# Syllabus

# International Doctoral Degree Program (2015-Spring Term)

(D51010010)Advanced Seminar o	n Mechanical Engir	neering	ILVQV	anced	Seminar on Me	chan	ical Engineering I	
Subject name[English]	Advanced Semir	nar on	Mec	hanica	Engineering	1[Ad	dvanced Seminar	on Mechanical
	Engineering 1]							
Schedule number	D51010010	Subje	ct are	a	Advanced		Required or	Required
					Mechanical		elective	
					Engineering			
Time of starting a course	Year	Day	of	the	Intensive		Credit(s)	4
		week,	perio	d				
Faculty	Graduate Progran	n for Do	octora	l Degre	e		Subject grade	1~3
Department Offered	Mechanical Engin	eering					Beggining	D1
							grade	
Charge teacher name_Roman	S1糸教務委員1	kei kyon	nu Iin	-S				
alphabet mark								
Numbering								
Objectives of class								
The seminar aims to enhance the	ability of each stu	dent to	plan a	and acc	omplish resear	ch in	the field of mech	anical engineering
through reviewing, reading, and di	scussing technical	papers i	relate	d to his	s/her doctor th	esis	research topic.	
The seminar aims to enhance the	ability of each stu	dent to	plan	and acc	complish resear	ch in	the field of mech	anical engineering
through reviewing, reading, and di	scussing technical	papers i	relate	d to his	s/her doctor th	esis	research topic.	
Contents of class								
Each student reads English tecl	nnical papers relat	ed to h	is/he	r docto	or thesis, intro	duce	s the contents o	f the papers and
discusses them with other studer	nts and his/her sup	ervisor.						
Each student reads English tecl	nnical papers relat	ed to h	is/he	r docto	or thesis, intro	duce	s the contents o	f the papers and
discusses them with other studer	nts and his/her sup	ervisor.						
Self Preparation and Review								
Related subjects								
Inquire this of your supervisor.								
Inquire this of your supervisor.								
Notes for textbook								
Inquire this of your supervisor.								
Inquire this of your supervisor.								
Notes for reference								
Goals to be achieved								
To acquire the ability of each st	udent to discuss hi	is∕her d	octor	thesis	research topic	c and	topics related to	his/her research
field with his/her supervisor and	specialists in his/he	er field.						
To acquire the ability to write En	glish technical pape	ers.						
I o acquire the ability of each st	udent to discuss hi	s/herd	octor	thesis	research topic	and	topics related to	his/her research
Teld with his/her supervisor and	specialists in his/he	er field.						
For acquire the ability to write Eng	giish technical pape	ers.						
The achivement is evoluated here	ad on the require at	fnance	intro-	luction	understanding	of ~	anare anowers to	questions and an
the contribution to discussion	sa on the results of	paper		accion,	understationig	or pa	apers, answers to	questions, and on
The achivement is evaluated base	ed on the results of	fpaner	introc	luction	understanding	ofn	apers, answers to	questions and on
the contribution to discussion		papor			and of order uning	5. pt		
Examination								
試験期間中には何も行わない								
None during exam period								
Details of examination								
Other information								
Inquire this of your supervisor.								
Inquire this of your supervisor.								
Reference URL								
Office hours								
Inquire this of your supervisor.								
Inquire this of your supervisor.								
Relations to attainment objective	s of learning and e	ducatio	ı					

Key words

(D51010020)Advanced Seminar on Mechanical Engineering 2IAdvanced Seminar on Mechanical Engineeri	ng 2[Advanced Seminar on Mechanical Engineering 2]
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Subject name[English]	Advanced Sen	nnar on Mechanica	I Engineering 2	LAdvanced Seminar	on Mechanic
Schedule number	D51010020 Subject area		Advanced Mechanical Engineering	Required or elective	Required
Time of starting a course	Year	Day of the	Intensive	Credit(s)	1
Faculty	Graduate Progra	am for Doctoral Degr	ee	Subject grade	2~3
Department Offered	Mechanical Eng	ineering		Beggining grade	D2
Charge teacher name[Roman	S1系教務委員	1kei kyomu Iin−S		6	
Numbering					
engineering through reviewing, re The seminar aims to enhance th engineering through reviewing, re <b>Contents of class</b> Each student reads English tec discusses them with other stude Each student reads English tec discusses them with other stude	ading, and discuss ne ability of each ading, and discuss hnical papers rela hnical papers rela hnical papers rela nts and his/her su	ing technical papers student to plan and ing technical papers ated to his/her doct upervisor. ated to his/her doct upervisor.	related to his/her accomplish his/h related to his/her or thesis, introdu or thesis, introdu	doctor thesis resear er research in the fir doctor thesis resear uces the contents of uces the contents of	ch topic. eld of mechanic ch topic. f the papers ar f the papers ar
Related subjects					
Inquire this of your supervisor.					
Notes for textbook					
Inquire this of your supervisor					
Inquire this of your supervisor.					
Notes for reference					
Goals to be achieved					
To acquire the ability of each st	udent to discuss	his/her doctor thesis	research topic a	and topics related to	his/her researc
field with his/her supervisor and	specialists in his/	her field.			
To acquire the ability to write En	glish technical pa	pers.			
To acquire the ability of each st	udent to discuss	his/her doctor thesis	research topic a	and topics related to	his/her researc
field with his/her supervisor and	specialists in his/	her field.			
To acquire the ability to write En	glish technical pa	pers.			
Evaluation of achievement		<b>,</b> , , , , ,		c	
The achivement is evaluated bas	ed on the results	of paper introduction	, understanding o	t papers, answers to	questions, and c
The achivement is evaluated has	ed on the reculto	of namer introduction	understanding a	f naners answers to	questions and
the contribution to discussion		or paper introduction	, understanding O	i papers, answers (0	questions, and C
Framination					
試験期間中には何も行わたい					
None during exam period					
Details of examination					
Other information					
Inquire this of your supervisor.					
Inquire this of your supervisor.					
Reference URL					
Office hours					
Inquire this of your supervisor.					
Inquire this of your supervisor.					

Relations to attainment objectives of learning and education

Key words

#### (D51030010)Advanced Mechanical Systems[Advanced Mechanical Systems]

Subject name[English]	Advanced Mechar	Advanced Mechanical Systems[Advanced Mechanical Systems]					
Schedule number	D51030010	Subject area	Advanced	Required or	Elective		
			Mechanical	elective			
			Engineering				
Time of starting a course	Spring term	Day of the	Mon.2~2	Credit(s)	2		
		week,period					
Faculty	Graduate Program	n for Doctoral Degre	ee	Subject grade	1~3		
Department Offered	Mechanical Engine	eering	Beggining				
				grade			
Charge teacher name[Roman	河村 庄造,足立	5 忠晴,竹市 嘉約	记 KAWAMURA Sh	ozo, ADACHI Tad	aharu, TAKEICHI		
alphabet mark]	Yoshinori						
Numbering							

#### **Objectives of class**

The class aims to give advanced knowledge on solid mechanics, vibration engineering or tribology.

The class aims to give advanced knowledge on solid mechanics, vibration engineering or tribology.

#### **Contents of class**

Prof. S. Kawamura

#### From 01 to 05 week

Vibration engineering of machines and structures is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the vibration engineering, and must present them. Practical modeling and simulation of structural vibration are understood through discussion based on the presentations.

Topics: Vibration engineering, Modeling and simulation of dynamic phenomena and so on.

#### Prof. T. Adachi

#### From 06 to 10 week

Mechanics of solids and structures including materials science is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the mechanics, and must present them. Practical mechanics and design of engineering materials and mechanical structures are understood through discussion based on the presentations. Topics: Mechanics of solids and structures, Mechanical properties of materials, Design of mechanical components and so on.

#### Prof. Y. Takeichi

#### From 11 to 15 week

Fundamentals of tribology including materials science are lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the tribology, and must present them. Practical lubrication engineering and design of sliding mechanical components are understood through discussion based on the presentations. Topics: Tribology, Lubrication engineering, Surface properties, Wear of materials, Tribological coatings and so on.

#### Prof. S. Kawamura

From 01 to 05 week

Vibration engineering of machines and structures is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the vibration engineering, and must present them. Practical modeling and simulation of structural vibration are understood through discussion based on the presentations.

Topics: Vibration engineering, Modeling and simulation of dynamic phenomena and so on.

#### Prof. T. Adachi

#### From 06 to 10 week

Mechanics of solids and structures including materials science is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the mechanics, and must present them. Practical mechanics and design of engineering materials and mechanical structures are understood through discussion based on the presentations. Topics: Mechanics of solids and structures, Mechanical properties of materials, Design of mechanical components and so on.

#### Prof. Y. Takeichi

#### From 11 to 15 week

Fundamentals of tribology including materials science are lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the tribology, and must present them. Practical lubrication engineering and design of sliding mechanical components are understood through discussion based on the presentations. Topics: Tribology, Lubrication engineering, Surface properties, Wear of materials, Tribological coatings and so on.

#### Self Preparation and Review

Related subjects
Fundamental knowledge on solid mechanics, vibration engineering or tribology.
Fundamental knowledge on solid mechanics, vibration engineering or tribology.
Notes for textbook
Handouts will be prepared
Handouts will be prepared
Notes for reference
Goals to be achieved
get advanced knowledge on solid mechanics, vibration engineering or tribology.
get advanced knowledge on solid mechanics, vibration engineering or tribology.
Evaluation of achievement
A comprehensive report(70%) and discussion(30%)
A comprehensive report(70%) and discussion(30%)
Examination
レポートで実施
By Report
Details of examination
Other information
Tadaharu Adachi: Room D-305, E-mail: adachi@me.tut.ac.jp
Shozo Kawamura: Room D-404, E-Mail: kawamura@me.tut.ac.jp
Yoshinori Takeichi: Room D-304, E-Mail: takeichi@tut.jp
Tadaharu Adachi: Room D-305, E-mail: adachi@me.tut.ac.jp
Shozo Kawamura: Room D-404, E-Mail: kawamura@me.tut.ac.jp
Yoshinori Takeichi: Room D-304, E-Mail: takeichi@tut.jp
Reference URL
Office hours
ask us bv E-Mail
ask us by E-Mail
Relations to attainment objectives of learning and education
•
Key words
solid mechanics, vibration engineering, tribology
solid mechanics, vibration engineering, tribology

#### (D51030030)Advanced Manufacturing Processes[Advanced Manufacturing Processes]

Subject name[English]	Advanced Manufa	cturing Proce	esses[/	Advanced Manufact	uring Processes]	
Schedule number	D51030030	Subject are	a	Advanced	Required or	Elective
				Mechanical	elective	
				Engineering		
Time of starting a course	Spring term	Day of	the	Tue.2~2	Credit(s)	2
		week,period	ł			
Faculty	Graduate Program	n for Doctora	l Degre	e	Subject grade	1~3
Department Offered	Mechanical Engine	eering			Beggining	
					grade	
Charge teacher name[Roman	福本 昌宏,安井	利明,伊﨑	i 昌伸	1, 横山 誠二 FUKI	JMOTO Masahiro	, YASUI Toshiaki,
alphabet mark]	IZAKI Masanobu,	YOKOYAMA	Seiji			
Numbering						
Objectives of class						
To understand fundamentals of	advanced technol	ogy in mater	rials jo	oining, especially bo	oth with high pe	formance coating
formation by particles deposition	and with non-meltir	ng diffusion b	onding	by Friction Stir We	ding.	
To understand fundamental scie	nce of physics and	l chemistry o	on inor	ganic thin film and	the production,	especially solution
process.						
To understand fundamentals of	advanced technol	ogy in mater	rials jo	oining, especially bo	oth with high pe	formance coating
formation by particles deposition	and with non-meltir	ng diffusion b	onding	by Friction Stir We	ding.	
To understand fundamental scie	nce of physics and	l chemistry o	on inor	ganic thin film and	the production,	especially solution
process.						
Contents of class						
1. Fundamental of thermal spray	process, Splat form	nation probler	n			
2. Process control with Transitio	n temperature & Tr	ansition pres	sure			
3. Cold spray and Aero-sol depo	sition process					
4. Fundamental of Friction Stir W	lelding, Joining betv	veen dissimilla	ar mat	erials by FSW		
5. Friction spot welding, practical	l applications of FS	W				
6. Fundamentals of thin film depo	osition					
7. Related technology for dry pro	ocess, PVD, CVD					
8. Advanced deposition process						
Laboratory tour will be arranged to	co experience the ad	ctual process	•			
9. Thermodynamics and thermocr	nemistry in solution	processing				
11 Eurodamental solid state physic		and symmet	n			
12 Soft-solution processing for th	e inorganic thin film		.гу			
13 Vapor pressure and activity		production				
14 Dissolution of gases in metals	Thermodynamics ar	nd kinetics				
15.Phase stability diagram in vario	ous solution.					
16.Extraction of valuable substant	ces and hazards fro	m industrial v	wastes			
1. Fundamental of thermal spray	process, Splat form	nation probler	n			
2. Process control with Transitio	n temperature & Tr	ansition pres	sure			
3. Cold spray and Aero-sol depo	sition process					
4. Fundamental of Friction Stir W	lelding, Joining betw	veen dissimilla	ar mat	erials by FSW		
5. Friction spot welding, practical	l applications of FS	W				
6. Fundamentals of thin film depo	osition					
7. Related technology for dry pro	ocess, PVD, CVD					
8. Advanced deposition process						
Laboratory tour will be arranged t	o experience the a	ctual process	•			
9. Thermodynamics and thermoch	emistry in solution	processing				
11 Fundamental solid state physic	s-electronic state					
12 Soft-solution processing for the	- crystal structure	anu symmet	ıу			
13 Vapor pressure and activity	ie morganic trim Tim	production				
14 Dissolution of gases in metals	Thermodynamics ar	nd kinetics				
15 Phase stability diagram in varie	ous solution	a ninotioa.				
16 Extraction of valuable substan	ces and hazards fro	m industrial v	vastes			
Self Preparation and Review				•		

Related subjects

Basic knowledge on materials joining process, solid state physics and chemistry and solution chemistry is desirable.

Basic knowledge on materials joining process, solid state physics and chemistry and solution chemistry is desirable.

#### Notes for textbook

Handouts will be prepared for participants.

(Reference)

Required readings will be taken from a variety of reference books and research papers.

Handouts will be prepared for participants.

(Reference)

Required readings will be taken from a variety of reference books and research papers.

Notes for reference

#### Goals to be achieved

- Understand following items,
- -Joining mechanism between dissimilar materials
- -Features and mechanism of various joining methods
- -Features and mechanism of thick and thin film coating
- -Features of functionally gradient material and composite material
- -Fundamental thermodynamics in thin film production
- -Fundamental solid state physics in thin film
- -Fundamentals of physical chemistry for material processing

Understand following items,

- -Joining mechanism between dissimilar materials
- -Features and mechanism of various joining methods
- -Features and mechanism of thick and thin film coating
- -Features of functionally gradient material and composite material
- -Fundamental thermodynamics in thin film production
- -Fundamental solid state physics in thin film
- -Fundamentals of physical chemistry for material processing

#### Evaluation of achievement

Interim report & presentation (40%) and term-end report (60%). Interim report & presentation (40%) and term-end report (60%).

