, 70% Final examination or report	
Examination	
その他	
Other	
Details of examination	
Other information	
Room # B-302, E-mail: kakuta@ens.tut.ac.jp,	
Room # B-302, E-mail: kakuta@ens.tut.ac.jp,	
Reference URL	
Office hours	
Anytime when I will be.	
Anytime when I will be.	
Relations to attainment objectives of learning and education	
Key words	
adsorption, solid surface, heterogeneous catalysis	
adsorption, solid surface, heterogeneous catalysis	

# (M45610010)Seminar on Architecture and Civil Engineering I[Seminar on Architecture and Civil Engineering I]

Subject name[English]	Seminar on Architecture and Civil Engineering I[Seminar on Architecture and Civ				
	Engineering I]	T		· _ · · ·	
Schedule number	M45610010	Subject area	Advanced	Required or	Required
			Architecture and Civil	elective	
			Engineering		
Time of starting a course	Year	Day of the	Intensive	Credit(s)	3
		week,period			
Faculty	Graduate Program	m for Master's Degr	ee	Subject grade	1~2
Department Offered	Architecture and	Civil Engineering		Beggining	M1
				grade	
Charge teacher name[Roman	S5系教務委員 5	ikei kyomu Iin−S			
alphabet mark]					
Numbering					
Objectives of class					
All the students are required to					
subjects related to the current re		the laboratory. The	scheduled program	of the seminars is a	announced by the
supervisor at the guidance of the					
All the students are required to					
subjects related to the current re	-	the laboratory. The	scheduled program	of the seminars is a	announced by the
supervisor at the guidance of the	seminar.				
Contents of class					
Self Preparation and Review					
Delete d suble ste					
Related subjects					
Notes for textbook					
Notes for reference					
Goals to be achieved					
Evaluation of achievement					
Report					
Report					
Examination					
レポートで実施					
By Report					
Details of examination					
Other information					
Reference URL					
Office hours					
Relations to attainment objective	s of learning and a	ducation			
Key words					

### (M45610020)Seminar on Architecture and Civil Engineering II[Seminar on Architecture and Civil Engineering II]

Subject name[English]	Seminar on Architecture and Civil Engineering II[Seminar on Architecture and Civil					ecture and Civil
Schedule number	Engineering II] M45610020 <b>Subject area</b> Advanced				Required or	Poquirod
Schedule number	M43610020	Subject area		Advanced Architecture	Required or elective	Required
				and Civil	01001140	
				Engineering		
Time of starting a course	Year		the	Intensive	Credit(s)	3
Faculty	Graduate Program	week,period	Jagre	0	Subject grade	2~2
Department Offered	Architecture and		-	.0	Beggining	M2
			.0		grade	
Charge teacher name[Roman	S5系教務委員5	kei kyomu Iin−S	;			
alphabet mark]						
Numbering						
Objectives of class						
All the students are required to	attend all the sem	inars, which is	arran	ged by the laborato	ory supervisor for	the special study
subjects related to the current re	esearch activity of	the laboratory.	The s	scheduled program o	of the seminars is a	announced by the
supervisor at the guidance of the						
All the students are required to						
subjects related to the current re	-	the laboratory.	The s	scheduled program o	of the seminars is a	announced by the
supervisor at the guidance of the	seminar.					
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Report						
Report						
Examination						
レポートで実施						
By Report						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	es of learning and e	ducation				
Key words		-	-			

### (M45610030)Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]

Subject name[English]	Thesis Research o Civil Engineering]	on Arch	itectu	re and	l Civil Engineering[T	hesis Research on	Architecture and
Schedule number	M45610030	Subje	ct are	a	Advanced Architecture and Civil Engineering	Required or elective	Required
Time of starting a course	2Years	Day week,	of period	the	Intensive	Credit(s)	6
Faculty	Graduate Program	for Ma	ster's	Degre	e	Subject grade	1~2
Department Offered	Architecture and Civil Engineering					Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	S5系教務委員 5k	S5系教務委員 5kei kyomu lin-S					
Numbering							

### **Objectives of class**

This thesis research on architecture and civil engineering is designated to deepen the knowledge and enhance the skills of the students in their research fields through the self-oriented endeavour with the instruction of his/her supervisor(s).

This thesis research on architecture and civil engineering is designated to deepen the knowledge and enhance the skills of the students in their research fields through the self-oriented endeavour with the instruction of his/her supervisor(s).

### **Contents of class**

The subjects and the contents of the thesis vary depending on the laboratory. All students must present their thesis at the end of the course and take a final examination on the thesis, as a requirement for the graduation of the master course. The study for the thesis is planned and conducted under the guidance of the supervisor(s).

The subjects and the contents of the thesis vary depending on the laboratory. All students must present their thesis at the end of the course and take a final examination on the thesis, as a requirement for the graduation of the master course. The study for the thesis is planned and conducted under the guidance of the supervisor(s).

# Self Preparation and Review

#### Related subjects

TBD by the laboratory

# TBD by the laboratory

**Notes for textbook** TBD by the laboratory TBD by the laboratory

#### Notes for reference

### Goals to be achieved

### Evaluation of achievement

This credit is assigned for all the process for the preparation and presentation of the thesis. This credit is assigned for all the process for the preparation and presentation of the thesis. **Examination** 

#### **Details of examination**

#### Other information

Refer to administration office. Refer to administration office.

