# Syllabus

# International Master's Degree Program (2016-Spring Term)

# (M40030010)Management Science[Management Science]

Subject name[English]	Management	Science[Managemen	nt Science]					
Schedule number	M40030010		Subject area	General	Required or	Elective		
				courses	elective			
Time of starting a	Spring term		Day of the	Thu.1~1	Credit(s)	2		
course			week,period					
Faculty	Graduate Program for Master's Degree Subject 1~							
Department Offered	Common				Beggining	M1, M2		
Charge teacher	藤原 老里 F	UJIWARA Takao			Brade			
name[Roman_alphabet	14 11 1 23							
mark								
Numbering								
Objectives of class								
Study objective is to lea	m an analytica	Loopability on cooial	and economical n	archaotivac				
This class introduces ha	asic finance kn	n capability on social	nd the managerial	lidea and tool for t	the company va	lue and canital		
onet	asic infance kn	lowledge to understa	nu the manageria	i luea and tool for t	the company va	iue anu capitai		
Cost. Taaahing languaga ia ma	inly dependent	on English						
Contents of class	miy dependent							
The class will disusse	about basis id	as about the entire	valuation boord	on the elementer	probability into	arest rate and		
arbitrage	about Dasic 106	as about the option	i valuation Dased	on the elementary	probability, inte	arest rate, and		
Close content will includ	o following to	ioo:						
Glass content will includ	e tollowing top	ICS:						
#1: baic probability,								
#2: normal probability va	riable,							
#3: geometric Brownian	motion,							
#4: interest rates,								
#5: arbitrage trade,								
#6 /: Black Scholes form	nula,							
#8 10: additional items; o	dividend, jump,	and volatility estimat	ion,					
#11: valuation by expect	ed utility,							
#12: stochastic order,								
#13: optimization model,								
#14: stochastic dynamic	programming,							
#15: exotic option,								
#16: semester examinati	on.							
Self Preparation and Re	view							
Teaching materials will b	be uploaded at	moodle. Attending st	udents are expect	ted to complete pre	e- and re-views,	investigate by		
themselves, and ask the	lecturer.		·					
Related subjects								
Management (undergrad	duate). Operat	ions Management. F	Real Options. Ga	me Theory, MOT.	Entrepreneurs	nip. Innovation		
Managemen			····· · [ ·····, ···	···· ,				
Notes for textbook								
As noted above. materia	ls will be uploa	ded at moodle.						
,	··· ··· ·· ··							
Reference 1	Book title	An Elementary Int	roduction to Mat	hematical Finance	ISBN	978-0-521-		
Valatalica I		(3rd od)	TOUCCION TO MAT	nematical Finance		10252-0		
	Authori	Shalden M. D.	Dubliat	Combuid	Dubliat	19233-0		
	Autrior Sileidori M. Ross Publisher Cambridge Publish year 2011 #							
				University				
			1	Press	I	I		
Notes for reference								
Goals to be achieved								
1) To understand the me	eaning of norma	al random variable.						
2) To comprehend the b	asic model stru	ucture of Black Schol	es formula.					

3) To value an European call option.

#### Evaluation of achievement

Evaluation Style:

Evaluation weight allocation is planned as Semester Examination 60% and Reports 40%.

#### **Evaluation Criteria:**

A: If students achieved every above goals and their summed scores are equal or more than 80 (the maxim scores 100).

B:If students achieved at least 65% of above goals and their summed scores are equal or more than 80 (the maxim scores 100).

C:If students achieved at least 55% of above goals and their summed scores are equal or more than 55 (the maxim scores 100).

Examination

その他 Examination(Face to Face)

Details of examination

#### Other information

Reference URL

#### Office hours

At any time if available.