Examination

レポートで実施

By Report

#### **Details of examination**

#### Other information

Masahiro Fukumoto: Room: D-503, ext.: 6692, e-mail: fukumoto@tut.jp Toshiaki Yasui: Room: D-601, ext:6703, e-mail: yasui@tut.jp Masanobu Izaki Room: D-505, ext:6694, e-mail:m-izaki@me.tut.ac.jp Seiii Yokovama: Room: D-507, ext:6696, e-mail: yokoyama@me.tut.jp Masahiro Fukumoto: Room: D-503, ext.: 6692, e-mail: fukumoto@tut.jp Toshiaki Yasui: Room: D-601, ext:6703, e-mail: yasui@tut.jp Masanobu Izaki Room: D-505, ext:6694, e-mail:m-izaki@me.tut.ac.jp Seiji Yokoyama: Room: D-507, ext:6696, e-mail: yokoyama@me.tut.jp Reference URL http://isf.me.tut.ac.jp/ http://tf.me.tut.ac.jp http://isf.me.tut.ac.jp/

http://tf.me.tut.ac.jp

Office hours

Masahiro Fukumoto: Wednesday 18:00-18:30 Toshiaki Yasui: Monday 17:00-18:00

Masanobu Izaki: any time, but to contact me before visit

Seiji Yokoyama: Monday 17:00–18:00

Masahiro Fukumoto: Wednesday 18:00-18:30

Toshiaki Yasui: Monday 17:00-18:00

Masanobu Izaki: any time, but to contact me before visit

Seiji Yokoyama: Monday 17:00-18:00

Relations to attainment objectives of learning and education

#### Key words

Joining in dissimilar materials, FSW, Sutface modification, Thermal spraying, Cold spraying, Thin film, Oxide, Thermodynamics, Band structure, Crystal structure, Reaction kinetics, Waste management.

Joining in dissimilar materials, FSW, Sutface modification, Thermal spraying, Cold spraying, Thin film, Oxide, Thermodynamics, Band structure, Crystal structure, Reaction kinetics, Waste management.

#### (D51030050)Engineering of Intelligent Robotics[Engineering of Intelligent Robotics]

Subject	Engineering of Intelligent Robotics[	Engineering of Inte	elligent Robotics]		
name[Englisn] Schedule number	D51030050	Subject area	Advanced	Required or	Flective
	201000000		Mechanical	elective	LICCLIVE
			Engineering	0.000.00	
Time of starting a course	Spring term	Day of the week.period	Thu.3~3	Credit(s)	2
Faculty	Graduate Program for Doctoral Deg	gree		Subject	1~3
				grade	
Department Offered	Mechanical Engineering			Beggining grade	
Charge teacher	寺嶋 一彦,鈴木 新一,三好 孝明	电, 内山 直樹 TE	RASHIMA Kazuhiko	o, SUZUKI Shin	ichi, MIYOSHI
name[Roman alphabet	Takanori, UCHIYAMA Naoki				
mark					
Numbering					
Objectives of class					
Understand design, mea	surement and control methods for int	elligent robots su	ich as autonomous i	mobile robots w	th human-like
ability.					
Understand design, mea	surement and control methods for int	elligent robots su	ich as autonomous i	mobile robots w	th human-like
ability.					
We provide the fellowing	a schodula. Possues this source is	fau DhD atudam	ha wa ana anaida	, the very sete	from the DhD
students	ig scriedule. Decause triis course is	for PhD studen	ls, we can consider	r the requests	from the PhD
students.					
1at waalu Dahatia atuwa	*				
Ist week: Robotic struc	ture				
3rd week: Kinematics I					
4th week: Environmenta	l recognition I				
5th week: Environmenta	l recognition II				
6th week: Localization a	ind identification I				
7th week: Localization a	nd identification II				
8th week: Motion planni	ng I				
9th week: Motion planni	ng II				
10th week: Motion contr	rol I				
11th week: Motion contr	rol II				
12th week: Force contro					
13th week: Force contro					
14th week: Visual servo	1				
16th week: Report	11				
We provide the following	ng schedule. Because this course is	for PhD student	s, we can consider	r the requests	from the PhD
students.			,		
1st week: Robotic struc	ture				
2nd week: Kinematics I					
3rd week: Kinematics II					
4th week: Environmenta	l recognition I				
5th week: Environmental recognition II					
6th week: Localization a	ind identification I				
/th week: Localization a	ind identification II				
oth week: Motion planning	ng I ng II				
10th week: Motion cont					
11th week: Motion cont	rol II				
12th week: Force control	ol I				
13th week: Force control	ol II				
14th week: Visual servo	I				
15th week: Visual servo	п				
16th week: Report					

Self Preparation and R	eview					
Read the handouts bef	ore and after th	ne lecture.				
Read the handouts bef	ore and after th	ne lecture.				
Related subjects						
Fundamentals of linear	algebra, differe	ntial equation, mechani	ics, measurement	and control theory.	and robotics.	
Fundamentals of linear	algebra, differe	ntial equation, mechan	ics, measurement	and control theory,	and robotics.	
Notes for textbook	_			-		
Handouts will be prepa	red.					
Handouts will be prepa	red.					
Reference1	Book title	Introduction to Auto	onomous Mohile	Robots (Intelligent	ISBN	
		Robotics and Autono	omous Agents sei	ries)	102.1	
	Author	Roland Siegwart	Publisher	MIT Press	Publish vear	2004
	/ ucroi	and Illah R		101111033	i abilon you	2001
		Nourbakhsh				
Notes for reference		Nouibarristi				
Notes for reference						
Goals to be achieved						
(1) Understand the des	ign methods of	intelligent robots				
(2) Understand the env	rironmental reco	ogintion and measurem	ent methods for i	ntelligent robots		
(3) Understand the mot	tion plannig met	thods for intelligent rob	oots			
(4) Understand the con	trol methods fo	or intelligent robots				
(1) Understand the des	ign methods of	intelligent robots				
(2) Understand the env	ironmental reco	ogintion and measurem	ent methods for i	ntelligent robots		
(3) Understand the mot	tion plannig met	thods for intelligent rob	oots	0		
(4) Understand the con	trol methods fo	or intelligent robots				
( )						
Evaluation of achiever	ant					
	Ionic					
Report (100 %)						
$A\!:\!Score$ of the report	is 80 or higher.					
$B\!:\!Score$ of the report	is 65 or higher.					
$C\!:\!Score$ of the report	is 55 or higher.					
Report (100 %)						
A: Score of the report	is 80 or higher.					
B:Score of the report	is 65 or higher					
C: Score of the report	is 55 or higher					
Exemination	is to of higher.					
By Report						
Details of examination						
Other information						
Reference URL						
Basic knowledge on rol	potics and cont	rol are required.				
Basic knowledge on rol	potics and cont	rol are required.				
Office hours						
Contact the professors	by e-mail first					
Contact the professors	by e-mail first					
Relations to attainmon	t objectives of	learning and education				
	C ODJEGUVES OF	ICALINING AND BOUCATION				
(B)理論的·応用的知	識の獲得と発展	長的活用能力 重要な常	術・技術分野の	理論・応用知識を自	発的に獲得し	発展的に活用
できる能力						

Key words

#### (D51030070)Advanced Energy Engineering[Advanced Energy Engineering]

Subject name[English]	Advanced Energy	EngineeringAdvand	ced Energy Enginee	ring]	
Schedule number	D51030070	Subject area	Advanced	Required or	Elective
			Mechanical	elective	
			Engineering		
Time of starting a course	Spring term	Day of the	Fri.4~4	Credit(s)	2
<b>C</b>		week,period			
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	1~3
Department Offered	Mechanical Engin	eering		Beggining	
				grade	
Charge teacher name[Roman	北村 健三,野田	進, 鈴木 孝司, 「	P村 祐二 KITAMUI	RA Kenzo, NODA	Susumu, SUZUKI
alphabet mark]	Takashi, NAKAMI	JRA Yuji			
Numbering					
Objectives of class	1				
The aim of the present lecture	is to obtain advan	ced knowledge on t	he transpot and eff	ective utilization o	f thermal energy
on the combustion of gases and s	solids, and on the a	tomization of liquids			
The aim of the present lecture	is to obtain advan	ced knowledge on t	he transpot and eff	ective utilization o	f thermal energy.
on the combustion of gases and s	solids, and on the a	tomization of liquids			
Contents of class		·			
1st week Introduction					
2nd week Introduction of combu	stion				
3rd week Physics and chemistry	of diffusion flame				
4th week Physics and chemistry	/ of premixed flame				
5th week Analytical treatment o	of combustion				
6th week Experimental techniqu	es of combustion				
7th week Introduction of heat tr	ransfer				
8th week Heat transfer by cond	uction				
9th week Heat transfer by conv	ection (1)				
10th week Heat transfer by con	vection (2)				
11th week Heat transfer by radi	ation				
12th week Introdution of atomiz	ation				
13th week Physics of atomization	on				
14th week Experimental techniq	ues for atomization	1			
15th week Analytical treatment	of atomization				
16th week Final examination					
1 at we also finders double a					
2nd week Introduction of combu	ation				
3rd week Physics and chemistry	of diffusion flame				
4th week Physics and chemistry	of premixed flame				
5th week Analytical treatment of	of combustion				
6th week Experimental techniqu	les of combustion				
7th week Introduction of heat tr	ransfer				
8th week Heat transfer by cond	uction				
9th week Heat transfer by conv	ection (1)				
10th week Heat transfer by con	vection (2)				
11th week Heat transfer by radi	ation				
12th week Introdution of atomiz	ation				
13th week Physics of atomization	on				
14th week Experimental techniq	ues for atomizatior	1			
15th week Analytical treatment	of atomization				
16th week Final examination					
Self Preparation and Review					
Related subjects					

The knowledge on "Fluid dynamics", "Combustion engineering" and "Heat transfer" is neccesary. Otherwise, students will feel difficulty to catch up with the lecture. The knowledge on "Fluid dynamics", "Combustion engineering" and "Heat transfer" is neccesary. Otherwise, students will feel

difficulty to catch up with the lecture.

## Notes for textbook

(Textbooks) K.K.Kuo,"Principles of Combustion", John Wiley & Sons, 2005. W.S. Janna,"Engineering Heat Transfer (3rd Edition)", CRC Press, 2009

(Textbooks) K.K.Kuo,"Principles of Combustion", John Wiley & Sons, 2005. W.S. Janna,"Engineering Heat Transfer (3rd Edition)", CRC Press, 2009

#### Notes for reference

#### Goals to be achieved

To understand the analytical and experimental techniques to solve the practical problems concerning with Combustion, Heat Transfer and Atomization.

To understand the analytical and experimental techniques to solve the practical problems concerning with Combustion, Heat Transfer and Atomization.

#### Evaluation of achievement

Evaluation will be based on the score of final examination.

Evaluation will be based on the score of final examination.

#### Examination

レポートで実施 By Report

#### Details of examination

#### Other information

Room: D3-201, Phone: 6666 E-mail: kitamura@me.tut.ac.jp

Room: D3-201, Phone: 6666 E-mail: kitamura@me.tut.ac.jp

#### **Reference URL**

#### Office hours

Every Friday, after the lecture to 6:00PM. Every Friday, after the lecture to 6:00PM.

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

#### Key words

Combustion, Heat Transfer, Spray and Atomization Combustion, Heat Transfer, Spray and Atomization

# (D52010020)Seminar on Electrical and Electronic Information Engineering 2[Seminar on Electrical and Electronic Information Engineering 2]

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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 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           Coursework, presentation and/or report.           Coursework, presentation and/or report.           Coursework, presentation and/or report.           Examination           Itsignill pticlid=tofto/tokto           None during exam period           Details of examination           Other information           Reference URL           Office hours           Relations to attainment objectives of learning and education	Textbook or material will be made	e available from the	supervisor. To be a	nnounced by individ	lual supervisors.	
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.         To acquire the ability of finding a problem, the ability of solving the problem and the presentation skill.         Evaluation of achievement         Coursework, presentation and/or report.         Examination         Exity finding exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education	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.         To acquire the ability of finding a problem, the ability of solving the problem and the presentation skill.         Evaluation of achievement         Coursework, presentation and/or report.         Coursework, presentation and/or report.         Examination         Sitigs pilliptic Lic (可も行わない)         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education						
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. <b>Evaluation of achievement</b> Coursework, presentation and/or report. Coursework, presentation and/or report. <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> <b>Reference URL</b> <b>Office hours</b> <b>Relations to attainment objectives of learning and education</b>	Goals to be achieved					
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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 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	To acquire the ability of finding a	problem. the ability	/ of solving the prob	lem and the present	tation skill.	
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Evaluation of achievement         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	To acquire the ability of finding a	problem, the ability	of solving the prob	lem and the present	tation skill.	
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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	Coursework, presentation and/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 objectives of learning and education	Examination					
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Relations to attainment objectives of learning and education	Office hours					
Relations to attainment objectives of learning and education						
· ·	Relations to attainment objective	s of learning and e	ducation			

Key words

# (D52010030)Seminar on Electrical and Electronic Information Engineering 3[Seminar on Electrical and Electronic Information Engineering 3]

Subject name[English]	Seminar on Electrical and Electronic Information Engineering 3[Seminar on Electrical and					
	Electronic Informa	ation Engineering 3]				
Schedule number	D52010030	Subject area	Advanced	Required or	Required	
			Electrical and	elective		
			Electronic			
			Information			
			Engineering			
Time of starting a course	Year	Day of the	Intensive	Credit(s)	1	
		week,period				
Faculty	Graduate Progran	n for Doctoral Degre	Subject grade	2~3		
Department Offered	Electrical and Ele	ctronic Information	Beggining	D2		
			grade			
Charge teacher name[Roman	S2系教務委員 2	kei kyomu Iin−S				
alphabet mark]						
Numbering						
Objectives of class						
The seminar aims to provide a b	road understanding	g of theoretical and	experimental appro	oches related to t	he electrical and	
electronic information engineering	g for the research w	vork of his/her mast	ter thesis.			
The seminar aims to provide a b	road understanding	g of theoretical and	experimental appro	oches related to t	he electrical and	
electronic information engineering	g for the research w	vork of his/her mast	ter 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

 $Coursework, \ presentation \ and/or \ report.$ 

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

Key words

#### (D52030010)Advanced Electronic Materials 1[Advanced Electronic Materials 1]

Subject name[English]	Advanced Electro	nic Materials 1[Adv	anced Electronic Ma	iterials 1]		
Schedule number	D52030010	Subject area	Advanced	Required or	Elective	
			Electrical and	elective		
			Electronic			
			Information			
			Engineering			
Time of starting a course	Spring term	Day of the week,period	Wed.4~4	Credit(s)	2	
Faculty	Graduate Progran	n for Doctoral Degre	e	Subject grade	1~3	
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining grade		
Charge teacher name[Roman alphabet mark]	福田 光男,中村	雄一, 武藤 浩行 F	UKUDA Mitsuo, NA	KAMURA Yuichi, N	IUTO Hiroyuki	
Numbering						
Objectives of class						
Objective of this subject is to	learn about the fo	refront research ar	nd development on	spin electronics	and photonics in	
electronic materials, and electroc	hmical sensing, and	powder processing.				
Objective of this subject is to	learn about the fo	refront research ar	nd development on	spin electronics	and photonics in	
electronic materials, and electroc	hmical sensing, and	powder processing.				
Contents of class						
1. Spin electronics.						
You will learn about advanced ma	gnetic materials an	d area from fundame	entals to application	s of magnetics.		
1) Magnetic materials, 2) Applicat	ions of magnetics a	and magnetic materi	als, 3) Correlations	between spins and	l various physical	
quantities, 4) Micro-magnetic dev	vices and systems, §	5) Spintronics and s	pin photonics.			
2. Photonics.						
You will learn about optoelectroni	c materials and sor	ne typical device str	ructures.			
1) Light emitting device, 2) optica	l detector, 3) Optic	al modulator, 4)nanc	omaterial.			
3. Powder processing technologie	S					
You will learn about powder proce	essing techniques fo	or electronic devices	S.			
1) sintering, 2) micrstructute of c	eramics and 3) nand	ocomposite				
1. Spin electronics.						
You will learn about advanced ma	gnetic materials and	d area from fundame	entals to application	s of magnetics.		
1) Magnetic materials, 2) Applicat	ions of magnetics a	and magnetic materi	als, 3) Correlations	between spins and	l various physical	
quantities, 4) Micro-magnetic dev	rices and systems, §	5) Spintronics and s	pin photonics.			
2. Photonics.						
You will learn about optoelectroni	c materials and sor	ne typical device str	ructures.			
1) Light emitting device, 2) optica	l detector, 3) Optic	al modulator, 4)nanc	omaterial.			
3. Powder processing technologie	S					
You will learn about powder proce	You will learn about powder processing techniques for electronic devices.					
1) sintering, 2) micrstructute of c	eramics and 3) nan	ocomposite				
Self Preparation and Review						
Related subjects						
Notes for textbook						
Lecture materials will be distribut	ed.					
Lecture materials will be distribut	ed.					
Notes for reference						
Goals to be achieved	understand and the				and david is	
It aims at acquiring the broad kno	owledge of research	n and development b	by learning about th	e recent research	and development	

in various fields.