#### **Reference URL**

Refer to the URL of each laboratory Refer to the URL of each laboratory

### Office hours

Refer to administration office.

Refer to administration office.

#### Relations to attainment objectives of learning and education

Key words

### (M45610030)Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]

Subject name[English]	Thesis Researc Civil Engineerin	h on Architecture and g]	I Civil Engineering[T	hesis Research on	Architecture and
Schedule number	M45610030	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Required
Time of starting a course	2Years	Day of the week,period	Intensive	Credit(s)	6
Faculty	Graduate Progr	am for Master's Degr	e	Subject grade	1~2
Department Offered	Architecture an	id Civil Engineering		Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	S5系教務委員	, 5系各教員 5kei kyo	mu Iin−S, 5kei kakuk	xyouin	
Numbering					
<b>Objectives of class</b> Research on architecture and civi	il engineering				
Contents of class					
It depends on the laboratory. All the thesis, as a requirement for t the guidance of the supervisor.					
Self Preparation and Review					
Related subjects					
It depends on the laboratory					
Notes for textbook					
Notes for reference					
Goals to be achieved					
Evaluation of achievement					
Evaluation is based on report.					
Examination					
その他					
By Report					
Details of examination					
Other information					
Reference URL					
Office hours					
Relations to attainment objective	s of learning and	education			
-					
-					
-					

### (M4561003T)Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]

Subject name[English]	Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture a						
	Civil Engineering]						
Schedule number	M4561003T	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Required		
Time of starting a course	Year	Day of the week,period	Intensive	Credit(s)	6		
Faculty	Graduate Program	n for Master's Degre	Subject grade	2~2			
Department Offered	Architecture and	Civil Engineering	Beggining grade	M2			
Charge teacher name[Roman alphabet mark]	S5系教務委員 5k	S5系教務委員 5kei kyomu Iin−S					
Numbering							

### **Objectives of class**

This thesis research on architecture and civil engineering is designated to deepen the knowledge and enhance the skills of the students in their research fields through the self-oriented endeavour with the instruction of his/her supervisor(s).

This thesis research on architecture and civil engineering is designated to deepen the knowledge and enhance the skills of the students in their research fields through the self-oriented endeavour with the instruction of his/her supervisor(s).

### Contents of class

The subjects and the contents of the thesis vary depending on the laboratory. All students must present their thesis at the end of the course and take a final examination on the thesis, as a requirement for the graduation of the master course. The study for the thesis is planned and conducted under the guidance of the supervisor(s).

The subjects and the contents of the thesis vary depending on the laboratory. All students must present their thesis at the end of the course and take a final examination on the thesis, as a requirement for the graduation of the master course. The study for the thesis is planned and conducted under the guidance of the supervisor(s).

# Self Preparation and Review

Related subjects

Notes for textbook

### Notes for reference

Goals to be achieved

#### Evaluation of achievement

This credit is assigned for all the process for the preparation and presentation of the thesis. This credit is assigned for all the process for the preparation and presentation of the thesis.

Examination

レポートで実施 By Report

Details of examination

#### Other information

Refer to administration office. Refer to administration office.

### Reference URL

Refer to the URL of each laboratory Refer to the URL of each laboratory

# Office hours

Refer to administration office.

Refer to administration office.

Relations to attainment objectives of learning and education

Key words

# (M45610040)Seminar on Architecture and Civil Engineering[Seminar on Architecture and Civil Engineering]

Subject name[English]	Seminar on Architecture and Civil Engineering[Seminar on Architecture and Civil Engineering]						
Schedule number	M45610040	Subject area	Advanced	Required or	Required		
			Architecture	elective			
			and Civil				
Time of starting a course	Year	Day of the	Engineering Intensive	Credit(s)	6		
	1 cui	week,period	Inconsive	OI GUILLBY	0		
Faculty	Graduate Program	n for Master's Degre	ee	Subject grade	2~2		
Department Offered	Architecture and	Civil Engineering		Beggining	M2		
	05万势改委号 5			grade			
Charge teacher name[Roman alphabet mark]	S5系教務委員 5	kei kyomu lin-S					
Numbering							
Objectives of class							
All the students are required to	attend all the sem	inars. which is arrar	nged by the laborate	orv supervisor for	the special study		
subjects related to the current re							
supervisor at the guidance of the	seminar.	-			-		
All the students are required to	attend all the sem	inars, which is arrar	nged by the laborate	ory supervisor for	the special study		
subjects related to the current re		the laboratory. The	scheduled program	of the seminars is a	announced by the		
supervisor at the guidance of the	seminar.						
Contents of class							
In each seminar, students pure instruction of the faculty member				collectively and	solely under the		
In each seminar, students purs				collectively and	solely under the		
instruction of the faculty member				solicocively and			
Self Preparation and Review	•	-	·				
Related subjects							
Notes for textbook							
Notes for reference							
Goals to be achieved							
Evaluation of achievement							
Report							
Report							
Examination							
レポートで実施 By Banast							
By Report Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objective	s of learning and e	ducation					
-	_						

Key words

# (M45630020)Finite Element Method for Continua and Bar Structures[Finite Element Method for Continua and Bar Structures]