Relations to attainment objectives of learning and education

Key words

Real Options, Game Theory, Operations Management, Management

# (M40030020)Industrial Policies[Industrial Policies]

Subject name[English]	Industrial Pol	cies[Industrial Polic	ies]								
Schedule number	M40030020		Subject area	General courses	Required or elective	Elective					
Time of starting a course	Spring term		Day of the week,period	Thu.5~5	Credit(s)	2					
Faculty	Graduate Pro	gram for Master's D	Subject grade	1~							
Department Offered	Common		Beggining grade	M1, M2							
Charge teacher	渋澤 博幸 S	HIBUSAWA Hiroyuk	i								
name[Roman alphabet											
mark]											
Numbering											
Objectives of class											
In this course, students I	uppoures or uses										
In this course, students I	earn the fundar	mental of input-outr	out analysis and th	ne industrial policy e	valuation metho	dology.					
Contents of class						dology.					
1. Introduction and Over	view										
2-6 Input-Output Analys	is at the Nation	al Level									
7-8: Numerical Evamples	and Case Stur	lies at the National	l evel								
9-13:Input-Output Apaly	sis at the Regio	nal I evel	20701								
14-15: Numerical Evampl	es and Case St	udies at the Region	al Level								
, i io. numerioai Exampi	00 010 0000 01	aaloo at the Negiun									
1: Introduction and Over	view										
2–6:Input–Output Analys	is at the Nation	al Level									
7–8: Numerical Examples	and Case Stud	lies at the National	Level								
9–13:Input–Output Analy	sis at the Regio	onal Level									
14–15: Numerical Exampl	es and Case St	udies at the Region	al Level								
Self Preparation and Rev	/iew										
Related subjects											
Economics, Policy, Simul	ation										
Economics, Policy, Simul	ation										
Notes for textbook											
Papers will be distributed	ł.										
Reference : Miller and Bla	iir, Input-Outpu	t Analysis(Second E	Edition), Cambridge	e University Press, 2	2009						
Papers(resume) will be d	istributed.										
· · · · · · · · · · · · · · · · · · ·											
Defense en Millen and Die				- Hulting the Deces	2000						
Reference: Miller and Bla	iir, input-Outpu	t Analysis (Second E	dition), Cambridge	e University Press, a	2009						
	1	1			1						
Reference1	Book title	Input-Output Ana	alysis(Second Edit	ion)	ISBN	978-0-521-					
						/3902					
	Author	Miller and Blair	Publisher	Cambridge	Publish year	2009					
				University							
				Press							
Notes for reference											
Goals to be achieved											
Acquiring the knowledge	of the advance	d Input-Output anal	lysis								
Acquiring the knowledge	of the advance	d Economic Simulat	ion Methods								
<b>.</b>	C 11 1										
Acquiring the knowledge	of the advance	d Input-Output anal	lysis								
Acquiring the knowledge	of the advance	d economic simulati	on methods								

## Evaluation of achievement

Test(50%)+Report(50%)=100%

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

Course Evaluation

Evaluation is based primarily on examinations (50 points) and reports (50points), totally 100 points. A: Total points of exam and reports, 80 or higher (out of 100 points).

B: Total points of exam and reports,  $\mathbf{65}$  or higher (out of 100 points).

C: Total points of exam and reports, 55 or higher (out of 100 points).

#### 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-409 Tel:6963 E-mail:hiro-shibu@tut.jp Room: B-409 Tel:6963

# E-mail:hiro-shibu@tut.jp

Reference URL www.pm.ace.tut.ac.jp

#### www.pm.ace.tut.ac.jp Office hours

Wednesday 9:00-10:00 Wednesday 9:00-10:00

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

#### Key words

Industrial Policy, Economics, Simulation Industrial Policy, Economics, Simulation

#### (M40030050)Japanese Life Today[Japanese Life Today]

Subject name[English]	Japanese Life Today[Japanese Life Today]						
Schedule number	M40030050	Subject area	General	Required or	Elective		
			courses	elective			
Time of starting a course	Spring term	Day of the	Fri.1~1	Credit(s)	2		
		week,period					
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~		
Department Offered	Common			Beggining grade	M1, M2		
Charge teacher name[Roman	S総合一教務委員	,藤原 孝男,Lim	Pang Boey, 寺嶋	一彦,大門 裕之,	井佐原 均,穗積		
alphabet mark]	直裕,齊藤 大樹,	岩佐 精二,福本	昌宏,髙嶋 孝明,	加藤 三保子,鈴木	、新一,池松 峰		
	男,武藤 浩行,	伊藤 公毅 Sougou	kyoiku kyomu Iin,	FUJIWARA Takao,	Lim Pang Boey,		
	TERASHIMA Kazuhiko, DAIMON Hiroyuki, ISAHARA Hitoshi, HOZUMI Naohiro, SAITOH						
	Taiki, IWASA Seiji, FUKUMOTO Masahiro, TAKASHIMA Takaaki, KATOH Mihoko, SUZUKI						
	Shinichi, IKEMATS	SU Mineo, MUTO Hi	royuki, ITO Koki				
Numbering							