It aims at acquiring the broad knowledge of research and development by learning about the 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

Spin electronics: Yuuichi Nakamura: nakamura@ee.tut.ac.jp Powder processing: Hiroyuki Muto: muto@ee.tut.ac.jp Photonics: Mitsuo Fukuda: fukuda@ee.tut.ac.jp Spin electronics: Yuuichi Nakamura: nakamura@ee.tut.ac.jp Powder processing: Hiroyuki Muto: muto@ee.tut.ac.jp Photonics: Mitsuo Fukuda: fukuda@ee.tut.ac.jp

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

spin electronics, photonics, electrochmical sensing, and powder processing. spin electronics, photonics, electrochmical sensing, and powder processing.

#### (D52030040)Advanced Electrical Systems 2[Advanced Electrical Systems 2]

Subject name[English]	Advanced Electric	cal Systems 2[Adva	nced Electrical Syst	ems 2]	
Schedule number	D52030040	Subject area	Advanced	Required or	Elective
			Electrical and	elective	
			Electronic		
			Information		
			Engineering		
Time of starting a course	Spring term	Day of the week.period	Wed.2~2	Credit(s)	2
Faculty	Graduate Progran	n for Doctoral Degre	e	Subject grade	1~3
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	
			5 5	grade	
Charge teacher name[Roman	須田 善行,稲田	亮史,村上 義信 \$	SUDA Yoshiyuki, INA	ADA Ryoji, MURAK	AMI Yoshinobu
Numbering					
Objectives of class					
This lecture is implemented as a	n introduction to e	lectrical energy sys	tems and intended	for students and o	other engineering
disciplines. It is being useful as re	eference and self-s	study guide for the p	professional dealing	with this importan	t area. There are
following three sub courses to ch	oose from.				
This lecture is implemented as a	n introduction to e	lectrical energy sys	tems and intended	for students and o	other engineering
disciplines. It is being useful as re	eference and self-s	study guide for the p	professional dealing	with this importan	t area. There are
following three sub courses to ch	oose from.				
Contents of class					
Sub Course 1(Y. Suda)					
1. Fundamental concept of electri	ical energy enginee	ring			
2. Three-phase systems					
3. Power electronics					
Sub Course 2(R. Inada)					
1. Introduction of Electrochemica	l Energy Conversion	n Devices			
2. Lithium-Ion Secondary Batterie	es				
3. Recent Trend in Electrochemic	al Energy Conversi	on Devices			
Sub Course 3(Yo. Murakami)					
1. Introduction of Electric Energy	Systems				
2. High Voltage Engineering and E	lectrical Insulation				
3. Fundamental Properties of Diel	ectrics and Electric	cal Insulating Materia	als.		
Sub Course 1(Y. Suda)					
1. Fundamental concept of electri	ical energy enginee	ring			
2. Three-phase systems					
3. Power electronics					
Sub Course 2(R. Inada)					
1. Introduction of Electrochemica	l Energy Conversio	n Devices			
2. Lithium-Ion Secondary Batterie	es				
3. Recent Trend in Electrochemic	al Energy Conversi	on Devices			
Sub Course 3(Yo. Murakamı)	<b>a</b> .				
1. Introduction of Electric Energy	Systems				
2. High Voltage Engineering and E	lectrical Insulation				
3. Fundamental Properties of Diel	ectrics and Electric	cal Insulating Materia	als.		
Self Preparation and Review					
Related subjects					
Basic electrical power engineering	g course is prerequ	isite.			
Basic electrical power engineering	g course is prerequ	isite.			
Notes for textbook					
Materials will be prepared by the	lecturer.				
Materials will be prepared by the	lecturer.				
Notes for reference					
Goals to be achieved					

#### Evaluation of achievement

Marks are based on examinations(100%). Marks are based on examinations(100%).

Examination

定期試験を実施(対面)

Examination(Face to Face)
Details of examination

#### Other information

#### Reference URL

(1) J. Larminie and A. Dicks: Fuel Cell Systems Explained (Wiley)

- (2) M. Yoshio, R.J. Brodd and A. Kozawa: Lithium Ion Batteries: Science and Technologies (Springer-Verlag)
- (3) E. Kuffel, W. Zaengel and J. Kuffel: High Voltage Engineering (Newnes)

(1) J. Larminie and A. Dicks: Fuel Cell Systems Explained (Wiley)

(2) M. Yoshio, R.J. Brodd and A. Kozawa: Lithium Ion Batteries: Science and Technologies (Springer-Verlag)

(3) E. Kuffel, W. Zaengel and J. Kuffel: High Voltage Engineering (Newnes)

Office hours

Relations to attainment objectives of learning and education

Key words

#### (D52030050)Advanced Microelectronics 1[Advanced Microelectronics 1]

Subject name[English]	Advanced Microe	lectronics 1[Advanc	ed Microelectronics	; 1]	
Schedule number	D52030050	Subject area	Advanced	Required or	Elective
			Electrical and	elective	
			Electronic		
			Information		
			Engineering		
Time of starting a course	Spring term	Day of the	Mon.3~3	Credit(s)	2
		week,period			
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	1~3
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	
				grade	
Charge teacher name <u>l</u> Roman	澤田 和明,石日	田 誠,村上 裕二	,関口 寛人, 髙橋	新 一 浩 SAWADA	Kazuaki, ISHIDA
alphabet mark	Makoto, MURAKA	MI Yuji, SEKIGUCH	I Hiroto, TAKAHASI	HI Kazuhiro	
Numbering					
Objectives of class					
From the viewpoint of deep under	erstanding of advan	ced microelectronic	s, physics of semic	conductors includin	g material design
and an example of latest device v	vill be lectured.				
From the viewpoint of deep under	erstanding of advan	ced microelectronic	s, physics of semic	conductors includin	g material design
and an example of latest device v	vill be lectured.				
Contents of class					
a) Physics and Properties of Sem	niconductors				
Crystal growth and device proce	essing				
Energy band engineering					
Alloy semiconductor					
Strain effect					
Superlattice					
Carrier transport phenomena					
Tummeling effect					
b)Metal-Semiconductor Contacts	5				
Schottky barrier					
Current transport processes					
Ohmic contact					
a) Interveted singuite					
device processing					
MEMS/NEMS					
Latest MOS FETs					
Current topics in IC/MEMS					
a) Physics and Properties of Sem	niconductors				
Crystal growth and device proce	essing				
Energy band engineering	U				
Alloy semiconductor					
Strain effect					
Superlattice					
Carrier transport phenomena					
Tummeling effect					
b)Metal-Semiconductor Contacts	3				
Schottky barrier					
Current transport processes					
Ohmic contact					
c) Integrated circuits					
device processing					
MEMS/NEMS					
Latest MOS FETs					
Current topics in IC/MEMS					
Self Preparation and Review					

Related subjects

The basic knowledge on the quantum mechanics, thermodynamics, and electronics are desirable.

Semiconductor Physics, Master course

The basic knowledge on the quantum mechanics, thermodynamics, and electronics are desirable.

Semiconductor Physics, Master course

#### Notes for textbook

Physics of Semiconducotr Devices S.M.Sze, Willy Physics of Semiconducotr Devices S.M.Sze, Willy

#### Notes for reference

#### Goals to be achieved

(1) To understand fundamental aspects on microelectronics, and physics of semiconductors including material design.

(2) To get the knowledge on the latest technologies on microelectronics.

To understand fundamental aspects on microelectronics, and physics of semiconductors including material design.
 To get the knowledge on the latest technologies on microelectronics.

#### Evaluation of achievement

Reports (50%) and Final examination (50%)

Reports (50%) and Final examination (50%)

#### Examination

定期試験を実施(対面)

Examination(Face to Face)

#### **Details of examination**

#### Other information

M.Ishida (C-606) ishida@ee.tut.ac.jp ext. 6740 K.Sawada (C-605) sawada@ee.tut.ac.jp ext. 6739 T.Kawano (C-603) kawano@ee.tut.ac.jp ext. 6738 Y.Murakami (C-607) ymurakami@ee.tut.ac.jp ext. 6741 M.Ishida (C-606) ishida@ee.tut.ac.jp ext. 6740 K.Sawada (C-605) sawada@ee.tut.ac.jp ext. 6739 T.Kawano (C-603) kawano@ee.tut.ac.jp ext. 6738 Y.Murakami (C-607) ymurakami@ee.tut.ac.jp ext. 6741 **Reference URL** http://www.tut.ac.jp/english/introduction/02EE.pdf (department) http://www.int.ee.tut.ac.jp/

(devision)

http://www.tut.ac.jp/english/research/research\_highlights.html (research activities) http://www.tut.ac.jp/english/introduction/02EE.pdf (department)

http://www.int.ee.tut.ac.jp/ (devision)

http://www.tut.ac.jp/english/research/research\_highlights.html (research activities)

Office hours

book an apopintment by e-mail, phone, etc. book an apopintment by e-mail, phone, etc.

Relations to attainment objectives of learning and education

Key words

#### (D52030070)Advanced Information and Communication Systems 1[Advanced Information and Communication Systems 1]

Subject name[English]	Advanced Inform	nation and Com	munication Systen	ns 1[Advanced	Information and			
	Communication S	Communication Systems 1]						
Schedule number	D52030070 Subject area Advanced			Required or	Elective			
			Electrical and	elective				
			Electronic					
			Information					
			Engineering					
Time of starting a course	Spring term	Day of the	Mon.2~2	Credit(s)	2			
		week,period						
Faculty	Graduate Program	n for Doctoral Degre	ee	Subject grade	1~3			
Department Offered	Electrical and Elec	ctronic Information	Engineering	Beggining				
				grade				
Charge teacher name[Roman	上原 秀幸, 大平 孝 UEHARA Hideyuki, OHIRA Takashi							
alphabet mark]								
Numbering								

#### **Objectives of class**

This course is intended for learning the mechanism of medium access control and multi-hop communications for ad hoc and sensor networks. Students try to give solutions of the problems which cause performance degradation.

This course is intended for learning the mechanism of medium access control and multi-hop communications for ad hoc and sensor networks. Students try to give solutions of the problems which cause performance degradation.

#### **Contents of class**

1. Medium access control protocols

- 2. Multi-hop communications
- 3. Ad hoc and sensor networks
- 1. Medium access control protocols
- 2. Multi-hop communications
- 3. Ad hoc and sensor networks

#### Self Preparation and Review

#### **Related subjects**

The students who will take this course are supposed to have sufficient knowledge about the following; wireless digital modulation and demodulation, radio propagation characteristic, signal processing, probability, random variables and stochastic process

The students who will take this course are supposed to have sufficient knowledge about the following; wireless digital modulation and demodulation, radio propagation characteristic, signal processing, probability, random variables and stochastic process

#### Notes for textbook

Instruct in 1st class.

Instruct in 1st class.

#### Notes for reference

#### Goals to be achieved

- Understand the mechanism of medium access control and multi-hop communications
- Understand the characteristics of ad hoc and sensor networks
- Present a solution or a new application for the above
- Understand the mechanism of medium access control and multi-hop communications
- Understand the characteristics of ad hoc and sensor networks
- Present a solution or a new application for the above

#### Evaluation of achievement

Marks are based on reports and presentations.

Marks are based on reports and presentations.

#### Examination

試験期間中には何も行わない

#### None during exam period

#### Details of examination

#### Other information

For e-mail address information, visit http://www.comm.ee.tut.ac.jp/

#### For e-mail address information, visit http://www.comm.ee.tut.ac.jp/ Reference URL

http://www.comm.ee.tut.ac.jp/ http://www.comm.ee.tut.ac.jp/

#### Office hours

Appoint a time slot via email

Appoint a time slot via email

Relations to attainment objectives of learning and education

#### Key words

wireless networks, medium access control, multi-hop wireless networks, medium access control, multi-hop

#### (D53010010)Seminar on Computer Science and Engineering 1[Seminar on Computer Science and Engineering 1]

Subject name[English]	Seminar on Con	nputer Scier	nce an	d Engineering 1[	Seminar on Compu	ter Science and	
	Engineering 1]						
Schedule number	D53010010	Subject an	Required or	Required			
				Computer	elective		
				Science and	1		
				Engineering			
Time of starting a course	Year	Day of	the	Intensive	Credit(s)	4	
		week,perio	d				
Faculty	Graduate Program	n for Doctora	al Degre	ee	Subject grade	1~3	
Department Offered	Computer Scienc	e and Engine	ering		Beggining	D1	
					grade		
Charge teacher name[Roman	S3系教務委員 3kei kyomu Iin−S						
alphabet mark]							
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

Key words

#### (D53010020)Seminar on Computer Science and Engineering 2[Seminar on Computer Science and Engineering 2]

Seminar on Com	nputer Scien	ce and	d Engineering 2	Seminar on Compu	ter Science and
Engineering 2]					
D53010020 Subject area Advanced				Required or	Elective
			Computer	elective	
			Science an	b	
			Engineering		
Year	Day of	the	Intensive	Credit(s)	1
	week,period	i			
Graduate Program	n for Doctora	l Degre	e	Subject grade	2~3
Computer Science	e and Enginee	ering		Beggining	D1
				grade	
S3系教務委員 3k	kei kyomu Iin-	-S			
	Seminar on Con Engineering 2] D53010020 Year Graduate Program Computer Science S3系教務委員 3	Seminar on Computer Scient Engineering 2] D53010020 Subject are Year Day of week,period Graduate Program for Doctora Computer Science and Enginee S3系教務委員 3kei kyomu Iin-	Seminar on Computer Science and Engineering 2] D53010020 Subject area Year Day of the week,period Graduate Program for Doctoral Degre Computer Science and Engineering S3系教務委員 3kei kyomu Iin-S	Seminar on Computer Science and Engineering 2[ Engineering 2] D53010020 Year Qraduate Program for Doctoral Degree Computer Science and Engineering S3系教務委員 3kei kyomu Iin-S	Seminar on Computer Science and Engineering 2[Seminar on Computer Science and Engineering 2]       Subject area       Advanced       Required or elective         D53010020       Subject area       Advanced       Computer       elective       or elective         Year       Day of the week,period       Intensive       Credit(s)         Graduate Program for Doctoral Degree       Subject grade         Computer Science and Engineering       grade         S3系教務委員 3kei kyomu lin-S