Subject name[English]	Finite Element I and Bar Structu	_	ontinua a			
Schedule number	M45630020	Subject		Advanced Architecture and Civil Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day o week,pei		Tue.4~4	Credit(s)	2
Faculty	Graduate Progr			20	Subject grade	1~2
Department Offered	Architecture an		-		Beggining	M1, M2
•			0		grade	
Charge teacher name[Roman	中澤 祥二 NAM	AZAWA Sho	oji			
alphabet mark]						
Numbering						
Objectives of class	6					
The course provides fundamental		-				
The course provides fundamental Contents of class	s for static analys	sis and comp	uter prog	gramming for simple	bar, such as truss	structures.
1. Fields for application and funda	mentals of elastic	citv				
2.1 Virtual work for displacement						
2.2 Minimum potential energy prin			plied to l	bars		
3. Stiffness method for truss stru						
4. Load matrix for truss structure						
<ol> <li>Global equation and solution fo</li> <li>Structure of FEM program</li> </ol>	r linear equations	with multi-d	legrees o	TTreedom		
7. Examples for analysis						
8. Introduction for extension to 2	D elements					
1. Fields for application and funda	mentals of elasti	city				
2.1 Virtual work for displacement						
2.2 Minimum potential energy prin		ment field ap	plied to I	bars		
<ol> <li>Stiffness method for truss stru</li> <li>Load matrix for truss structure</li> </ol>						
5. Global equation and solution fo		with multi-	legrees o	f freedom		
6. Structure of FEM program			0			
7. Examples for analysis						
8. Introduction for extension to 2	D elements					
Self Preparation and Review						
Related subjects						
<b>Notes for textbook</b> Robert D. Cook: Concepts and Ap	oplications of finit	e Element A	nalysis			
(Reference)						
Robert D. Cook: Concepts and Ap	plications of finit	e Element A	nalysis			
(Reference)						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Examination 50%, home work 50%						
Examination 50%, home work 50%						
<b>Examination</b> レポートで実施						
By Report						

# Other information

Contact to Shoji Nakazawa : Room : D-816, Phone :6857 E-mail : nakazawa@ace.tut.ac.jp

Contact to Shoji Nakazawa : Room : D-816, Phone :6857 E-mail : nakazawa@ace.tut.ac.jp

# Reference URL

http://www.st.ace.tut.ac.jp/~nakazawa http://www.st.ace.tut.ac.jp/~nakazawa

**Office hours** Thursday 15:15 to 16:30

Thursday 15:15 to 16:30

Relations to attainment objectives of learning and education

Key words

### (M45630050)Geotechnical Analysis[Geotechnical Analysis]

Subject name[English]	Geotechnical An	alysis[Geotechnical /	Analysis]		P
Schedule number	M45630050	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day of the week,period	Thu.3~3	Credit(s)	2
Faculty	Graduate Progra	m for Master's Degr	e	Subject grade	1~2
Department Offered	Architecture and	l Civil Engineering		Beggining	M1, M2
Charge teacher name[Roman alphabet mark] Numbering	三浦 均也 MIUF	RA Kinya		grade	
Objectives of class					
Understand the concept of ana mathematical calculation methods Understand the concept of ana	5.	-		-	
mathematical calculation methods			geoteoninear ongin		
Contents of class					
Introductory guidance					
01. Fundamentals of trigonometric	function				
02. Unification of trigonometric fu	nction and expone	ential function			
03. Fourier series					
04. Complex Fourier series					
05. Expansion of Fourier analysis					
Midterm exam					
06. Governing equation for flow p					
07. Exact solution of 1–D steady					
08. Solution by means of Fourier		-	m		
09. Solution for Steady 2–D and 3		n			
10. Exact solution of 2–D flow pro					
11. Numerical solution by means of	-				
12. Numerical solution by means of					
<ol> <li>Numerical solution by means of Term-end exam</li> </ol>	ot Finite Element	vietnoa (FEM)			
Term-end exam					
Tutur du tutur antida a s					
Introductory guidance	function				
01. Fundamentals of trigonometric 02. Unification of trigonometric fu		ential function			
03. Fourier series					
04. Complex Fourier series					
05. Expansion of Fourier analysis					
Midterm exam					
	roblem				
06. Governing equation for flow p 07. Exact solution of 1-D steady					
06. Governing equation for flow p 07. Exact solution of 1-D steady	problem	r 1-D Steady Proble	n		
06. Governing equation for flow p 07. Exact solution of 1-D steady 08. Solution by means of Fourier	problem Transformation fo	•	m		
06. Governing equation for flow p 07. Exact solution of 1-D steady 08. Solution by means of Fourier	problem Transformation fo I-D steady problem	•	n		
06. Governing equation for flow pr 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro-	problem Transformation fo I-D steady problem blem	n	n		
06. Governing equation for flow pr 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro-	problem Transformation fo I-D steady proble Iblem of Weighted Resid	m uals Method (WRM)	n		
06. Governing equation for flow pr 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro 11. Numerical solution by means of 12. Numerical solution by means of 13. Numerical solution by means of	problem Transformation fo I–D steady proble blem of Weighted Resid of Finite Differenc	m uals Method (WRM) e Method (FDM)	n		
06. Governing equation for flow pr 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro 11. Numerical solution by means of	problem Transformation fo I–D steady proble blem of Weighted Resid of Finite Differenc	m uals Method (WRM) e Method (FDM)	n		
06. Governing equation for flow pr 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro 11. Numerical solution by means of 12. Numerical solution by means of 13. Numerical solution by means of	problem Transformation fo I–D steady proble blem of Weighted Resid of Finite Differenc	m uals Method (WRM) e Method (FDM)	n		
06. Governing equation for flow pr 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro 11. Numerical solution by means of 12. Numerical solution by means of 13. Numerical solution by means of Term-end exam	problem Transformation fo I–D steady proble blem of Weighted Resid of Finite Differenc	m uals Method (WRM) e Method (FDM)	n		
06. Governing equation for flow pr 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro 11. Numerical solution by means of 12. Numerical solution by means of 13. Numerical solution by means of Term-end exam Self Preparation and Review Related subjects	problem Transformation fo I-D steady problem of Weighted Resid of Finite Differenc of Finite Element I	n uals Method (WRM) e Method (FDM) Method (FEM)	m		
06. Governing equation for flow p 07. Exact solution of 1-D steady 08. Solution by means of Fourier 09. Solution for Steady 2-D and 3 10. Exact solution of 2-D flow pro 11. Numerical solution by means of 12. Numerical solution by means of 13. Numerical solution by means of Term-end exam Self Preparation and Review	problem Transformation fo I-D steady problem of Weighted Resid of Finite Differenc of Finite Element I	n uals Method (WRM) e Method (FDM) Method (FEM) asre course)	m		