#### **Objectives of class**

In this series of lectures, the excellent experts of our university from different areas will impart to the engineering students highly interesting insider knowledge. The participants will get to know Japan of today from technical, economic and social viewpoints.

#### Contents of class

1. Lim Pang Boey "Japanese Education System"

Learn about the Japanese education system and what the life of a student is like in Japan?

2. Daimon "Working in Japanese Company"

Learn and discuss about working in Japanese company and what you should do for it.

3. Terashima "Robot in Japan"

Robot is very popular in Japan. Especially, industry robot is number one all over the world. The year of 1980 is said to be the first year of robotics in Japan. Since then, Japanese robot has been extremely developed. In this lecture, history of robotics development and state of art in robot is lectured.

4. Iwasa "The Range of Organic Chemistry

I will give a talk on the following subjects as one of scene of science and technology in Japan:

- ♦ Organic Chemistry in Environment Amazing Natural Products—
- ◆Development of Life Environment —Molecular Sensor as an Basic Technology in all of Science—
- New Horizon of Catalytic Asymmetric Synthesis -C1 Asymmetric Catalyst-

5. Isahara "Computer and Japanese"

Japanese language is very much different from other languages. Problems caused by such differences during computer processing of Japanese are discussed in this lecture.

6. Hozumi "Japan's Modernization Suppoted by Electric Power"

Japan's modernization started in the middle of 19 th centry when a long period of isolation policy has been terminated. Her repid growth until now has been strongly supported by electric power. Now Japan's power supply is recognized as the best quality in the world. In the lecture, history and state of the art of Japan's electric power will be presented.

7. Saito "Earthquake safety of buildings in Japan"

The purpose of this lecture is to understand the history of earthquake disasters in Japan and lessons learned from those disasters for the safety of buildings.

8. Muto "Fine Ceramics"

Fine Ceramics (also known as "advanced ceramics") are used to make components that require high levels of performance and reliability, such as advanced electronic devices and so on. In fact, Fine Ceramics support the latest technologies in diverse applications throughout modern society.

In this class, students will learn about "manufacture (Mono-zukuri)" in Japan.

9. Fukumoto "Introduction of advanced surface modofication and welding technology in Japan" Two advanced materials processing will be introduced. One is on the surface modification technology based on the particles deposition. Thermal spray, Cold spray and Aero-sol deposition will be explained. Another is on the welding technology based on the friction stirring. Fundamental aspects on FSW will be given in the lecture.

10. Takashima & Fujiwara "A global company doing business in Japan"

IBM, a global enterprise, is running business in Japan more than 75 years. A history and transformation of IBM's business in Japan are introduced. A comparative analysis of IBM with TOYOTA is provided to see and think about the differences. An insight that the lecturer got from the experience of working in IBM for 32 years is also shared.

11. Fujiwara "Japaneses-style Business Management"

Since 1980s, Japanese management style has become popular in automobile, electrical, and electronics industries in terms of employment, promotion, and industrial relations for quality control and skill transfer. We will discuss its advantages and disadvantages.

12. Ito "Progress in pure mathematics in Japan"

In this lecture, we focus on the progress in pure mathematics in Japan

after World War II; especially we give a brief introduction to

1. the work done by Kunihiko Kodaira, who is the first Japanese mathematician awarded to Fields Medal, and

2. algebraic analysis, promoted strongly by Japanese mathematicians (e.g. Mike Sato, Kazuhiko Aomoto, etc.)

13. Kato "Japanese culture and their mind"

This lecture will provide students with an opportunity to become familiar with Japanese culture and its artifacts as well as an understanding of the differences between Japan and other countries. Students will be expected to demonstrate knowledge of the way Japanese people think or act and their cultural heritage.