#### **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

Key words

#### (D53030020)Speech and Language Processing[Speech and Language Processing]

Subject name[English]	Speech and Language Processing Speech and Language Processing							
	D52020020 Subject and Language				<b>Bequired or</b> Elective			
	00000020	Subject alea		a	Computer	elective	Elective	
					Seiemee and	01000140		
					Science and			
<b>T</b> I <b>A A A</b>	0	-	~		Engineering	0		
l ime of starting a course	Spring term	Day	OT	the	Thu.2~2	Gredit(s)	Z	
Franktin	Cueduete Duemuen	week,p		Dearr		Cubicat and	1 2	
	Graduate Program		ctoral	Degre	ee	Subject grade	1~3	
Department Offered	Computer Scienc	e and En	ginee	ering		Beggining		
Observed to a base of Demonstration	利益 七百 山土			т		grade		
Charge teacher name Roman	│ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │	-2 Ar	(IBA	Iomo	yoshi, YAMAMUTU	Kazumasa		
Numbering								
Objectives of class								
Important topics on spoken / nat	ural language proce	ssing will	l be d	liscus	sed.			
Important topics on spoken / nat	ural language proce	ssing will	l be d	liscus	sed.			
Contents of class								
Either (I) or (II) should be selecte	d.							
(I) Basic of natural language	processing / Mad	aling ob	arant	ors /	Modeling words	/ Modeling center	noes / Modeling	
documents /Modeling aroon-large	are dependencies	oning Gfla	מומטנו	015 /	words ,	would have a seriler	ices / woulding	
documents/ Modeling cross-langu	age dependencies							
(II) Basic of spoken language proc	cessing / Basic of s	speech re	ecogr	nition ,	Algorithm for cont	tinuous speech rec	ognition / Hidden	
Markov Model / Language mode	and decoder / Sp	eech red	cogni	tion u	sing neural network	ks / Language proc	cessing / Spoken	
dialog systems, Multimodal dialog	systems / Languag	ge identif	ficatio	on, Sp	eaker identification,	Spoken document	retrieval, Spoken	
document summarization, Compu	ter aided language l	earning s	syster	m				
Either (I) or (II) should be selecte	d.							
(I) Basic of natural language	processing / Mod	eling cha	aracto	ers /	Modeling words	/ Modeling senter	nces / Modeling	
documents/Modeling cross-langu	age dependencies							
5 0								
(II) Pasia of anakan languaga pro-	and Pasia of	nooch re	<i>.</i> .	ition	/ Algorithm for cont	tinuqua anagah rag	omition / Hiddon	
(II) Basic of spoker language proc	cessing / Dasic of s	speech re	ecogr		Algorithm for con			
Markov Model / Language model	and decoder / Sp	eech red	cogni	tion u	sing neural network	s / Language proc	essing / Spoken	
dialog systems, Multimodal dialog	systems / Languag	ge identif	icatio	on, Sp	eaker identification,	Spoken document	retrieval, Spoken	
document summarization, Compu-	ter aided language l	earning s	systei	m				
Self Prenaration and Review								
Palatad autianta								
Information theory, Formal langua	ge theory							
Information theory, Formal langua	ge theory							
Notes for textbook								
Materials will be prepared by lect	urers.							
Materials will be prepared by lect	urers.							
Notes for reference								
Goals to be achieved								
(I) Understand the basic concept	s of information ret	rieval and	d nat	ural la	ngauge processing	/ Obtain actual abi	lity to deal with a	
large text corpus / Understand c	urrent methods for	the NLP	appli	icatior	IS.			
(II)								

Basics: Understand the role of spoken language as an human interface / Understand hierarchical structure of spoken language / Understand the basic speech analysing methods.

Speech Recognition: Understand the relation between speech recognition and information theory / Understand the algorithm for speech recognition using DP matching / Understand the Hidden Markov Model.

Natural Language Processing: Understand the role of language model / Understand the parser for context free language. Applications: Understand the dictation system and the spoken dialog system / Understand the applications of speech technology including computer aided language learning system.

(I) Understand the basic concepts of information retrieval and natural langauge processing / Obtain actual ability to deal with a large text corpus / Understand current methods for the NLP applications.

#### (II)

Basics: Understand the role of spoken language as an human interface / Understand hierarchical structure of spoken language / Understand the basic speech analysing methods.

Speech Recognition: Understand the relation between speech recognition and information theory / Understand the algorithm for speech recognition using DP matching / Understand the Hidden Markov Model.

Natural Language Processing: Understand the role of language model / Understand the parser for context free language. Applications: Understand the dictation system and the spoken dialog system / Understand the applications of speech technology including computer aided language learning system.

#### Evaluation of achievement

Marks are based on reports (100%).

Marks are based on reports (100%).

#### Examination

レポートで実施 By Report<u></u>

#### Details of examination

#### Other information

(I) Tomoyosi Akiba: C-505, 44-6758, akiba@ics.tut.ac.jp
 (II) Kazumasa Yamamoto: C-506, 44-6767, yamamoto@cs.tut.ac.jp

(I) Tomoyosi Akiba: C-505, 44-6758, akiba@ics.tut.ac.jp
 (II) Kazumasa Yamamoto: C-506, 44-6767, yamamoto@cs.tut.ac.jp

#### **Reference URL**

#### Office hours

16:25-17:40, Tuesday and Wednesday 16:25-17:40, Tuesday and Wednesday

Relations to attainment objectives of learning and education

#### Key words

spoken language processing, natural language processing, human language technology spoken language processing, natural language processing, human language technology

#### (D53030090)Molecular Simulation[Molecular Simulation]

Subject name[English]	Molecular Simulation[Molecular Simulation]					
Schedule number	D53030090	Subject are	a	Advanced	Required or	Elective
				Computer	elective	
				Science and		
				Engineering		
Time of starting a course	Spring term	Day of week,period	the I	Wed.1~1	Credit(s)	2
Faculty	Graduate Progran	n for Doctoral	Degre	e	Subject grade	1~3
Department Offered	Computer Science	e and Enginee	ering		Beggining	
					grade	
Charge teacher name[Roman	関野 秀男,後藤	仁志,栗田	典之き	SEKINO Hideo, GOT	O Hitoshi, KURITA	Noriyuki
alphabet mark]						
Numbering						
Objectives of class						
Understanding of theories for mol	lecular science and	simulation te	chnolo	gy based upon it		
Understanding of theories for mo	lecular science and	simulation te	chnolo	gy based upon it		
Contents of class						
1)Basic Quantum Mechanics (1s	t-3rd week)					
2)Molecular Quantum Mechanics	(Advanced) (4th-8t	h week)				
3)Mathematical Foundation for ba	isic Quantum Mech	anical problem	ns (9t	h−10th week)		
4)Quantum Signal Processing (11	th-15th week)					
1)Basic Quantum Mechanics (1st	t-3rd week) (Adversed) (Ath-9t	h waak)				
2)Molecular Quantum Mechanics 3)Mathematical Foundation for ba	(Advanced) (4th-8t	n week) aniaal problem	ac (0+	h-10th week)		
4)Quantum Signal Processing (11)	th-15th week)		15 (31	II TOUT WEEK)		
Self Preparation and Review						
Pelated subjects						
Molecular Design Engineering						
Molecular Design Engineering						
Molecular Design Engineering						
Molecular Design Engineering						
Notes for textback						
1)Quantum Chemistry						
Evring/Walter/Kimball						
_,						
2)Modern Quantum Chemistry						
Introduction to Advanced Electro	n Structure Theory					
A.Szabo and N.S.Ostlund	,					
1)Quantum Chemistry						
Eyring/Walter/Kimball						
2)Modern Quantum Chemistry						
Introduction to Advanced Electro	n Structure Theory					
A.Szabo and N.S.Ostlund						
Notes for reference						
Goals to be achieved						
To understand quantum mechanic	cs, its numerical rep	presentation o	n com	puter.		
To understand quantum mechanic	cs, its numerical rep	presentation o	n com	puter.		
Evaluation of achievement	مسام مستحالة					
Presentation in the class and rep	orts, small tests as	well as creati	on of	simulation programs	S.	
Fresentation in the class and rep	orts, smail tests as	well as creat	on of	simulation programs	i.	
このminiauvil その他						
Other						
Details of examination						

In each class, students must show the proof that they did understand the subject they learned. Sometimes, homework is given.

In each class, students must show the proof that they did understand the subject they learned. Sometimes, homework is given.

Other information F-305 0532-44-6880 F-305 0532-44-6880 Reference URL

**Office hours** Wed. 13:00 to 14:30 Wed. 13:00 to 14:30

Relations to attainment objectives of learning and education

Key words

Molecular Orbital Theory Electronic structure of matter Quantum Walk Molecular Orbital Theory Electronic structure of matter Quantum Walk

#### (D53030100)Advanced Molecular Information Engineering[Advanced Molecular Information Engineering]

Subject name[English]	Advanced Molecular Information Engineering[Advanced Molecular Information Engineerin						
Schedule number	D53030100	Subject a	rea	Advanced	Required or	Elective	
		-		Computer	elective		
				Science and			
				Engineering			
Time of starting a course	Spring term	Day of	the	Mon.5~5	Credit(s)	2	
		week,peric	bd				
Faculty	Graduate Program	n for Doctor	al Degr	ee	Subject grade	1~3	
Department Offered	Computer Science	e and Engine	eering		Beggining		
					grade		
Charge teacher name[Roman	高橋 由雅,加藤	博明 TAKA	HASHI	Yoshimasa, KATO I	Hiroaki		
alphabet mark							
Numbering							
Objectives of class							
The purpose of this course is t	o introduce and e	xplain pract	ical and	d applied approache	es to data analysis	s (or mining) and	
knowledge discovery with illustra	tive examples in ch	emistry and	molecu	ular biology. The co	urse is helpful for t	the students who	
are interested in not only pursuin	g careers in chemo	-informatics	but als	o taking general dat	ta science.		
The purpose of this course is t	o introduce and e	xplain pract	ical and	applied approache	es to data analysis	s (or mining) and	
knowledge discovery with illustra	tive examples in ch	iemistry and	moleci	lar biology. The co	urse is helpful for t	the students who	
are interested in not only pursuin	g careers in chemo-	-informatics	but als	o taking general dat	ta science.		
Topics to be covered:							
1.Structure and information of bio	macromolecules						
2. I ransmission and expression of	the genetic informa	ation					
3.Molecular biology database							
4.Sequence allignment by DP mat	ching						
5. Homology searching and multur	ble allignment						
6.Sequence motif and knowledge	Dase						
9 Even	and function predic	cuon					
o.Exam. 9 Chamical data appear and multiv	variata data analysia						
10 Quantitative structure-activity	relationships and l	, knowledge a	quicition				
11 Visualization of higher dimensi	onal data of molecu	viloc	quisitior	1			
12 Evaluation of structural similar	ity and its application	00					
13 Fundamentals of machine learn	ning	011					
14 Artificial neural network and c	hemical application						
15 Support vector machine and c	hemical application						
16.Exam.							
Topics to be covered							
Topica to be covered.							
1 Structure and information of his	maaramalaaulaa						
2. Trenemiesien and expression of		-+:					
2. Transmission and expression of	the genetic informa	ation					
4 Sequence allignment by DP mat	ching						
5 Homology searching and multuir	ole allignment						
6 Sequence motif and knowledge	base						
7.Tertiary structure classification	and function predic	ction					
8.Exam.	·						
9.Chemical data space and multiv	ariate data analysis	;					
10.Quantitative structure-activity	relationships and k	knowledge a	quisitior	ı			
11.Visualization of higher dimensi	onal data of molecu	lles					
12.Evaluation of structural similar	ity and its application	on					
13.Fundamentals of machine learn	ning						
14.Artificial neural network and cl	hemical application						
15.Support vector machine and c	hemical application						
16.Exam.							

#### Self Preparation and Review

#### **Related subjects**

Molecular Informatics, Linear Algebra, Elementary Analytics Molecular Informatics, Linear Algebra, Elementary Analytics

#### Notes for textbook

Material will be made available in the form of hard copies or on the class website (to be announced).

Material will be made available in the form of hard copies or on the class website (to be announced).

#### Notes for reference

Goals to be achieved

First half term (by Kato)

/They understand structure and information of biomacromolecules.

/They learn the basic concept of molecular biology database and acquire the abilities of database retrieval.

/They understand knowledge discovery techniques from databases such as sequence alignment and motif searching.

Second half term (by Takahashi)

/They understand regression analysis technique based on linear least squares method and the application to chemical data fitting.

/They learn fundamentals of quantitative structure-activity relationships (QSAR)

/They learn mathematical basis of principal component analysis and visualization of multivariate chemical data space.

/They understanad usefulness and importance of structural similarity in intelligent molecular information processing.

/They learn mathematical basis of machine learning.

/Artificial neural network (ANN) and applicaton in chemistry.

/Support vector machine (SVM) and application in drug design and development.

They acquire the abilities how they can apply the methods to chemical data analysis, data classification and prediction.

First half term (by Kato)

/They understand structure and information of biomacromolecules.

/They learn the basic concept of molecular biology database and acquire the abilities of database retrieval.

/They understand knowledge discovery techniques from databases such as sequence alignment and motif searching.

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/They learn mathematical basis of machine learning.

/Artificial neural network (ANN) and applicaton in chemistry.

/Support vector machine (SVM) and application in drug design and development.

They acquire the abilities how they can apply the methods to chemical data analysis, data classification and prediction.

Evaluation of achievement		
Reports and classroom perfor	rmance	20%
Written examination	80%	
Reports and classroom perfor	rmance	20%
Written examination	80%	
Examination		
定期試験を実施(対面)		
Examination(Face to Face)		
Details of examination		

Other information

Office: F-304 (Ext. 6879) Email: kato@cs.tut.ac.jp (Kato) Office: F-303 (Ext. 6878) Email: taka@cs.tut.ac.jp (Takahashi)

Office: F-304 (Ext. 6879) Email: kato@cs.tut.ac.jp (Kato) Office: F-303 (Ext. 6878) Email: taka@cs.tut.ac.jp (Takahashi)

#### **Reference URL**

http://www.mbi.cs.tut.ac.jp/~kato/lecture/(Kato) http://www.mis.cs.tut.ac.jp/ (Takahashi)

http://www.mbi.cs.tut.ac.jp/~kato/lecture/ (Kato) http://www.mis.cs.tut.ac.jp/ (Takahashi)

#### Office hours

Friday 15:00-16:30 (Kato) Friday 13:00-14:30 (Takahashi) Friday 15:00-16:30 (Kato) Friday 13:00-14:30 (Takahashi) **Relations to attainment objectives of learning and education** 

#### Key words

chemoinformatics, bioinformatics, multivariate data analysis, QSAR, chemometrics, pattern recognition, machine learning, data maining

chemoinformatics, bioinformatics, multivariate data analysis, QSAR, chemometrics, pattern recognition, machine learning, data maining