Notes for reference Goals to be achieved Understanding the basic concept of analytical method for flow problems in geotechnical analysis. Understanding the basic concept of analytical method for flow problems in geotechnical analysis. Evaluation of achievement The achievement is evaluated based on the report. The achievement is evaluated based on the report. The achievement is evaluated based on the report. Evamination Uther information Details of examination Details of exami	Handouts are distributed at the lectures Handouts are distributed at the lectures	
Understanding the basic concept of analytical method for flow problems in geotechnical analysis. Jinderstanding the basic concept of analytical method for flow problems in geotechnical analysis. Evaluation of achievement The achievement is evaluated based on the report. The achievement is evaluated based on the report. Examination レポートで実施 By Report Dotails of examination Other information 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2007 (Diffice hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education rot specified bisaster, Earthquake, Geologic Hazards, Numerical Analysis	Notes for reference	
Understanding the basic concept of analytical method for flow problems in geotechnical analysis. Jinderstanding the basic concept of analytical method for flow problems in geotechnical analysis. Evaluation of achievement The achievement is evaluated based on the report. The achievement is evaluated based on the report. Examination レポートで実施 By Report Dotails of examination Other information 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2007 (Diffice hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education rot specified bisaster, Earthquake, Geologic Hazards, Numerical Analysis		
Understanding the basic concept of analytical method for flow problems in geotechnical analysis. Evaluation of achievement The achievement is evaluated based on the report. The achievement is evaluated based on the report. Examination レポートで実施 By Report Details of examination Other information 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2003, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2015, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2016, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2016, Tel: 0532-44-6844, Tel: 0532-4844, Tel: 0532-44-6844, Tel: 0532-44-6844, Tel: 0532-4844, Tel: 0532-4844, Tel: 0532-4844, Tel: 0532-4844, Tel: 0532-4844,	Goals to be achieved	
Evaluation of achievement The achievement is evaluated based on the report. The achievement is evaluated based on the report. Examination Utボートで実施 3y Report Details of examination Other information D0ther information D0t	Understanding the basic concept of analytical method for flow problems in geotechnical analysis.	
The achievement is evaluated based on the report. The achievement is evaluated based on the report. Examination レポートで実施 3y Report Details of examination Other information DOther burs Iz:00-14:00 on Wednesday Iz:00-14:00 on Wednesday Iz:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified Disaster, Earthquake, Geologic Hazards, Numerical Analysis	Understanding the basic concept of analytical method for flow problems in geotechnical analysis.	
The achievement is evaluated based on the report. Examination レポートで実施 By Report Details of examination Other information DOTHER information D000000000000000000000000000000000000	Evaluation of achievement	
Examination レポートで実施 By Report Details of examination Other information Data Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp 2803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp Reference URL under preparing Office hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified mot specified Disaster, Earthquake, Geologic Hazards, Numerical Analysis	The achievement is evaluated based on the report.	
レポートで実施 By Report Details of examination DUther information DOther information D0ther information D0ther information D0ther information D0ther information D0ther information Reference URL under preparing under preparing D0tfice hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday 12:00-14:00 on Statianment objectives of learning and education not specified not specified Disaster, Earthquake, Geologic Hazards, Numerical Analysis	The achievement is evaluated based on the report.	
By Report Details of examination Details of e	Examination	
Details of examination         Other information         D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp         D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp         Reference URL         under preparing         under preparing         Office hours         12:00-14:00 on Wednesday         12:00-14:00 on Wednesday         not specified         not specified         Not specified         Disaster, Earthquake, Geologic Hazards, Numerical Analysis	レポートで実施	
Other information         D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp         D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp         Reference URL         under preparing         Office hours         12:00-14:00 on Wednesday         12:00-14:00 on Wednesday         Relations to attainment objectives of learning and education         not specified         Mot specified         Disaster, Earthquake, Geologic Hazards, Numerical Analysis	By Report	
D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp Reference URL under preparing Under preparing Office hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified hot specified Mey words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	Details of examination	
D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp Reference URL under preparing Under preparing Office hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified hot specified Mey words Disaster, Earthquake, Geologic Hazards, Numerical Analysis		
D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp Reference URL under preparing Under preparing Office hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified not specified Key words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	Other information	
Reference URL under preparing under preparing Office hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified not specified Key words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp	
under preparing under preparing Office hours 12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified not specified Key words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp	
Under preparing Office hours 12:00–14:00 on Wednesday 12:00–14:00 on Wednesday Relations to attainment objectives of learning and education not specified not specified Key words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	Reference URL	
Office hours         12:00-14:00 on Wednesday         12:00-14:00 on Wednesday         Relations to attainment objectives of learning and education         not specified         Not specified         Key words         Disaster, Earthquake, Geologic Hazards, Numerical Analysis	under preparing	
12:00-14:00 on Wednesday 12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified Not specified Key words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	under preparing	
12:00-14:00 on Wednesday Relations to attainment objectives of learning and education not specified Key words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	Office hours	
Relations to attainment objectives of learning and education not specified Key words Disaster, Earthquake, Geologic Hazards, Numerical Analysis	12:00-14:00 on Wednesday	
not specified not specified <b>Key words</b> Disaster, Earthquake, Geologic Hazards, Numerical Analysis	12:00-14:00 on Wednesday	
not specified <b>Key words</b> Disaster, Earthquake, Geologic Hazards, Numerical Analysis	Relations to attainment objectives of learning and education	
<b>Key words</b> Disaster, Earthquake, Geologic Hazards, Numerical Analysis	not specified	
<b>Key words</b> Disaster, Earthquake, Geologic Hazards, Numerical Analysis		
<b>Key words</b> Disaster, Earthquake, Geologic Hazards, Numerical Analysis	not specified	
Disaster, Earthquake, Geologic Hazards, Numerical Analysis		
Disaster, Earthquake, Geologic Hazards, Numerical Analysis	Key words	
Jisaster Farthquake Geologic Hazards Numerical Analysis	Disaster, Earthquake, Geologic Hazards, Numerical Analysis Disaster, Earthquake, Geologic Hazards, Numerical Analysis	