14. Ikematsu "Water Pollution History"

Japan has overcome lots of pollution incidents first in the world on her way to industrialization. Ashio Mining Pollution in 1878 was the first among various cases including Itai-Itai disease and Minamata disease. In the class, students are expected to learn about Japan's water pollution history and view the world's current environmental issues through the window of it.

15. Suzuki "Relativety, Energy and Japan"

Energy is one of the biggest issues for Japan. The class reviews the origin of the concept of nuclear energy and the relation between nuclear energy and Japan.

Self Preparation and Review

**Related** subjects

N/A

Notes for textbook

Notes for reference

Goals to be achieved

1) To understand a variety of Japanese cultural, social, and engineering perspectives.

2) To evaluate and criticize Japanese characteristics from interdisciplinary viewpoints.

3) To discuss and write global understanding.

Evaluation of achievement

Evaluation method: scoring will be proceeded by sum of each report evaluation.

Evaluation criteria:

Students who attend all classes will be evaluated as follows:

A: Achieved all goals and obtained total points of exam and reports, 80 or higher (out of 100 points).

B: Achieved 65 % of goals and obtained total points of exam and reports, 65 or higher (out of 100 points).

C: Achieved 55 % of goals and obtained total points of exam and reports, 55 or higher (out of 100 points).

Examination

その他 By Report

**Details of examination** 

### Other information

Reference URL

**Office hours** After each class.

Relations to attainment objectives of learning and education

Key words

Japan, Japanese, Culture, Religion, Politics & Economy, Technology

#### (M40030060)Intercultural Communication[Intercultural Communication]

Subject name[English]	Intercultural Communication[Inter	cultural Commun	ication					
Schedule number	M40030060	Subject area	General courses	Required or elective	Elective			
Time of starting a course	Spring term	Day of the week,period	Mon.2~2	Credit(s)	2			
Faculty	Graduate Program for Master's D	egree		Subject grade	1~			
Department Offered	Common			Beggining	M1, M2			
Charge teacher	村松 由起子 MURAMATSU Yukil	ko		<b>3</b>				
name[Roman alphabet mark]								
Numbering								
Objectives of class								
This is a Basic Japanese	e conversation class. You will learn	elementary Japar	nese grammar to spe	ak Japanese on	campus.			
This is a Basic Japanese	e conversation class. You will learn	elementary Japar	nese grammar to spe	ak Japanese on	campus.			
Contents of class								
Students will learn the fe	ollowing lessons in Japanese textbo	ook " Basic Japar	ese for Students Ha	kase1".				
		·						
1. Pronunciation of Japa	inese							
2. Lesson 1 Hajimemash	ite. Watashi wa Heren desu.							
3. Lesson 2 O-kuni wa d	lochira desuka.							
4. Lesson 3 Sore wa nar	n desuka.							
5. Lesson 4 Watashi wa	asa koohii o nomimasu.							
6. Lesson 5 Ima nan−ji d	esuka.							
7. Lesson 6 Ashita doko	e ikimasu ka.							
8. Lesson 7 Juu-gatsu ju	uu-go-nichi ni Nihon e kimashita.							
9. Lesson 8 Kyooshitsu i	ni dare ga imasu ka.							
10.Lesson 9 Yuubinkyok	u wa doko ni arimasu ka.							
11.Lesson 10 Nihon e ro	botto no kenkyuu ni kimashita.							
12.Lesson 11 Fuji-san w	a kireina yama desu.							
13.Lesson 12 Ryokoo wa	a doo deshita ka.							
14.Lesson 13 Shuumatsu	u ni nani oshitai desu ka.							
15.Lesson 14 Ongaku ga	suki desu ka.							
The term examination								
Students will learn the fo	ollowing lessons in Japanese textbo	ook " Basic Japar	ese for Students Ha	kase1".				
1. Pronunciation of Japa	nese							
2. Lesson 1 Hajimemash	ite. Watashi wa Heren desu.							
3. Lesson 2 O-kuni wa d	lochira desuka.							
4. Lesson 3 Sore wa nar	n desuka.							
5. Lesson 4 Watashi wa	asa koohii o nomimasu.							
6. Lesson 5 Ima nan-ji d	esuka.							
/. Lesson 6 Ashita doko	e ikimasu ka.							
δ. Lesson / Juu-gatsu ju	uu-go-nichi ni Nihon e kimashita.							
9. Lesson & Kyooshitsu I	ni uare ga imasu ka.							
11 Lesson 9 Yuubinkyöki	u wa doko ni arimasu ka.							
12 Lesson 11 Fuil-con w	pollo no kenkyuu ni kimashita. Ja kireina yama desu							
12.Lesson 11 Fuji-san w	a kireina yama desu.							
14 Lesson 13 Shuumata	a uoo uesnila ka. Lini nani oshitai desu ka							
15 Lesson 14 Ongaku ga	suki desu ka							
TO LEGISTINI TH Oliganu ga								
The term examination								