#### (D53030150)Web Data Engineering, Advanced 1[Web Data Engineering, Advanced 1]

Subject name[English]	Web Data Engineering Advanced 1[Web Data Engineering Advanced 1]						
Schedule number	D53030150	Subject area	Advanced	Required or	Elective		
		2	Computer	elective			
			Science and	0.000110			
			Engineering				
Time of starting a course	Spring1 term	Day of the week.period	Thu.1~1	Credit(s)	1		
Faculty	Graduate Program for Doctoral De	egree		Subject grade	1~3		
Department Offered	Computer Science and Engineerin	g		Beggining grade			
Charge teacher	青野 雅樹 AONO Masaki			8			
name[Roman alphabet mark]							
Numbering							
Objectives of class							
Data angine aring tacking	logies for the data (primarily on the	Wab) will be dire	ussed				
Main emphasia is on the	information retrievel and date minim		1335U.				
Data Mining technologic	s include principal component apoly	is connologies.	arning such as place	fication uncurs	nvised learning		
such as clustering and h	Neh mining technologies	שיט פונייט איז	arning such as classi	noadon, unsupe	a viseu ieartiirig		
Multimedia data process	ing will also be discussed						
Data engineering techno	logies for the data (primarily on the	Web) will be discu	issed				
Main emphasis is on the	information retrieval and data minir	ng technologies					
Data Mining technologie	s include principal component analy	sis supervised les	arning such as classi	fication unsure	rvised learning		
such as clustering and l	Neh mining technologies				a viseu learning		
Multimedia data process	ing will also be discussed						
Contents of class							
Classes will be held (the	oretically) 7.5 times. The last time v	will be kept for the	exam				
			o xum.				
1 Information Patrioval							
Fundamental techniques	to construct a coarch overam in	naluding how to	wild indiana haw t	a takaniza taxt	a and have to		
avtract features from to	yte and images will be considered			J LOKETIZE LEXT	s, and now to		
2 Data and Web Mining	tis and images, will be considered.						
Eundamental methods for	or data mining as well as Web mining	are discussed					
i undamentar methods ic							
We plan to do one or two	o assignments for data mining techr	niques inside.					
Please note that if this I	ecture is held at the same time with	n Japanese cours	e, the lecture might l	be in Japanese.			
Classes will be held (the	oretically) 7.5 times. The last time v	will be kept for the	e exam.				
1. Information Retrieval							
Fundamental techniques	s to construct a search system, ir	ncluding how to I	ouild indices, how to	o tokenize text	s, and how to		
extract features from te	xts and images, will be considered.						
2. Data and Web Mining							
Fundamental methods fo	or data mining as well as Web mining	g are discussed.					
We plan to do one or two	o assignments for data mining techr	niques inside.					
Please note that if this I	ecture is held at the same time with	n Japanese cours	e, the lecture might I	be in Japanese.			
Self Preparation and Re	view						
It is desirable to self-st	udy as well as review fundamental	data mining tech	iniques such as clus	tering, classific	ation, principal		
component analysis. and	d regression. It is recommended in	stalling R/Pvtho	n language (sometim	nes with Java/	C++) into vour		
computer, because some	e of the lecture materials are writte	n in R/Python lan	guage. (R is favorab	le for simple vis	sualization.)		
It is desirable to self-st	udy as well as review fundamental	data mining tech	iniques such as clus	tering, classific	ation, principal		
component analysis and	d regression. It is recommended in	stalling R/Pvtho	n language (sometim	nes with Java/	C++) into vour		
computer, because some	e of the lecture materials are writte	n in R/Python lan	guage. (R is favorab	le for simple vis	sualization.)		
Related subjects							

Notes for textbook						
Reference1	Book title	Information Retrie Search Engines	val, Implementin	ng and Evaluating	ISBN	978-0-262- 02651-2
	Author	Charles L.A. Clarke, Gordon V. Cormack	Publisher	MIT Press	Publish year	2010
Reference2	Book title	Data Mining: Conce	pts and Techniqu	ues, Third Edition	ISBN	978-0-123- 81479-1
	Author	Jiawei Han, Micheline Kamber, and Jian Pei	Publisher	Morgan Kaufmann	Publish year	2011
Reference3	Book title	Data Mining Pract	tical Machine Le	earning Tools and	ISBN	978-0-12- 374856-0
	Author	Ian H. Witten, Eibe Frank, and Mark A. Hall	Publisher	Morgan Kaufmann	Publish year	2011
Reference #4 Title: [Modern Informa Authors: Ricardo Baez Publisher: Addison We ISBN : 978-0-321-416 Year: 2011 Reference #5 Title: [Google's PageR Authors: Amy N. Lang Publisher: Princeton L ISBN : 978-0-691-122 Year: 2006 Reference #4 Title: [Modern Informa Authors: Ricardo Baez Publisher: Addison We ISBN : 978-0-321-416 Year: 2011 Reference #5 Title: [Google's PageR Authors: Amy N. Lang Publisher: Princeton L ISBN : 978-0-691-122 Year: 2006	tion Retrieval, t a-Yates, Bertie sley 91-9 ank and Beyond ville, Carl D. Me Jniversity Press 02-1 tion Retrieval, t a-Yates, Bertie sley 91-9 ank and Beyond ville, Carl D. Me Jniversity Press 02-1	he concepts and tech r Ribeiro-Neto 4J yer he concepts and tech r Ribeiro-Neto 4J yer	nnology behind se	earch, Second Edition	J J	
To acquire the following 1. Implement fundament 2. Understand advanced 3. Design, analyze, and To acquire the following 1. Implement fundament 2. Understand advanced 3. Design, analyze, and <b>Evaluation of achievem</b> Exercise (20%) and Final A: (>=80), B: (>=65), C:(	g knowledge tha tal data mining t d technologies f evaluate the inf g knowledge tha tal data mining t d technologies f evaluate the inf ent I exam (80%) >=55) I exam (80%)	t can make you echnologies. or information retriev ormation retrieval and t can make you echnologies. or information retriev ormation retrieval and	al, including dime d data mining tec al, including dime d data mining tec	nsional reduction. hnologies. nsional reduction. hnologies.		

A: (>=80), B: (>=65), C:(>=55)

**Examination** 定期試験を実施(対面)

Examination(Face to Face)
Details of examination

#### Other information

Masaki Aono (C-511) aono@tut.jp

Masaki Aono (C-511) aono@tut.jp

#### **Reference URL**

 $\label{eq:http://www.kde.cs.tut.ac.jp/~aono/myLecture.html \\ \http://www.kde.cs.tut.ac.jp/~aono/myLecture.html \\ \html{ac.jp} \\ \html{ac.jp} \\ \html{ac.jp} \\ \html{ac.jp} \\$ 

#### 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

Programming skills with Java, C++, R, and Python might be preferable.

Programming skills with Java, C++, R, and Python might be preferable.

Key words

#### (D54010010)Seminar on Environmental & Life Sciences 1[Seminar on Environmental & Life Sciences 1]

Subject name[English]	Seminar on Environmental & Life Sciences 1[Seminar on Environmental & Life Sciences 1						Life Sciences 1]	
Schedule number	D54010010	Subie	ct are	a	Advanced	Required	Required	
					Applied	elective		
					Chemistry and			
					Life Science			
Time of starting a course	Year	Day	of	the	Intensive	Credit(s)		4
<b>—</b>		week,	period				•	1.0
Faculty	Graduate Progra	m for Do	ctoral	Degre	e	Subject gra	ade	1~3
Department Offered	Environmental and Life Sciences					Beggining grade		וט
Charge teacher name[Roman	S4系教務委員 4							
alphabet mark]								
Numbering								
Objectives of class								
This course will provide the stude	ante with opportun	ities to s	tudy	on hie	/her research subje	acts on adva	nced a	anvironmental and
life sciences by reading scientific	naners under the	guidance	ofhi	s/her	supervisor The aim	of the lesse	n for	the students is to
learn the latest knowledge and p	resentation skills	required	for hi	s/her	research in the se	minar as we	llast	o deepen his/her
understanding of advanced enviro	nmental and life so	ciences	101 11	0/ 1101			. 40 (	
This course will provide the stude	ents with opportun	ities to s	studv (	on his	/her research subie	ects on adva	nced e	environmental and
life sciences by reading scientific	papers under the	guidance	of his	s/her	supervisor. The aim	of the lesse	n for	the students is to
learn the latest knowledge and p	resentation skills	required	for hi	s/her	research in the se	minar as we	ll as t	o deepen his/her
understanding of advanced enviro	nmental and life so	ciences.						·
Contents of class								
The students will be required to	read scientific pap	ers writt	en by	othe	<sup>.</sup> language than Jap	anese, espe	cially	English, which are
suggested by his/her supervisor,	and to report and	discuss c	deeply	on hi	s/her research subj	ect in the se	minar	
The students will be required to	read scientific pap	ers writt	en by	othe	· language than Jap	anese, espe	cially	English, which are
suggested by his/her supervisor,	and to report and	discuss c	deeply	on hi	s/her research subj	ect in the se	minar	
Self Preparation and Review								
Related subjects								
Seminar on Environmental & Life	Sciences 2							
All other relevant subjects in Adv	anced Environmen	tal and L	ife Sc	ience	6			
Seminar on Environmental & Life	Sciences 2							
All other relevant subjects in Adv	anced Environmen	tal and L	ife Sc	ience	3			
Notes for textbook								
Supervisor will recommend textbo	ooks, papers, and re	esearch i	materi	ials to	students.			
Supervisor will recommend textbo	ooks, papers, and re	esearch i	materi	ials to	students.			
Notes for reference								
Goals to be achieved								
To acquire advanced knowledge o	on environmental a	nd life sc	ience	s				
To understand the contents of sc	ientific papers in a	given fie	eld of	enviro	nmental and life sci	ences		
To be able to make oral and poste	er presentations re	elevant to	o pape	ers he	/she has read.			
To acquire advanced knowledge o	on environmental a	nd life sc	ience	s				
To understand the contents of sc	ientific papers in a	ı given fie	eld of	enviro	nmental and life sci	ences		
To be able to make oral and poste	er presentations re	elevant to	o pape	ers he	/she has read.			
Evaluation of achievement								
The evaluation is based on the s	scores of reading	textbook	s and	scier	tific papers. discus	sions, report	ts and	presentations of
his/her research in the seminar. H	His/her supervisor	evaluate	s the	score	S.	, <del>-</del>		
The evaluation is based on the s	scores of reading	textbook	s and	scier	tific papers, discus	sions, report	ts and	presentations of
his/her research in the seminar. H	His/her supervisor	evaluate	s the	score	S.	·		
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

## (D54010020)Seminar on Environmental & Life Sciences 2[Seminar on Environmental & Life Sciences 2]

Subject name[English]	Seminar on Envir	onmental & Life S	ciences 2[Seminar or	n Environmental & I	Life Sciences 2]
Schedule number	D54010020	010020 Subject area Advanced Required or Re			
			Applied	elective	
			Chemistry and		
			Life Science		
Time of starting a course	Year	Day of th	Intensive	Credit(s)	1
		week,period			
Faculty	Graduate Progra	m for Doctoral De	gree	Subject grade	2~3
Department Offered	Environmental ar	nd Life Sciences		Beggining	D1
				grade	
Charge teacher name[Roman	S4系教務委員4	lkei kyomu Iin−S			
alphabet mark					
Numbering					
Objectives of class					
This course will provide the stude	ents with opportun	ities to study on ł	is/her research subj	ects on advanced e	environmental and
life sciences by reading scientific	papers under the	guidance of his/he	r supervisor. The ain	n of the lessen for	the students is to
expand the knowledge and preser	ntation skills acquir	ed in Seminar on I	Environmental and Lif	e Science 1.	
This course will provide the stude	ents with opportun	ities to study on k	is/her research subj	ects on advanced e	environmental and
life sciences by reading scientific	papers under the	guidance of his/he	er supervisor. The ain	n of the lessen for	the students is to
expand the knowledge and preser	ntation skills acquir	ed in Seminar on l	Environmental and Lif	e Science 1.	
Contents of class					
The students will be required to	read scientific pap	ers written by oth	er language than Ja	panese, especially	English, which are
suggested by his/her supervisor,	and to report and	discuss deeply on	his/her research sub	ject in the seminar	
The students will be required to	read scientific pap	ers written by oth	ier language than Jaj	panese, especially	English, which are
suggested by his/her supervisor,	and to report and	discuss deeply on	his/her research sub	ject in the seminar	
Self Preparation and Review					
Related subjects					
Seminar on Environmental & Life	Sciences 1				
All other relevant subjects in Adv	anced Environmen	tal and Life Sciend	es		
Seminar on Environmental & Life	Sciences 1				
All other relevant subjects in Adv	anced Environmen	tal and Life Sciend	es		
Notes for textbook					
Supervisor will recommend textbo	ooks, papers, and r	esearch materials	to students.		
Supervisor will recommend textbo	ooks, papers, and r	esearch materials	to students.		
Notes for reference					
Goals to be achieved					
To acquire advanced knowledge o	on environmental a	nd life sciences			
To understand the contents of so	ientific papers in a	ı given field of env	ronmental and life so	iences	
To be able to make oral and post	er presentations re	elevant to papers h	e∕she has read.		
•					
To acquire advanced knowledge of	n environmental a	nd life sciences			
To understand the contents of so	vientific papers in a	nd line sciences given field of env	ronmental and life so	iences	
To be able to make oral and post	er presentations re	elevant to papers h	e/she has read	ichees	
Evaluation of aphiovement					
The evoluation is based on the	opprop of readings	touthooks and	ontific noneve dia	noinne konsette	l propontations -f
his /her research in the cominer	His/her supervises	evaluates the sec	enunic papers, discui rec	ssions, reports and	i presentations of
The evaluation is based on the	normer supervisor	evaluates the sco	ontific noncro dicess	cione reporte	l precentations of
his /her research in the service of the	Lie /her ever ending	avaluates the set	enunc papers, discu	ssions, reports and	presentations of
Evening the research in the seminar.	ns/ner supervisor	evaluates the sco	163.		
Examination					
武駅期间中には凹も1772で Nana during ayom pariod					
None during examperiod					
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