# (M45630160)Modeling Regional Environment[Modeling Regional Environment]

Subject name[English]	Modeling Regiona	al Environment[Mode	ling Regional Enviro	nment	i
Schedule number	M45630160	Subject area	Advanced Architecture and Civil	Required or elective	Elective
Time of starting a course	Fall term	Day of the	Engineering Thu.2~2	Credit(s)	2
<b>-</b> 1.		week,period			
Faculty	_	n for Master's Degre	e	Subject grade	1~2
Department Offered	Architecture and	Civil Engineering		Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	宮田 譲 MIYATA	A Yuzuru		0.000	I
Numbering					
Objectives of class					
To undestand the analysis of regi	ional economic acti	vities.			
To understand the interaction be	tween the natural e	environment and the	regional economy.		
To undestand the analysis of regi					
To understand the interaction be	tween the natural e	environment and the	regional economy.		
Contents of class					
This class discusses the intera			-	economic activiti	ies by employin
mathematical/numerical models.	Details of the lectu	ire are described as	follows:		
Topics					
1. The first and second lectures;			accounting		
2. The third and fourth lectures; v	waste and economi	c accounting matrix			
3. The fifth to seventh lectures; o	computable general	equilibrium analysis	of a regional enviro	nmental and econo	mic system
<ol><li>The eighth to tenth lectures; a</li></ol>	n intertemporal mo	del of a regional env	ironmental and eco	nomic system	
5. The eleventh and twelfth lectu	res; environmental	tax and the emission	ns trading		
6. The thirteenth to fifteenth lect	-			-	
This class discusses the intera			-	economic activiti	es by employin
mathematical/numerical models.	Details of the lectu	ire are described as	follows:		
Topics					
1. The first and second lectures;	-		accounting		
2. The third and fourth lectures; v		-			
3. The fifth to seventh lectures; o	computable general	equilibrium analysis	of a regional enviro	nmental and econo	mic system
4. The eighth to tenth lectures; a	n intertemporal mo				
5. The eleventh and twelfth lectu		del of a regional env	ironmental and ecor	nomic system	
	res; environmental	-		nomic system	
		tax and the emission	ns trading	-	
6. The thirteenth to fifteenth lect Self Preparation and Review		tax and the emission	ns trading	-	
Self Preparation and Review		tax and the emission	ns trading	-	
Self Preparation and Review Related subjects	ures; sustainable g	tax and the emission rowth in the environ	ns trading mental and econom	c dynamics	
Self Preparation and Review Related subjects microeconomics (undergraduate),	ures; sustainable g	tax and the emission rowth in the environ undergraduate), envi	ns trading mental and econom ronmental economic	c dynamics	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate),	ures; sustainable g	tax and the emission rowth in the environ undergraduate), envi	ns trading mental and econom ronmental economic	c dynamics	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook	ures; sustainable g , macroeconomics( , macroeconomics(	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi	ns trading mental and econom ronmental economic ronmental economic	c dynamics cs (master course) cs (master course)	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed	ures; sustainable g , macroeconomics( , macroeconomics( to students as har	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint file	ns trading mental and econom ronmental economic ronmental economic es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook	ures; sustainable g , macroeconomics( , macroeconomics( to students as har	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint file	ns trading mental and econom ronmental economic ronmental economic es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed	ures; sustainable g , macroeconomics( , macroeconomics( to students as har	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint file	ns trading mental and econom ronmental economic ronmental economic es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed	ures; sustainable g , macroeconomics( , macroeconomics( to students as har	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint file	ns trading mental and econom ronmental economic ronmental economic es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed Notes for reference Goals to be achieved	macroeconomics( macroeconomics( macroeconomics( to students