Self Preparation and Review

Preparation: Please read Vocabulary and Notes in each lesson. Review:Please memorize "Structures" after each lesson. Preparation: Please read Vocabulary and Notes in each lesson. Review:Please memorize "Structures" after each lesson.

# Related subjects

Basic Japanese Classes (Nihongo Hokoo):If you want to know more details, please contact the International Affairs Division (Kokusaikooryuuka).

Basic Japanese Classes (Nihongo Hokoo): If you want to know more details, please contact the International Affairs Division (Kokusaikooryuuka).

Textbook1	Book title	Basic Japanese for	· Students Hakase	e 1 (はかせ1)	ISBN	
	Author	Yamazaki	Publisher	3A Corporation	Publish year	
		yoshiko, Doi		(スリーエーネッ		
		mitsuru		トワーク)		
Notes for textbook						
Notes for reference						
Goals to be achieved						
You will be able to com	municate with J	lapanese people in ea	isy Japanese.			
You will be able to com	municate with J	lapanese people in ea	isy Japanese.			
Evaluation of achievem	ent					
Homework 40%						
The term examination	60%					
Homework 40%						
The term examination	60%					
Examination						
定期試験を実施(対面)						
Examination(Face to Fa	ce)					
Details of examination						
Other information						
Reference URL						
Office hours						
Tuesday 13:00-13:30						
Tuesday 13:00-13:30						
Relations to attainment	objectives of l	earning and education	n			
Key words						

# (M41610010)Seminar on Mechanical Engineering I[Seminar on Mechanical Engineering I]

Subject name[English]	Seminar on Mech	anical Engineering I	Seminar on Mecha	nical Engineering I]			
Schedule number	M41610010	Subject area	Advanced	Required or	Required		
			Mechanical	elective	Roquirou		
			Engineering	Siccure			
Time of starting a course	Year	Day of the	Intensive	Credit(s)	4		
		week period			•		
Faculty	Graduate Program	n for Master's Degre		Subject grade	1~		
Department Offered	Mechanical Engin	eering		Beggining	M1. M2		
				grade	,		
Charge teacher name[Roman	S1系教務委員。	1系各教員 1kei kvoi	mu Iin-S. 1kei kaku	kvouin			
alphabet mark]							
Numbering							
Objectives of class							
		• <b>f</b> the survey of the state of the		. <b>.</b>			
The seminar aims to provide a br	oad understanding	of the mechanical e	engineering available	e for the master the	esis research of a		
Student.							
		<b>C</b> 1 : //					
The class provides both of funda	amental knowledge	of his/her master t	nesis research wo	rk and the most ad	vanced results in		
the related field by reading rese	arch papers and r	nonographs. The co	ontents of the clas	ss depend on the s	supervisor. To be		
announced by individual supervise	ors.						
Seir Preparation and Review							
Related subjects							
Notes for textbook							
Textbook or material will be made	available from the	supervisors.					
Notes for reference							
Goals to be achieved							
To acquire fundamental knowledg	e of individual rese	arch fields.					
To acquire the ability to find prob	lems, the ability to	solve the problems,	and the presentati	ion skill.			
Evaluation of achievement							
Coursework presentation and/or	report						
Examination							
その他							
None during exam period							
Details of examination							
Oth an information							
Other Information							
Reference URL							
Office hours							
Relations to attainment objectives of learning and education							
	-						
1							
Key words							