#### (D54030010)Advanced Environmental Technology 1[Advanced Environmental Technology 1]

			ionical roomiology i		.7
Subject name[English]	Advanced Enviror	nmental Technology	nmental Fechnolog	y 1]	
Schedule number	D54030010	Subject area	Advanced	Required or	Elective
			Applied	elective	
			Chemistry and		
			Life Science		
Time of starting a course	Spring term	Day of the	Mon.3~3	Credit(s)	2
		week,period			
Faculty	Graduate Progran	n for Doctoral Degr	ee	Subject grade	1~3
Department Offered	Environmental an	d Life Sciences		Beggining	
				grade	
Charge teacher name[Roman	水野 彰,田中 三	E郎, 髙島 和則 MI	ZUNO Akira, TANAK	A Saburo, TAKAS	HIMA Kazunori
alphabet mark]					
Numbering					
				-	
静電気力やレーザを用いる DNA	分子や細胞の計測	い、操作が生命現象	の解明に有用な手	段であり、またラジ	カルを使う細胞や
ウイルスの制御は感染予防、さら	には医療への応用	が期待されている。	このような字際的な	領域での技術開発	発を進めるには電
気工学の基礎に加え細胞や分子	の取り扱いなどの知	口識が必要であり、	それらをこの講 義を	通じて学ぶ。	
Bio-manipulation of cells and ge	nes is an importan	t tool for life scier	nces. Control of r	microbes and virus	es using radicals
produced by plasma reduces infe	ction of diseases a	nd will possibly be	applied in medical ti	reatment. For thes	e interdisciplinary
developments, knowledge of cells	and genes is requ	ired in addition to	the basics of electr	rical engineering.	These points are
studied in this lecture.					
静電気力やレーザを用いる DNA	分子や細胞の計測	則、操作が生命現象	の解明に有用な手	段であり、またラジ	カルを使う細胞や
ウイルスの制御は感染予防、さら	には医療への応用	が期待されている。	このような学際的な	領域での技術開発	発を進めるには電
気工学の基礎に加え細胞や分子	の取り扱いなどの知	□識が必要であり、	それらをこの講 義を	通じて学ぶ。	
Bio-manipulation of cells and ge	nes is an importan	t tool for life scier	nces. Control of i	microbes and virus	es using radicals
produced by plasma reduces infe	ction of diseases a	nd will possibly be	applied in medical ti	reatment. For thes	e interdisciplinary
developments, knowledge of cells	and genes is requ	ired in addition to	the basics of electr	rical engineering.	These points are
studied in this lecture.					
Contents of class					
1. 序論 (Introduction)					
11 バノナ制御の日的 (Aim of Di		-+:)			
I.I ハイオ 前御の日的 (Alm of Bio 雨有て尚が細い、まにてほかい	ン-molecule manipula	ation) 「刺ナ田ナレ <i>マ</i> いてム	ナロナーレーガ		6 I I I I
電気工学が細胞・退伍于操作や語	「測にとのような佼	刮を未たしているル	や具体的をもとに	主件 9 る。(Importa	ince of electrical
engineering and its application in i	bio-manipulation si	nould be understo	od through several	examples.)	
*健康な境境の維持 (lo maintain	healthy environmei	nt)			
・静電気力とノフスマによる微生物	勿制御(Bio−molecu	le manipulation by e	electrostatic force a	and plasma)	
・新しい計測技術の開発 (Novel a	nalytical method)			_ 、	
・ポストゲノム時代の遺伝子等の解	解析の重要性(Impo	ortance of gene- se	equencing in Post-G	ienome Era.)	
1.2 電気を使う細胞や生体高分子	·制御の概要紹介(F	Electrostatic metho	d for manipulation o	of cells and molecul	es)
静電気力を使う細胞・分子操作	の実例を学ぶ。(F	Electrostatic manip	ulation of cells an	d molecules shoul	d be understood
through several examples)					
・電気泳動によるDNA配列解析(	Electrophoresis)				
・静電微粒化によるセルソータ(El	ectro-sprav and ce	ell sorter)			
・レーザと電界による・細胞・DNA	, 一分子操作(Manin	ulation of individual	cells and DNA mole	ecules)	
・低温プラズマによる細胞・ウイル	スの除去と破壊(D	estruction of micro	bes and viruses by i	non-thermal plasm	a)
			b)		
2. 復習:静電気工学の基礎 (Basi	ic of Electrostatics	)			
微小物体ならびに液体に働く静電	気力と、それによる	運動 に関する理論	輪の理解を深める。*	時に制御対象物体	の誘電分 極特性
により力の方向が変わることなど	、グレーディエント:	カの性質の理解を	采める。(Importanc	e of electrical en	gineering and its
application in bio-manipulation sh	ould be understood	through several ex	amples.)		
2.1 静電気による力学現象 (Elect	rostatic force)				
<ul> <li>・クーロンカ、影像カ、グレーデ</li> </ul>	ィエントカ重カ	粘性力、磁気力と	の比較(Coulomb	force, image force	e, gradient force
comparison with gravity drag may	gnetic force)				
secupariosi man gravity, arag, ma	5				
2.2 電気流体力学 (Electro Fluid o	dynamics)				

・電気ひずみカ、誘電泳動力、電気泳動力(Electrophoresis, Electro-Osmosis, Dielectro-phoresis)
 ・マイクロ流路の流れの制御(Flow control for micro-fluidics)

2.3 帯電液滴の発生と制御(Generation and control of charged droplets)

3. 細胞操作と計測 (Manipulation of cells for analysis)

個々の細胞に対し、静電気力により運動制御を行うための 実際的な方法を理解する。また集光したレーザによる微小 粒子や 細胞の捕捉に関し、その原理と実際の適用方法を知 る。あわせて細胞の融合や遺伝子導入の基礎として、細胞 の性質の概 要、取り扱い方法の知識を得る。また細胞操作 の具体例として、細胞の分極、膜に加わる電界強度とそれによる膜破壊に関す る知識を得る。(Obtain the knowledge for manipulation of individual cells by electrostatic force and laser. Electrical characteristics of cells should be studied, including polarization and membrane breakdown by pulsed high electric field. Lasertweezers and their practical applications should also be understood.)

3.1 細胞の観察 (Observation of cells)

3.2 細胞の電気的性質と静電気力による細胞操作 (Electrical characteristics of cells and manipulation by electrostatic force) ・電気泳動、誘電泳動、回転操作と生死判別 (Electrophoresis, Dielectro-phoresis, Cell rotation and detection of viability)

3.3 高電界の利用 (Application of High electric field) ・電気的細胞融合、細胞膜破壊 (Cell fusion, Punctuation of cell membrane)

3.4 レーザトラッピングによる細胞・分子操作 (Laser-tweezers for manipulation of cells and bio-molecules)

4. 生体高分子の操作技術 (Manipulation of single DNA molecules)

DNAの構造と性質、DNA複製、制限酵素の働きなど、DNA情報をもとに生体が作られる際の基本的事項に関し、理解を深める。また、この章ではDNA一分子を取り扱う方法に関する知識を得る。(Fundamentals of genes should be understood, which includes: Construction and nature of DNA, replication, activity of enzymes. Basic technique for manipulation of single DNA molecules should also be studied.)

4.1DNAの複製と相転移 (Phase-change and replication)

4.2DNA分子の可視化 (Visualization of DNA molecules)

4.3 染色体 DNA の取り出し、選別操作 (Extraction of DNA from single cell)

4.4DNA分子の伸張固定 (Fix in stretched shape)

4.5 制限酵素との反応と制限地図 (Restriction enzyme)

4.6DNA分子の切断加工ならびに PCR 増幅 (Cutting and PCR amplification of DNA)

4.7 マイクロ流路での反応・制御 (Micro fluidic system)

5. 復習:気体放電現象 (Review of ionized gas)

気体放電に関する基礎知識を整理し、大気圧低温プラズマ の発生方法、環境技術への応用に関する理解を深める。 (Fundamentals of ionized gases are reviewed. Generation of non-thermal plasma, and application in environmental remediation are studied.)

5.1 気体分子運動と電子衝突による電離、電子付着 (Ionization and electron attachment)

5.2 暗流と火花放電 (Dark current and spark discharge) ・タウンゼントの理論、パッシェンの法則、ストリーマ (Theory of gaseous breakdown: Townsend's theory, Paschen's law of flashover streamer formation) 5.3 大気中の各種放電 (Gas discharge in atmospheric air) ・コロナ放電、バリア放電、沿面放電 (Corona, Barrier, Surface discharge)

5.4 電離によるラジカル生成と反応 (Generation of Radicals) ・酸化によるガス状汚染物質の浄化、微生物の殺菌 (Oxidation by radicals for cleaning of gaseous pollutants and sterilization)

5.5 安全に高電圧を取扱うために (Safety for High voltages)

6. 放電プラズマによる環境中微生物、ウイルスの制御(Control of microbes and viruses by non-thermal plasma) 細胞やウイルスがプラズマにより受ける影響を知り、そのメカニズムを調べるための方法論に関する知識を得る。(Effect of non-thermal plasma on cells and viruses is to be studied.)

6.1 プラズマ殺菌 (Sterilization by plasma)

6.2 ウイルスの破壊メカニズムの解明に向けて (Mechanism of the virus inactivation)

6.3 生体とプラズマとの相互作用の計測 (Interaction between plasma and bioparticles)

6.4 一分子DNAの切断頻度計測によるプラズマ暴露液体などの安全性評価 (Evaluation of radical activity through the cutting rate of DNA molecules)

7. 展望 (Perspective)

7.1 DNA解析の高速化、一分子反応装置 (High speed sequencing and single molecule reactions)

7.2 バイオ制御と環境 (Bio-manipulation for reducing infection)

1. 序論 (Introduction)

1.1 バイオ制御の目的 (Aim of Bio-molecule manipulation)

電気工学が細胞・遺伝子操作や計測にどのような役割を果たしているかを具体例をもとに理解する。(Importance of electrical engineering and its application in bio-manipulation should be understood through several examples.)

・健康な環境の維持 (To maintain healthy environment) ・静電気力とプラズマによる微生物制御 (Bio-molecule manipulation by electrostatic force and plasma)

・新しい計測技術の開発 (Novel analytical method)

・ポストゲノム時代の遺伝子等の解析の重要性 (Importance of gene- sequencing in Post-Genome Era.)

1.2 電気を使う細胞や生体高分子制御の概要紹介 (Electrostatic method for manipulation of cells and molecules) 静電気力を使う細胞・分子操作の実例を学ぶ。(Electrostatic manipulation of cells and molecules should be understood through several examples)

・電気泳動によるDNA配列解析(Electrophoresis)

・静電微粒化によるセルソータ(Electro-spray and cell sorter)

・レーザと電界による・細胞・DNAー分子操作 (Manipulation of individual cells and DNA molecules)

・低温プラズマによる細胞・ウイルスの除去と破壊 (Destruction of microbes and viruses by non-thermal plasma)

2. 復習:静電気工学の基礎 (Basic of Electrostatics) 微小物体ならびに液体に働く静電気力と、それによる運動 に関する理論の理解を深める。特に制御対象物体の誘電分 極特性 により力の方向が変わることなど、グレーディエントカの性質の理解を深める。 (Importance of electrical engineering and its application in bio-manipulation should be understood through several examples.) 2.1 静電気による力学現象 (Electrostatic force) ・クーロンカ、影像カ、グレーディエントカ 重力、粘性力、磁気力との比較 (Coulomb force, image force, gradient force, comparison with gravity, drag, magnetic force)

2.2 電気流体力学 (Electro Fluid dynamics)

・電気ひずみ力、誘電泳動力、電気泳動力(Electrophoresis, Electro-Osmosis, Dielectro-phoresis)
 ・マイクロ流路の流れの制御(Flow control for micro-fluidics)

2.3 帯電液滴の発生と制御 (Generation and control of charged droplets)

3. 細胞操作と計測(Manipulation of cells for analysis) 個々の細胞に対し、静電気力により運動制御を行うための 実際的な方法を理解する。また集光したレーザによる微小 粒子や 細胞の捕捉に関し、その原理と実際の適用方法を知 る。あわせて細胞の融合や遺伝子導入の基礎として、細胞 の性質の概 要、取り扱い方法の知識を得る。また細胞操作 の具体例として、細胞の分極、膜に加わる電界強度とそれによる膜破壊に関す る知識を得る。(Obtain the knowledge for manipulation of individual cells by electrostatic force and laser. Electrical characteristics of cells should be studied, including polarization and membrane breakdown by pulsed high electric field. Lasertweezers and their practical applications should also be understood.)

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3.3 高電界の利用 (Application of High electric field)
 ・電気的細胞融合、細胞膜破壊 (Cell fusion, Punctuation of cell membrane)

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DNAの構造と性質、DNA複製、制限酵素の働きなど、DNA情報をもとに生体が作られる際の基本的事項に関し、理解を深める。また、この章ではDNA一分子を取り扱う方法に関する知識を得る。(Fundamentals of genes should be understood, which includes: Construction and nature of DNA, replication, activity of enzymes. Basic technique for manipulation of single DNA molecules should also be studied.)

4.1DNAの複製と相転移 (Phase-change and replication)

4.2DNA分子の可視化 (Visualization of DNA molecules)

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4.4DNA分子の伸張固定 (Fix in stretched shape)

4.5 制限酵素との反応と制限地図 (Restriction enzyme)

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4.7 マイクロ流路での反応・制御 (Micro fluidic system)

5. 復習:気体放電現象 (Review of ionized gas) 気体放電に関する基礎知識を整理し、大気圧低温プラズマ の発生方法、環境技術への応用に関する理解を深める。 (Fundamentals of ionized gases are reviewed. Generation of non-thermal plasma, and application in environmental remediation are studied.) 5.1 気体分子運動と電子衝突による電離、電子付着 (Ionization and electron attachment)

5.2 暗流と火花放電 (Dark current and spark discharge) ・タウンゼントの理論、パッシェンの法則、ストリーマ (Theory of gaseous breakdown: Townsend's theory, Paschen's law of flashover streamer formation)

5.3 大気中の各種放電 (Gas discharge in atmospheric air) ・コロナ放電、バリア放電、沿面放電 (Corona, Barrier, Surface discharge)

5.4 電離によるラジカル生成と反応 (Generation of Radicals) ・酸化によるガス状汚染物質の浄化、微生物の殺菌 (Oxidation by radicals for cleaning of gaseous pollutants and sterilization)

5.5 安全に高電圧を取扱うために (Safety for High voltages)

6. 放電プラズマによる環境中微生物、ウイルスの制御(Control of microbes and viruses by non-thermal plasma) 細胞やウイルスがプラズマにより受ける影響を知り、そのメカニズムを調べるための方法論に関する知識を得る。(Effect of non-thermal plasma on cells and viruses is to be studied.)

6.1 プラズマ殺菌 (Sterilization by plasma)

6.2 ウイルスの破壊メカニズムの解明に向けて (Mechanism of the virus inactivation)

6.3 生体とプラズマとの相互作用の計測 (Interaction between plasma and bioparticles)

6.4 一分子DNAの切断頻度計測によるプラズマ暴露液 体などの安全性評価 (Evaluation of radical activity through the cutting rate of DNA molecules)

7. 展望 (Perspective)

7.1 DNA解析の高速化、一分子反応装置 (High speed sequencing and single molecule reactions)

7.2 バイオ制御と環境 (Bio-manipulation for reducing infection)

Self Preparation and Review

#### Related subjects

#### Notes for textbook

必要な文献等を配布する。 References will be distributed. 必要な文献等を配布する。 References will be distributed. Notes for reference

Goals to be achieved

#### Evaluation of achievement

レポートにより評価する Evaluated by reports.

レポートにより評価する
Evaluated by reports.
Examination
レポートで実施
By Report
Details of examination
Other information
連絡先:
水野彰 Email: mizuno@ens.tut.ac.jp, G 棟 607 号室, 内線 6904
田中三郎 Email: tanakas@ens.tut.ac.jp, G 棟 605 号室, 内線 6916
高島和則 Email: takashima@ens.tut.ac.jp, G 棟 310 号室, 内線 6921
連絡先:
水野彰 Email: mizuno@ens.tut.ac.jp, G 棟 607 号室, 内線 6904
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高島和則 Email: takashima@ens.tut.ac.jp, G 棟 310 号室, 内線 6921
Reference URL
http://ens.tut.ac.jp/electrostatics/
http://ens.tut.ac.jp/electrostatics/
Office hours
Relations to attainment objectives of learning and education
Key words

#### (D54030030)Advanced Ecological Engineering[Advanced Ecological Engineering]

Subject name[English]	Advanced Ecolog	ical Engi	ineerir	ω[Adv	anced Ecological E	ngineering]	
	D54030030	Subia		-6L/-LUV	Advanced	Required or	Flective
	20700000	Gubje	or are	a	Applied	elective	
					Chamiatry and	01000100	
					Life Seienee		
Time of starting a source	Spring torm	Dev	-f	the	Thu 2~2	Credit(a)	2
Time of starting a course	Spring term	Day	OT noried	une	Thu.2~2	Great(s)	2
Faculty	Graduate Program	n for Do	period	Dogra		Subject grade	1~3
Paculty Department Offered	Environmental en		oionor	Degre		Subject grade	1.03
Department Onered	Environmental an		cience	:5		Deggining	
Charma tasahar nama[Baman	日日 新美 後藤	出己。	十回	淡ゥ	山縣 淡羊 南海北	↓ 老子 KVKIIIIV V	lariyaahi COTOH
olabebet mental	月山 毛我, 夜旅 Nachira DAIMON	, גענייין עעריסייום	Л ] .: МАЦ				
	Naoniro, DAIMON	Throyur	AI, INAI	ANU	HIROINI, TORAIRIN	Tanayuni	
Numbering							
Objectives of class							
The course provides students w	ith the opportunity	to impr	rove t	heir le	vel in the skills(re	ading, writing, pres	entation) through
reading current research articles.							
The course provides students w	ith the opportunity	to impr	rove t	heir le	vel in the skills(re	ading, writing, pres	entation) through
reading current research articles.							
Contents of class							
1. Students have to select at leas	st three articles in t	he field	of on	e of pr	ofessors.		
2. Students prepare both reports	and present slides.						
3. The key words will be given at	the first class.						
1. Students have to select at leas	st three articles in t	he field	of on	e of pr	ofessors.		
2. Students prepare both reports	and present slides.						
3. The key words will be given at	the first class.						
Solf Dreportion and Deview							
Self Preparation and Review							
Related subjects							
Knowledge of environmental chen	nistry, chemical eng	ineering	; and n	nateria	als science is desira	able.	
Knowledge of environmental chen	nistry, chemical eng	ineering	; and n	nateria	als science is desira	able.	
Notes for textbook							
No textbook will be used.							
No textbook will be used.							
Notes for reference							
Goals to be achieved							
To improve presentation skills(wr	iting of reports and	preparir	ng of s	slides).			
To improve presentation skills(wr	iting of reports and	preparir	ng of s	slides).			
Evaluation of achievement							
30% Report, 70% Presentation(30-	-45 min)						
30% Report, 70% Presentation(30-	-45 min)						
Examination							
試験期間中には何も行わない							
None during exam period							
Details of examination							
Other information							
Room # B-302, F-mail: kakuta@ee	ns.tut.ac.ip						
Room # G-603. E-mail: goto@ens	.tut.ac.jp						
Room # CRFC-Center 208. E-ma	il: hiromi@crfc.tut a	c.jp					
Room # G-602, E-mail: daimon@e	ens.tut.ac.ip	5.					
Room # G-405. F-mail: tokairin@e	ens.tut.ac.in						
Room # B-302, F-mail: kakuta@er	ns.tut.ac.ip						
Room # G-603. F-mail: goto@ens	.tut.ac.in						
Room # CREC-Center 208 F-ma	il: hiromi@crfc.tut a	c in					
Room # $G-602$ F-mail: daimon@e	enstutacin	-1P					
	no.tut.do.jp						

Room # G-405, E-mail: tokairin@ens.tut.ac.jp Reference URL

#### Office hours

Anytime, but reservation is desirable. Anytime, but reservation is desirable.