as har to students as har	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint file	ns trading mental and econom ronmental economic ronmental economic es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed Notes for reference Goals to be achieved By applying mathematical/numeri	ures; sustainable g , macroeconomics( , macroeconomics( to students as har to students as har ical models;	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi indout. Powerpoint film indout. Powerpoint film	ns trading mental and econom ronmental economic ronmental economic es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed Notes for reference Goals to be achieved By applying mathematical/numeri To undestand the analysis of regi	macroeconomics( macroeconomics( to students as har to students as har ical models; ional economic acti	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi indout. Powerpoint fill adout. Powerpoint fill	ns trading mental and econom ronmental economic ronmental economic es are available for es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed Notes for reference	macroeconomics( macroeconomics( to students as har to students as har ical models; ional economic acti tween the natural of	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi indout. Powerpoint fill adout. Powerpoint fill	ns trading mental and econom ronmental economic ronmental economic es are available for es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed Notes for reference Goals to be achieved By applying mathematical/numeri To undestand the analysis of regi To understand the interaction be	macroeconomics( macroeconomics( macroeconomics( to students as har to students as har ical models; ional economic acti tween the natural o ical models;	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint fill adout. Powerpoint fill ivities.	ns trading mental and econom ronmental economic ronmental economic es are available for es are available for	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed Notes for reference Goals to be achieved By applying mathematical/numeri To undestand the analysis of regi To understand the interaction be By applying mathematical/numeri To understand the analysis of regi To understand the analysis of regi To understand the analysis of regi	ical models; ional economic acti ical models; ional economic acti ical models; ional economic acti	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint fill adout. Powerpoint fill ivities. environment and the ivities.	ns trading mental and economic ronmental economic ronmental economic es are available for es are available for regional economy.	ic dynamics es (master course) es (master course) students as well.	
Self Preparation and Review Related subjects microeconomics (undergraduate), microeconomics (undergraduate), Notes for textbook Lecture materials are distributed Lecture materials are distributed Notes for reference Goals to be achieved By applying mathematical/numeri To undestand the analysis of regi To understand the interaction be By applying mathematical/numeri	ures; sustainable g , macroeconomics( , macroeconomics( to students as har to students as har to students as har ical models; ional economic acti tween the natural of ical models; ional economic acti tween the natural of	tax and the emission rowth in the environ undergraduate), envi undergraduate), envi ndout. Powerpoint fill adout. Powerpoint fill ivities. environment and the ivities.	ns trading mental and economic ronmental economic ronmental economic es are available for es are available for regional economy.	ic dynamics es (master course) es (master course) students as well.	

Students are evaluated by the term report (100%).

**Examination** レポートで実施

By Report

# Details of examination

# Other information

room # : B411 phone : 0532-44-6955 e-mail address : miyata@ace.tut.ac.jp room # : B411 phone : 0532-44-6955 e-mail address : miyata@ace.tut.ac.jp

### **Reference URL**

http://pm.hse.tut.ac.jp/kakenA/ http://pm.hse.tut.ac.jp/kakenA/

# Office hours

16:00 to 17:00 on every Tuesday

16:00 to 17:00 on every Tuesday

Relations to attainment objectives of learning and education

### Key words

computable general equilibrium model, global environmental problems, regional sustainable development computable general equilibrium model, global environmental problems, regional sustainable development