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

Subject name[English]	Seminar on Mec	hanical Engineering II	Seminar on Mecha	nical Engineering II		
Schedule number	M41610020	Subject area	Advanced	Required or	Required	
			Mechanical	elective		
			Engineering	0.00010		
Time of starting a course	Year	Dav of the	Intensive	Credit(s)	2	
		week.period				
Faculty	Graduate Progra	m for Master's Degre	e	Subject grade	2~	
Department Offered	Mechanical Engi	neering		Beggining	M2	
				grade		
Charge teacher name[Roman	S1系教務委員,	1系各教員 1kei kyo	mu Iin−S, 1kei kakul	kyouin		
alphabet mark]						
Numbering						
Objectives of class						
The seminar aims to provide a br	oad understanding	of the mechanical e	ngineering available	for the master the	sis research of a	
student.						
Contents of class						
The class provides both of funda	mental knowledge	of his/her master t	hesis research wor	k and the most ad	vanced results in	
the related field by reading rese	arch papers and	monographs. The co	ontents of the clas	s depend on the s	upervisor. To be	
announced by individual supervise	ors.					
Self Preparation and Review						
Related subjects						
Notes for textbook						
Textbook or material will be made	available from the	e supervisors				
Notes for reference						
Goals to be achieved						
To acquire fundamental knowledge	e of individual res	earch fields				
To acquire the ability to find prob	lems the ability to	solve the problems.	and the presentati	on skill		
		, contro ano problemio,				
Evaluation of achievement						
Coursework presentation and/or	report					
Examination						
その他						
None during exam period						
Details of examination						
Other information						
Deference UDI						
Office hours						
Relations to attainment objective	s of learning and o	education				
1						
Key words						

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

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

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

Subject name[English]	Thesis Research	on Mechanical Engir	neering[Thesis Rese	earch on Mechanica	I Engineering]			
Schedule number	M41610030	Subject area	Advanced	Required or	Required			
			Mechanical	elective				
			Engineering					
Time of starting a course	2Years	Dav of the	Intensive	Credit(s)	6			
		week.period						
Faculty	Graduate Progra	m for Master's Degre	20	Subject grade	1~			
Department Offered	Mechanical Engir	neering		Beggining	M1 M2			
	Weenamour Engi	leering		grade	111, 112			
Charge teacher name[Roman alphabet mark]	S1系教務委員,	1系各教員 1kei kyoi	mu Iin−S, 1kei kakul	kyouin	<u> </u>			
Numbering								
Objectives of class								
The thesis research aims to pr	ovide a practical	experience of resea	rch work, and to	acquire research s	kills with a deep			
understanding of relevant knowle	dge.							
Contents of class								
The research subject depends	on the supervisor	and the research	group you join. Ind	dividual students w	ill have different			
research subjects. Discuss with v	our supervisor.		-					
Self Preparation and Review	I							
Delete d'autricete								
Related subjects								
Notes for textbook								
Reference and material will be av	ailable from the su	pervisor.						
Notes for reference								
Goals to be achieved								
To get comething new on individu	al waaaawah fialda							
I o develop your research skills in	icluding planning ai	nd presentation skills	S.					
Evaluation of achievement								
Examination								
その他								
Other								
Details of exemination								
Details of examination								
Other information								
Reference URL								
Office house								
	Office hours							
Relations to attainment objective	Relations to attainment objectives of learning and education							
Key words								
Noy Words								