Relations to attainment objectives of learning and education

#### Key words

environmental chemistry, chemical engineering, materials science, sustainable engineering environmental chemistry, chemical engineering, materials science, sustainable engineering

#### (D54030040)Advanced Biotechnology 1[Advanced Biotechnology 1]

Subject nemel English	Advanacd Dist I	hnology 1 [ A duran	Distophysicant		
Schedule number	D54030040	Subject area		Required or	Flective
	0000040		Annlied	elective	LIECTIVE
			Chemistry and	51000140	
			Life Science		
Time of starting a course	Spring term	Day of the	Fri.3~3	Credit(s)	2
-		week,period			
	Graduate Progran	n for Doctoral Degr	ee	Subject grade	1~3
Department Offered	Environmental and	d Life Sciences		Beggining grade	
Charge teacher name[Roman	浴俊彦,平石	明,田中照通,「	中鉢 淳,佐久間	耶弘 EKI Toshihiko	, HIRAISHI Akira,
alphabet mark]	TANAKA Terumic	chi, NAKABACHI At	sushi, SAKUMA Kur	nihiro	
Numbering					
Objectives of class					
This course will provide the stu	idents with the op	portunity to study	on advanced life	sciences (e.g., ger	iomics, molecular
genetics, microbiology, and biotec	hnology).				
This course will provide the stu	idents with the op	portunity to study	on advanced life	sciences (e.g., ger	iomics, molecular
genetics, microbiology, and biotec	hnology).				
Contents of class					
In this course, the students will	be expected to re-	ad several papers	on the current pro	gress in advanced	life science (e.g.,
genomics, molecular genetics, mic	robiology, and biot	echnology) to unde	rstand the frontier o	of these scientific f	ields. This course
will be given by five instructors as	s described below (I	Eki, Hiraishi, Tanaka	a, Nakabachi and Sa	kuma).	
1st <sup>-3</sup> rd week: Genome and gene s	sciences (Dr. T. Eki	)			
4th 6th week:	(Dr. A. I	Hiraishi)			
7th 9th week:	(Dr. T. <sup>-</sup>	Tanaka)			
10th 12th week: Molecular biology	of skeletal muscle	(Dr. K. Sakuma)			
13th 15th week: Animal-microbe	symbioses (Dr. A. N	1 - 1 l l- ! <b>)</b>			
		akabachi)			
In this course, the students will	be expected to re	ad several papers	on the current pro	gress in advanced	life science (e.g.,
In this course, the students will genomics, molecular genetics, mic	be expected to re- crobiology, and biote	ad several papers echnology) to under	on the current prop rstand the frontier of	gress in advanced of these scientific f	life science (e.g., ields. This course
In this course, the students will genomics, molecular genetics, mic will be given by five instructors as	be expected to re- crobiology, and biote described below (I	ad several papers echnology) to under Eki, Hiraishi, Tanaka	on the current prop rstand the frontier c a, Nakabachi and Sa	gress in advanced If these scientific f kuma).	life science (e.g., ields. This course
In this course, the students will genomics, molecular genetics, mic will be given by five instructors as 1st <sup>~</sup> 3rd week: Genome and gene s	be expected to re- crobiology, and bioto described below (I sciences (Dr. T. Eki	aakabacni) ad several papers echnology) to under Eki, Hiraishi, Tanaka )	on the current prog rstand the frontier o a, Nakabachi and Sa	gress in advanced If these scientific f kuma).	life science (e.g., ields. This course
In this course, the students will genomics, molecular genetics, mic will be given by five instructors as 1st <sup>°</sup> 3rd week: Genome and gene s 4th <sup>°</sup> 6th week:	be expected to re- crobiology, and bioto s described below (I sciences (Dr. T. Eki, (Dr. A. I	aakabacni) ad several papers echnology) to undei Eki, Hiraishi, Tanaka ) Hiraishi)	on the current prog stand the frontier o a, Nakabachi and Sa	gress in advanced If these scientific f kuma).	life science (e.g., ields. This course
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In this course, the students will genomics, molecular genetics, mic will be given by five instructors as 1st <sup>°</sup> 3rd week: Genome and genes 4th <sup>°</sup> 6th week: 7th <sup>°</sup> 9th week: 10th <sup>°</sup> 12th week: Molecular biology	be expected to re- crobiology, and bioto s described below (I sciences (Dr. T. Eki (Dr. A. I (Dr. A. I (Dr. T. <sup>-</sup> y of skeletal muscle	ad several papers echnology) to unde Eki, Hiraishi, Tanaka ) Hiraishi) Tanaka) e (Dr. K. Sakuma)	on the current prog stand the frontier o a, Nakabachi and Sa	gress in advanced If these scientific f kuma).	life science (e.g., ields. This course
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In this course, the students will genomics, molecular genetics, mic will be given by five instructors as 1st <sup>~</sup> 3rd week: Genome and gene s 4th <sup>~</sup> 6th week: 7th <sup>~</sup> 9th week: 10th <sup>~</sup> 12th week: Molecular biology 13th <sup>~</sup> 15th week: Animal-microbe Self Preparation and Review	be expected to re- crobiology, and bioto s described below (I sciences (Dr. T. Eki, (Dr. A. I (Dr. T. <sup>-</sup> v of skeletal muscle symbioses (Dr. A. N	ad several papers echnology) to unde Eki, Hiraishi, Tanaka ) Hiraishi) Tanaka) e (Dr. K. Sakuma) Iakabachi)	on the current prop stand the frontier o a, Nakabachi and Sa	gress in advanced If these scientific f kuma).	life science (e.g., ields. This course
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試験期間中には何も行わない

None during exam period **Details of examination** 

#### Other information

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**Reference URL** 

#### Office hours

Please make an appointment.

Please make an appointment.

Relations to attainment objectives of learning and education

Key words

(D54030060)Advanced Molecular Function Chemistry 1[Advanced Molecular Function Chemistry 1]

Schedule number         D54030080         Subject area         Advanced Applied Optimistry and Life Science         Required or elective         Elective           Time of starting a course         Spring term         Day of the weak_period         True.1-1         Oredit(a)         2           Faculty         Oraduate Program for Doctrail Dagree         Subject grade         1~3           Department Offered         Environmental and Life Sciences         Begefining grade         1           Otherse teacher name[Forman sightabet mark]         StillATTOMI Kazuka, HARAGUCHI Naoki         1         3           Numbering         Objectives of class         This course focuses on stata-of-the-art technology of functional polymers. Synthesis and various applications of the functional polymers. Synthesis and various applications of the functional polymers. Synthesis and various applications of the functional polymers will be discussed.         Conterts of class           (1) General aspects of functional polymers (traune, Haraguchi)         (2) Procise molecular design of throntional polymers applications.         Stranguchi)           (3) Proparation of highly functionalized polymers(traune, Haraguchi)         (3) Boateve antural products (wasa)         (3) Protein endeparation of highly functionalized compounds and their synthesic applications. (Shibatom)         (3) Advanced Lawas acid catalysis. (Shibatom)         (3) Advanced capanolaxis. (Shibatom)         (3) Advanced capanolaxis. (Shibatom)           (3) Advanced capanolaxis	Subject name[English]	Advanced Molecular Function Chemistry 1[Advanced Molecular Function Chemistry 1]					
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Related subjects         Notes for textbook         No textbooks are required.         No textbooks are required.         Notes for reference	Self Preparation and Review						
Notes for textbook No textbooks are required. No textbooks are required. Notes for reference	Related subjects						
No textbooks are required. No textbooks are required. Notes for reference	Notes for textbook						
No textbooks are required. Notes for reference	No textbooks are required.						
Notes for reference	No textbooks are required.						
	Notes for reference						

## Goals to be achieved To understand the latest trend of the research on functional polymers. To understand the latest trend of the research on total synthesis of natural products and their synthetic methods. To understand the latest trend of the research on functional polymers. To understand the latest trend of the research on total synthesis of natural products and their synthetic methods. Evaluation of achievement Presentation (50%) and discussion (50%) Presentation (50%) and discussion (50%) Examination レポートで実施 By Report Details of examination Other information S. Itsuno: itsuno@ens.tut.ac.jp 6813 S. Iwasa: office:B-506, tel: 6817, email: iwasa@ens.tut.ac.jp K. Shibatomi: shiba@ens.tut.ac.jp (room: B-507) S. Itsuno: itsuno@ens.tut.ac.jp 6813 S. Iwasa: office:B-506, tel: 6817, email: iwasa@ens.tut.ac.jp K. Shibatomi: shiba@ens.tut.ac.jp (room: B-507) **Reference URL** Office hours Relations to attainment objectives of learning and education Key words functional polymer, asymmetric catalyst, transition metal, organocatalyst, Lewis acid, fluorine functional polymer, asymmetric catalyst, transition metal, organocatalyst, Lewis acid, fluorine

#### (D55010010)Seminar on Architecture and Civil Engineering 1[Seminar on Architecture and Civil Engineering 1]

Subject name[English]	Seminar on Architecture and Civil Engineering 1[Seminar on Architecture and Civil						
	Engineering 1]						
Schedule number	D55010010	Subject area	Advanced	Required or	Required		
			Architecture	elective			
			and Civil				
Time of starting a course	Year	Day of the	Intensive	Credit(s)	4		
		week,period					
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	1~3		
Department Offered	Architecture and	Civil Engineering		Beggining	D1		
				grade			
Charge teacher name_Roman	S5糸教務委員5	kei kyomu Iin−S					
alphabet mark							
Numbering							
Objectives of class							
All the students are required to	attend all the sem	inars, which is arrar	nged by the laborat	ory supervisor for	the special study		
subjects related to the current re	esearch activity of	the laboratory. The	scheduled program	of the seminars is	announced by the		
All the students are required to	attend all the sem	inars which is arran	nged by the laborat	ory supervisor for	the special study		
subjects related to the current re	esearch activity of	the laboratory. The	scheduled program	of the seminars is	announced by the		
supervisor at the guidance of the	seminar.	2			2		
Contents of class							
In each seminar, students purs	sue several resear	rch topics and/or	undertake projects	collectively and	solely under the		
instruction of the faculty member	rs of the departmer	nt and/or those of o	ther departments.				
In each seminar, students purs	sue several resear	rch topics and/or	undertake projects	collectively and	solely under the		
instruction of the faculty member	rs of the departmer	nt and/or those of o	ther departments.				
Ser Preparation and Review							
Related subjects							
Notes for textbook							
Notes for reference							
Goals to be achieved							
Evaluation of achievement							
レポート							
By Report							
Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objective	s of learning and e	ducation					

Key words

#### (D55010020)Seminar on Architecture and Civil Engineering 2[Seminar on Architecture and Civil Engineering 2]

Subject name[English]	Seminar on Arc	hitecture and	Civil Engineering 2	Seminar on Archit	- ecture and Civil		
	Engineering 2]						
Oshadala assubas				Do and and an	Demined		
Schedule number	D55010020	Subject area	Advanced	Required or	Required		
			Architecture	elective			
			and Civi				
			Engineering				
Time of starting a course	Year	Day of t	he Intensive	Credit(s)	1		
		week,period					
Faculty	Graduate Program	n for Doctoral D	egree	Subject grade	2~3		
Department Offered	Architecture and	Civil Engineerin	g	Beggining	D2		
				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	attand all the same	ineve which is a	www.www.ad. hy. the labou		the energial study		
All the students are required to	attend all the sem	inars, which is a	rranged by the labor	atory supervisor for			
subjects related to the current re	search activity of 1	the laboratory. I	ne scheduled program	n of the seminars is	announced by the		
supervisor at the guidance of the	seminar.						
All the students are required to	attend all the sem	inars, which is a	rranged by the labor	atory supervisor for	the special study		
subjects related to the current re	search activity of t	the laboratory. T	he scheduled program	n of the seminars is	announced by the		
supervisor at the guidance of the	seminar.						
Contents of class							
Self Preparation and Review							
<b>B 1 1 1 1</b>							
Related subjects							
Notes for textbook							
Notes for reference							
Goals to be achieved							
Evaluation of achievement							
レポート							
レポート							
Examination							
D小 PC 天旭 By Bapart							
Details of exemination							
Details of examination							
Other information							
Reference URL							
055							
Relations to attainment objective	s of learning and e	ducation					
1							
Key words							

(D55030030)Advanced Building Environmental Engineering and Building Services[Advanced Building Environmental Engineering and Building Services]

Subject	Advanced Building Environmental F	Engineering and B	uilding Services[Adv	anced Building	Environmental	
name[Fngligh]	Engineering and Building Services			unoca Banang		
Schedule number		Subject area	Advanced	Required or	Flective	
	20000000	Oubject al ca	Architecture and	elective	LICCUVE	
			Civil Engineering	01000170		
Time of starting a	Spring term	Day of the	Mon 5~5	Credit(s)	2	
		week period			2	
Faculty	Graduate Program for Doctoral Des	ree		Subject	1~3	
		3		grade		
Department Offered	Architecture and Civil Engineering			Beggining		
				grade		
Charge teacher	松本 博 MATSUMOTO Hiroshi					
name[Roman						
alphabet mark]						
Numbering						
Objectives of class						
The goal of this course	se is to help professionals undate	related to the	recent research and	d development	on life cycle	
assessment (LCA) for h	uildings environmental symbiotic tec	chnologies climati	c building design and	urban energy n	anagement	
The goal of this cours	se is to help professionals undate	related to the	recent research and	d development	on life cycle	
assessment (I CA) for b	uildings, environmental symbiotic tec	chnologies, climati	c building design and	urban energy n	anagement.	
Contents of class						
The course consists of	the following topics					
1. Buildings and its Impa	act on the Global Environment					
2. Impact Assessment i	ndices for Buildings					
3. Life Cycle Inventory	for Buildings					
4. Overview of CASBEE						
5. Environmental Symbi	otic Technologies (1)					
6. Environmental Symbi	otic Technologies (2)					
7. Ecological Building De	esign (1)					
8. Ecological Building De	esign (2)					
9. Climatic Building Des	ign (1)					
10. Climatic Building De	sign (2)					
11. Sustainable Building	Design (1)					
12. Sustainable Building	Design (2)					
13. Energy and Buildings (1)						
14. Energy and Buildings (2)						
15. Compact city -urba	n energy management-					
The course consists of	the following topics.					
1. Buildings and its Impa	act on the Global Environment					
2. Impact Assessment i	ndices for Buildings					
3. Life Cycle Inventory	for Buildings					
4. Overview of CASBEE						
5. Environmental Symbi	otic Technologies (1)					