# (M45630170)Management of Technology[Management of Technology]

Subject name[English]	Management of 1	echnology[Manager	ent of Technology]		
Schedule number	M45630170	Subject area	Advanced	Required or	Elective
			Architecture	elective	
			and Civil		
			Engineering		
Time of starting a course	Fall term	Day of the week,period	Wed.3~3	Credit(s)	2
Faculty	Graduate Progra	n for Master's Degre	e	Subject grade	1~2
Department Offered		Civil Engineering		Beggining	M1, M2
				grade	
Charge teacher name[Roman alphabet mark]	藤原 孝男 FUJI	WARA Takao			
Numbering					
Objectives of class					
The main objective is to underst findings from a perspective of fina Especially the decision-making mo	ancial engineering.				
The main objective is to underst findings from a perspective of fina Especially the decision-making mo	ancial engineering.				of basic researc
Contents of class					
From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory,	, ision,		stment in risky bu	t promising project	s, this class ha
From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options,	, ision, epreneurship or sta he technological c ,	art-ups.			
From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options,	, ision, epreneurship or sta he technological c , ision,	art-ups. levelopment as inve			
From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory,	, ision, epreneurship or sta he technological c , ision,	art-ups. levelopment as inve			
From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre Self Preparation and Review Related subjects Management Science (English), Optimised (States)	, ision, epreneurship or sta he technological o , ision, epreneurship or sta perations Managen	art-ups. levelopment as inve art-ups. nent (Japanese), & S	stment in risky bu Gocial Infrastructure	t promising project Management (Japa	s, this class ha
From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre Self Preparation and Review Related subjects Management Science (English), Of Management Science (English), Of Notes for textbook	, ision, epreneurship or sta he technological o , ision, epreneurship or sta perations Managen	art-ups. levelopment as inve art-ups. nent (Japanese), & S nent (Japanese), & S	stment in risky bu Gocial Infrastructure	t promising project Management (Japa	s, this class ha
From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre From a view point of regarding t following topics: 1)Technological Entrepreneurship 2)Technological Entrepreneurship 2)Technological Management Dec 3)Investment Science, 4)Real Options, 5)Game Theory, 6)Eco-system for high-tech entre Self Preparation and Review Related subjects Management Science (English), Of Management Science (English), Of	, ision, epreneurship or sta he technological c , ision, epreneurship or sta perations Managen perations Managen duced at first clas	art-ups. levelopment as inve art-ups. nent (Japanese), & S nent (Japanese), & S s.	stment in risky bu Gocial Infrastructure	t promising project Management (Japa	s, this class ha

Main goal is to draw a creative business plan for transformation of technological ideas into economic value. Especially risk-hedge model is understood for irreversible investment under uncertainty.

Strategic response to competitors is also needed for survival.

Main goal is to draw a creative business plan for transformation of technological ideas into economic value.

Especially risk-hedge model is understood for irreversible investment under uncertainty.

Strategic response to competitors is also needed for survival.

### Evaluation of achievement

Scoring is based on the semester report (50%) and the business proposal by power point (50%) in terms of (1) originality, (2) academic contribution, and (3) practical usefulness.

Scoring is based on the semester report (50%) and the business proposal by power point (50%) in terms of (1) originality, (2) academic contribution, and (3) practical usefulness.

Examination

レポートで実施

By Report

Details of examination

### Other information

Office#: B-313, Phone#: 6946, e-mail: fujiwara@las.tut.ac.jp Office#: B-313, Phone#: 6946, e-mail: fujiwara@las.tut.ac.jp **Reference URL** 

### Office hours

After4:00 PM on Weekdays After4:00 PM on Weekdays

Relations to attainment objectives of learning and education

### Key words

Real Options, Game Theory, & Technological Entreprneurship Real Options, Game Theory, & Technological Entreprneurship

### (M45630190)Advanced Structural System Planning and Design I[Advanced Structural System Planning and Design I]

Subject as a set of Tardiah]	,				-	
Subject name[English]	-	ural System Planni	ng and Design ILAd	anced Structural	System Planning	
<u> </u>	and Design I			<b>_</b>	<b>-</b>	
Schedule number	M45630190	Subject area	Advanced	Required or	Elective	
			Architecture	elective		
			and Civil			
			Engineering			
Time of starting a course	Fall term	Day of the	Intensive	Credit(s)	2	
-		week,period				
Faculty	Graduate Program	n for Master's Degre	1e	Subject grade	1~2	
Department Offered	Architecture and			Beggining	M1, M2	
Dopar unent Onered	Architeotare and			grade	WIT, WIZ	
Ohanna tarahan mana [Daman	05 乙	Let Lesser The C		grade		
Charge teacher name[Roman	S5系教務委員 5	kei kyömu im-5				
alphabet mark]						
Numbering						
Objectives of class						
It depends on the laboratory. T	he resistered stur	dents are required	to attend all the c	eminare which is	arranged by the	
laboratory supervisor for the spe				ty of the laborator	y. The scheduled	
program of the seminars is annou		-				
It depends on the laboratory. T						
laboratory supervisor for the spe	ecial study subjects	s related to the cur	rent research activi	ty of the laborator	y. The scheduled	
program of the seminars is annou	inced by the superv	visor at the guidance	e of the seminar.			
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Evaluation of achievement						
Examination						
レポートで実施						
By Report						
Details of examination						
Details of examination						
Other information						
Reference URL						
Office hours						
Deletions to attainment attain						
Relations to attainment objective	es of learning and e	oucation				
1						
Key words						

# (M45630210)Advanced Environmental System Planning and Design I[Advanced Environmental System Planning and Design I]

Subject name[English]	Advanced Environmental System Planning and Design I[Advanced Environmental System					
	Planning and Design I]			<b>_</b>	<b>F</b> 1	
Schedule number	M45630210	Subject area	Advanced	Required or	Elective	
			Architecture and Civil	elective		
			Engineering			
Time of starting a course	Fall term	Day of the	Intensive	Credit(s)	2	
		week,period		<u></u>	1 0	
Faculty Department Offered	Architecture and	n for Master's Degr	ee	Subject grade Beggining	1~2 M1. M2	
Department Onered	Architecture and	Own Engineering		grade	1011, 1012	
Charge teacher name[Roman	S5系教務委員 5	kei kyomu Iin−S				
alphabet mark]						
Numbering						
Objectives of class						
It depends on the laboratory. T	he resistered stud	lents are required	to attend all the s	eminars, which is	arranged by the	
laboratory supervisor for the spe	ecial study subjects	related to the cur	rent research activi	ty of the laborator	y. The scheduled	
program of the seminars is annou	inced by the superv	visor at the guidanc	e of the seminar.			
It depends on the laboratory. T						
laboratory supervisor for the spe				ty of the laborator	y. The scheduled	
program of the seminars is annou	inced by the superv	visor at the guidanc	e of the seminar.			
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Examination						
レポートで実施						
By Report Details of examination						
Dotailo VI OranillaUVII						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	s of learning and e	ducation				
Key words						

# (M45630230)Advanced Regional System Planning and Design I[Advanced Regional System Planning and Design I]

Subject name[English]	Advanced Regional System Planning and Design I[Advanced Regional System Planning and					
Schedule number	Design IJ M45630230	Subject a		Advanced	Required or	Elective
Schedule humber	M43030230	Subject a	rea	Advanced	elective	Elective
			and Civil			
				Engineering		
Time of starting a course	Fall term	Day of	the	Intensive	Credit(s)	2
		week,peri	od			
Faculty	Graduate Program		-	ee	Subject grade	1~2
Department Offered	Architecture and	Civil Engine	ering		Beggining	M1, M2
Charge teacher name[Roman	S5系教務委員 5	kei kuomu I	n-9		grade	
alphabet mark]	30宋秋初安員 0	Kel Kyölliü I	11 0			
Numbering						
<b>Objectives of class</b> It depends on the laboratory. T	be recistored stur	lanta ara r	auirod	to attend all the c	ominars which is	arranged by the
laboratory supervisor for the spe						
program of the seminars is annou						y. The soliculed
It depends on the laboratory. T			-		eminars, which is	arranged by the
laboratory supervisor for the spe	cial study subjects	related to	the cur	rent research activi	ty of the laborator	y. The scheduled
program of the seminars is annou	nced by the superv	isor at the	guidanc	e of the seminar.		
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Examination						
レポートで実施						
By Report						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	s of learning and e	ducation				
Key words						
··· <b>, ·····</b>						

# (M45630290)Seismic Design of Structures[Seismic Design of Structures]

Subject name[English]	Seismic Design of	f Structures	Seismi	c Design of Structur	es]	
Schedule number	M45630290	Subject a		Advanced	Required or	Elective
				Architecture	elective	
				and Civil	0.000.00	
				Engineering		
Time of starting a course	Fall term	Day of	the	Mon.4~4	Credit(s)	2
		week,perie				_
Faculty	Graduate Progran			ee	Subject grade	1~2
Department Offered	Architecture and		-		Beggining	M1, M2
			0		grade	
Charge teacher name[Roman	齊藤 大樹 SAITO	OH Taiki			-	
alphabet mark]						
Numbering						
Objectives of class						
The objective of this class is to	learn the evaluat	tion mothod	of ctr	intural performance	of the building h	acad on dynamic
behavior and ultimate strength ar			or sur			ased on dynamic
The objective of this class is to	-	-	of str	ictural performance	of the building h	ased on dynamic
behavior and ultimate strength ar			01 301		of the building t	ased on dynamic
Contents of class	a acronnation cape					
1. Basic concept of seismic desig	n of huilding					
2. Force-deformation characteris	-	erials				
3. Seismic evaluation method for	-					
3–1. Screening method 1	entering bundlingo					
3–2. Screening method 2						
4. Post-seismic quick risk assess	ment of damaged b	uilding				
1 Pasia concert of exismic desig	n of building					
1. Basic concept of seismic desig	-	oviala				
2. Force-deformation characteris	-	eriais				
3. Seismic evaluation method for 3-1. Screening method 1	existing buildings					
3-2. Screening method 2						
4. Post-seismic quick risk assess	ment of damaged b	uilding				
4. FOST SEISING QUICK HSK assess	ment of damaged b	ullullig				
Out Description of Description						
Self Preparation and Review						
Related subjects						
None						
None						
Notes for textbook						
Notes for reference						
Goals to be achieved						
To understand structural design t	hrough learning the	e seismic ev	aluation	method of structura	al member and bui	lding.
To understand structural design t	hrough learning the	e seismic eva	aluation	method of structura	al member and bui	lding.
Evaluation of achievement						
Report						
Report						
Examination						
レポートで実施						
By Report						
Details of examination						
Other information						
Professor Taiki Saito (D805), e-m	nail: tsaito@ace tut a	ac.ip (Room <sup>.</sup>	D-805)			
Professor Taiki Saito (D805), e-m						
Reference URL	ian. tourtoeaue.tut.a	20.jp (110011).	5 000)			

http://www.rc.ace.tut.ac.jp/saito/index-e.html http://www.rc.ace.tut.ac.jp/saito/index-e.html **Office hours** 

Relations to attainment objectives of learning and education

Key words