6. Environmental Symbiotic Technologies (2)

- 7. Ecological Building Design (1) 8. Ecological Building Design (2)
- 9. Climatic Building Design (1)
- 10. Climatic Building Design (2)
- 11. Sustainable Building Design (1)
- 12. Sustainable Building Design (2)
- 13. Energy and Buildings (1)
- 14. Energy and Buildings (2)
- 15. Compact city -urban energy management-

Self Preparation and Review

Related subjects

Building science: Indoo Building science: Indoo	r Air Quality a r Air Quality a	nd Ventilation, Building nd Ventilation, Building	and Urban Therr and Urban Therr	nal Environment nal Environment				
Notes for textbook								
The related handouts v	vill be distribut	ed						
The related handouts will be distributed.								
Reference1	Reference 1 Book title Architecture for a Sustainable Future -All about the ISBN							
		Holistic Approach in Japan-						
	Author	Architectural	Publisher	Institute for	Publish	2002		
		Institute of Japan		Building	vear			
				Environment and	•			
				Energy				
				Conservation				
Notes for reference	1	1	1		1	1		
Goals to be achieved								
Achievement level of t	his course is t	o understand the back	ground of buildin	g's impact on the glo	hal environmen	t the practical		
strategies for sustainal	ble building des	sign, urban energy mana	agement and so (	on.				
Achievement level of t	his course is t	o understand the back	ground of buildin	g's impact on the glo	al environmen	t, the practical		
strategies for sustainal	ble building des	sign, urban energy mana	agement and so (	on.				
Evaluation of achieven	nent	······································						
Reports related to this	subject are re	eviewed to evaluate the	achievement lev	/el.				
Reports related to this	subject are re	eviewed to evaluate the	achievement lev	/el.				
Examination	·							
レポートで実施								
By Report								
Details of examination								
Other information								
Hiroshi Matsumoto: D-	710. Phone: 05	532-44-6838. Fax: 0532	-44-6831. E-ma	il: matsu@ace.tut.ac.in	)			
	,	,						
Hiroshi Matsumoto <sup>,</sup> D-	710 Phone 05	532-44-6838 Fax: 0532	-44-6831 E-ma	il: matsu@ace tut ac ir	,			
	710, 1 110110. 00	102 H 0000, 1 ux. 0002	. 44 0001, E ma	in. matsueuco.tat.ao.jp	,			
Peference LIPI								
Hirachi Mataumata: htt	n://ainatain.ac	a tut ao in /						
HIROSHI Watsumoto: htt	.p.//einstein.ac	e.tut.ac.jp/						
Hiroshi Matsumoto: htt	p://einstein.ac	ce.tut.ac.jp/						
Office hours								
Hiroshi Matsumoto: Mo	onday 15:00-17	:30						
Hiroshi Matsumoto: Mo	nday 15:00-17	:30						
Relations to attainmen	t objectives of	f learning and educatior	า					
Key words								
climatic building design	, sustainable b	uilding design, building o	energy managem	ent, energy saving				
climatic building design	, sustainable b	uilding design, building o	energy managem	ent, energy saving				

#### (D55030090)Advanced Transportation Systems and Economics[Advanced Transportation Systems and Economics]

Subject name[English]	Advanced Transportation Systems and Economics[Advanced Transportation Systems and Economics]						
Schedule number	D55030090	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Elective		
Time of starting a course	Spring term	Day of the week,period	Tue.2~2	Credit(s)	2		
Faculty	Graduate Progran	n for Doctoral Degre	e	Subject grade	1~3		
Department Offered	Architecture and	Civil Engineering		Beggining grade			
Charge teacher name[Roman alphabet mark]	宮田 譲, 渋澤 博幸 MIYATA Yuzuru, SHIBUSAWA Hiroyuki						
Numbering							

#### Objectives of class

To undestand the analysis of regional economic activities.

To understand the interaction between the natural environment and the regional economy.

To undestand the analysis of regional economic activities.

To understand the interaction between the natural environment and the regional economy.

#### Contents of class

This class discusses the interaction between the natural environment and the regional economic activities by employing mathematical/numerical models. Details of the lecture are described as follows:

Topics

- 1. The first and second lectures; integrated environmental and economic accounting
- 2. The third and fourth lectures; waste and economic accounting matrix
- 3. The fifth to seventh lectures; computable general equilibrium analysis of a regional environmental and economic system
- 4. The eighth to tenth lectures; an intertemporal model of a regional environmental and economic system
- 5. The eleventh and twelfth lectures; environmental tax and the emissions trading
- 6. The thirteenth to fifteenth lectures; sustainable growth in the environmental and economic dynamics

This class discusses the interaction between the natural environment and the regional economic activities by employing mathematical/numerical models. Details of the lecture are described as follows:

#### Topics

- 1. The first and second lectures; integrated environmental and economic accounting
- 2. The third and fourth lectures; waste and economic accounting matrix
- 3. The fifth to seventh lectures; computable general equilibrium analysis of a regional environmental and economic system
- 4. The eighth to tenth lectures; an intertemporal model of a regional environmental and economic system
- 5. The eleventh and twelfth lectures; environmental tax and the emissions trading

6. The thirteenth to fifteenth lectures; sustainable growth in the environmental and economic dynamics

#### Self Preparation and Review

#### **Related** subjects

microeconomics (undergraduate), macroeconomics(undergraduate), environmental economics (master course) microeconomics (undergraduate), macroeconomics(undergraduate), environmental economics (master course)

#### Notes for textbook

Lecture materials are distributed to students as handout. Powerpoint files are available for students as well.

Lecture materials are distributed to students as handout. Powerpoint files are available for students as well.

#### Notes for reference

#### Goals to be achieved

- By applying mathematical/numerical models;
- To undestand the analysis of national/regional economic activities.
- To understand the interaction between the natural environment and the national/regional economy.
- By applying mathematical/numerical models;
- To undestand the analysis of national/regional economic activities.

To understand the interaction between the natural environment and the national/regional economy.

#### **Evaluation of achievement**

Students are evaluated by the term report (100%). 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, national/regional sustainable development computable general equilibrium model, global environmental problems, national/regional sustainable development

#### (D55030110)Advanced Management of Technology[Advanced Management of Technology]

Subject name[English]	Advanced Management of Technology[Advanced Management of Technology]					
Schedule number	D55030110	Subject area	Advanced	Required or	Elective	
			Architecture	elective		
			and Civil			
			Engineering			
Time of starting a course	Spring term	Day of the	Wed.4~4	Credit(s)	2	
		week,period				
Faculty	Graduate Progran	Graduate Program for Doctoral Degree			1~3	
Department Offered	Architecture and Civil Engineering			Beggining		
				grade		
Charge teacher name[Roman	藤原 孝男, 渋澤 博幸 FUJIWARA Takao, SHIBUSAWA Hiroyuki					
alphabet mark]						
Numbering						
Objectives of class						
The main objective is to understand the function of technological entrepreneurship for commercialization of basic research						
results from a perspective of financial engineering.						
Especially the decision-making model is examined for irreversible investment under uncertainty(Fujiwara).						
In this course, students learn the regional and urban economic modeling techniques and the urban and regional policy						

The main objective is to understand the function of technological entrepreneurship for commercialization of basic research results from a perspective of financial engineering.

Especially the decision-making model is examined for irreversible investment under uncertainty(Fujiwara).

In this course, students learn the regional and urban economic modeling techniques and the urban and regional policy evaluation methodology(Shibusawa).

#### Contents of class

Fujiwara

From a view point regarding the technological development as risky but competitive investment, this class has following topics: 1)Technological Entrepreneurship,

2)Technological Management Decision,

evaluation methodology(Shibusawa).

3)Investment Science,

4)Real Options, &

5)Game Theory.

For each week class discussion, self-preview & review are expected.

#### Shibusawa

1–2:Urban and Regional Policy and Evaluation 3–5:Modeling of the Urban and Regional Economic Systems

6-8:Policies and the Evaluation Methodology

9–11:Evaluation Techniques and Tools

12-13:Case Studies of the urban and regional policy

14–15:Evaluating Case Studies

Fujiwara

From a view point regarding the technological development as risky but competitive investment, this class has following topics: 1)Technological Entrepreneurship.

2)Technological Management Decision,

3)Investment Science,

4)Real Options, &

5)Game Theory.

For each week class discussion, self-preview & review are expected.

#### Shibusawa

1-2:Urban and Regional Policy and Evaluation

3-5:Modeling of the Urban and Regional Economic Systems

6-8:Policies and the Evaluation Methodology

9-11:Evaluation Techniques and Tools

12-13:Case Studies of the urban and regional policy

14-15:Evaluating Case Studies

#### Self Preparation and Review

#### **Related subjects**

#### Fujiwara

Management Science (English), Operations Management (Japanese), & Social Infrastructure Management (Japanese).

#### Shibusawa

Economics, Policy, Simulation Fujiwara

Management Science (English), Operations Management (Japanese), & Social Infrastructure Management (Japanese).

#### Shibusawa

Economics, Policy, Simulation

#### Notes for textbook

Fujiwara Educational materials will be introduced at first class.

#### Shibusawa

Papers will be distributed. Fujiwara Educational materials will be introduced at first class.

#### Shibusawa

Papers will be distributed. Notes for reference

#### Goals to be achieved

#### Fujiwara

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

#### Shibusawa

Advanced Urban and Regional Economics Advanced Economic Simulation Model Policy Evaluation Methodology Fujiwara Main goal is to draw a creative business plan for transformation of technological ideas into economic value. Especially risk-hedge model can be understood for irreversible investment under uncertainty.

#### Shibusawa

Advanced Urban and Regional Economics Advanced Economic Simulation Model

#### Policy Evaluation Methodology Evaluation of achievement

Fujiwara

Scoring is based on the semester report in terms of originality, academic contribution, and practical usefulness.

#### Shibusawa

Policy evaluation reports must be submitted. A: 80 Points or higher, B: 65 points or higher, C:55 points or higher, D: Less than 55 points

#### Fujiwara

Scoring is based on the semester report in terms of originality, academic contribution, and practical usefulness.

#### Shibusawa

Policy evaluation reports must be submitted.

A: 80 Points or higher, B: 65 points or higher, C:55 points or higher, D: Less than 55 points

**Examination** レポートで実施

By Report

#### Details of examination

#### Other information

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

Shibusawa Office#: B-409, Phone#: 6963, e-mail: hiro-shibu@tut.jp Fujiwara Office#: B-313, Phone#: 6946, e-mail: fujiwara@las.tut.ac.jp

Shibusawa Office#: B-409, Phone#: 6963, e-mail: hiro-shibu@tut.jp **Reference URL** 

## Office hours

Fujiwara After4:00 PM during Weekdays

Shibusawa Tuesday 10:00-12:00

Fujiwara After4:00 PM during Weekdays

Shibusawa Tuesday 10:00-12:00

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

Key words

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

#### (D55030130)Advanced Western Culture[Advanced Western Culture]

Subject name[English]	Advanced Wester	n Culture[Advance	Western Culture		<b>-1</b>		
Schedule number	D55030130	Subject area	Advanced	Required or	Elective		
			Architecture	elective			
			and Civil				
			Engineering				
Time of starting a course	Spring term	Day of the	Fri.2~2	Credit(s)	2		
		week,period					
Faculty	Graduate Program	n for Doctoral Degr	ee	Subject grade	1~3		
Department Offered	Architecture and	Civil Engineering		Beggining			
-				grade			
Charge teacher name[Roman	相京 邦宏 AIKYO	) Kunihiro			l		
alphabet mark]							
Numbering							
Objectives of class							
Research on a history of scientifi	ic ideas in the ancie	ent world.					
Research on a history of scientifi	ic ideas in the ancie	ent world.					
Contents of class							
Lecture on a view of nature and	science in the ancie	ent world.					
Modern scinece and ancient 'scie	ence'. What are simi	larities or differnece	es between the two?	)			
Program of lecture							
1 Orientation (authing of the last	ture)						
2. Dumpers of the Series	(ure)						
2. Purpose of the Series							
3. Science in Antiquity?							
4. Modern Science 1							
5. Modern Science 2							
6. History and Philosophy							
7. Building Histories 1							
8. Building Histories 2							
9. Building Histories 3	. Building Histories 3						
10. Intellectual Paternities 1							
11. Intellectual Paternities 2	I. Intellectual Paternities 2						
12. Selective Survival of Texts	ive Survival of Texts						
13. Resources for History 1							
14. Resources for History 2	14. Resources for History 2						
15. Summery of the lecture							
· · · · · · · · · · · · · · · · · · ·							
Lecture on a view of nature and	science in the ancie	ent world.					
Modern scinece and ancient scie	ence'. What are simi	larities or differnece	es between the two?	,			
Program of lecture							
1. Orientation (outline of the led	ture)						
2. Purpose of the Series							
3. Science in Antiquity?							
4. Modern Science 1							
5. Modern Science 2							
6 History and Philosophy							
0. Filosophi and Filipsophi 7 Ruilding Historiae 1							
2. Building Histories 1							
9 Building Histories 2							
3. Dunuing Fistories 3							
IV. Intellectual Paternities I							
II. Intellectual Paternities 2							
12. Selective Survival of Texts							
13. Resources for History 1							
14. Resources for History 2							
15. Summery of the lecture							
1							
Self Preparation and Review							

Preparation & review of text Preparation & review of text
Related subjects
Notes for textbook
Roger French, Ancient Natural History. Routledge, 1994.
Roger French, Ancient Natural History. Routledge, 1994.
Notes for reference
Goals to be achieved
(1)A correct perception of a history of science.
(2)A conprehensive grasp of the origin of scientific ideas in Western Europe.
(3)Understanding of basic terms on a history of scinece.
(4)A correct understanding of a relation between modern science and pre-modern scinece.
(5)A total appreciation of a transition of scientific ideas.
(6)A correct understanding of literature on a history of science.
(1)A correct perception of a history of science.
(2)A conprehensive grasp of the origin of scientific ideas in Western Europe.
(3)Understanding of basic terms on a history of scinece.
(4)A correct understanding of a relation between modern science and pre-modern scinece.
(5)A total appreciation of a transition of scientific ideas.
(6)A correct understanding of literature on a history of science.
Evaluation of achievement
Holding the end-of-term exams.
Holding the end-of-term exams.
Examination
レポートで実施
By Report
Details of examination
Other information
Reference URL
Office hours
pm. 2–5(Tuesday)
pm. 1-4(Wednesday)
pm. 2-5(Tuesday)
pm. 1-4(Wednesday)
Relations to attainment objectives of learning and education
Key words
ancient, science, history
ancient, science, history