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

Subject name[English]	Thesis Research	on Mechanical Engir	neering[Thesis Rese	earch on Mechanica	Engineering]		
Schedule number	M4161003T	Subject area	Advanced	Required or	Required		
			Mechanical	elective			
			Engineering	0.000110			
Time of starting a course	Vear	Day of the	Intensive	Credit(e)	6		
Time of starting a course	Ical	weak period	Incensive	Orbuil(s)	0		
<b>F</b> a	Que du et a Due man	week,period		Cubic at such	00		
	Graduate Program		e	Subject grade	2~2		
Department Offered	wechanical Engine	eering		Beggining	IVIZ		
Observed to a strength of the	01 乙		T 0 11 1 1 1	grade			
Charge teacher name_Roman	51 杀 牧 務 安 貝,	茶合软貝 Tkei kyoi	mu lin-5, Tkei kakul	kyouin			
alphabet mark							
Numbering							
Objectives of class							
The thesis research aims to pr	ovide a practical e	xperience of resea	rch work, and to	acquire research s	kills with a deep		
understanding of relevant knowle	døe				·····		
	-80.						
Ormhamta of the							
The research subject depends	on the supervisor	and the research	group you join. Inc	dividual students w	III have different		
research subjects. Discuss with y	our supervisor.						
Self Preparation and Review							
Related subjects							
-							
No							
Notes for textbook							
Reference and material will be av	ailable from the sup	ervisor.					
Notes for reference							
Goals to be achieved							
To get something new on individu	al research fields.						
To develop your research skills in	cluding planning an	d presentation skills	3.				
Evaluation of achievement	01 0						
Examination							
その他							
Other							
Details of examination							
Other information							
Reference URL							
Office hours							
Delation to entrinsical efficiency of the second education							
Relations to attainment objective	s or learning and e	aucation					
Key words							

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

Subject name[English]	Seminar on Mech	anical Engineering[S	Seminar on Mechan	ical Engineering]			
Schedule number	M41610040	Subject area	Advanced	Required or	Required		
			Mechanical	elective			
			Engineering				
Time of starting a course	Year	Day of the	Intensive	Credit(s)	6		
		week,period					
Faculty	Graduate Program	n for Master's Degre	ee	Subject grade	2~		
Department Offered	Mechanical Engin	eering		Beggining	M2		
_				grade			
Charge teacher name[Roman	S1系教務委員,	1	mu Iin−S, 1kei kaku	kyouin			
alphabet mark							
Numbering							
Objectives of class							
The seminar aims to provide a br	oad understanding	of the mechanical e	ngineering available	e for the master the	esis research of a		
student.							
Contents of class							
The class provides both of funda	amental knowledge	of his/her master t	hesis research wo	rk and the most ac	lvanced results in		
the related field by reading rese	earch papers and r	monographs. The co	ontents of the clas	ss depend on the	supervisor. To be		
announced by individual supervise	ors.						
Self Preparation and Review							
Related subjects							
Notes for textbook							
Textbook or material will be made	e available from the	supervisors.					
Notes for reference							
Goals to be achieved							
To acquire fundamental knowledg	e of individual rese	arch fields.					
To acquire the ability to find prob	lems, the ability to	solve the problems,	and the presentati	ion skill.			
Evaluation of achievement							
Coursework, presentation and/or	report.						
Examination							
その他							
None during exam period							
Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objective	Relations to attainment objectives of learning and education						
1							
Key words							

#### (M41630070)Joining and Surfacing of Materials[Joining and Surfacing of Materials]

Subject name[English]	Joining and Surfa	Joining and Surfacing of Materials[Joining and Surfacing of Materials]						
Schedule number	M41630070	Subject area	Advanced	Required or	Elective			
			Mechanical	elective				
			Engineering					
Time of starting a course	Spring1 term	Day of the	Tue.1~1	Credit(s)	1			
		week,period						
Faculty	Graduate Program	n for Master's Degre	ee	Subject grade	1~			
Department Offered	Mechanical Engine	eering		Beggining	M1, M2			
				grade				
Charge teacher name[Roman	福本 昌宏 FUKUMOTO Masahiro							
alphabet mark]								
Numbering								

#### Objectives of class

To understand fundamentals of advanced technology in materials joining, especially both in high performance thick coating formation by Thermal Spraying, Cold Spraying, Aero-sol Deposition, and in non-melting diffusion bonding by Friction Stir Welding.

To understand fundamentals of advanced technology in materials joining, especially both in high performance thick coating formation by Thermal Spraying, Cold Spraying, Aero-sol Deposition, and in non-melting diffusion bonding by Friction Stir Welding.

#### **Contents of class**

- 1. Fundamental of surface modification process and technology
- 2. Fundamentals of thermal spray process, Splat formation problem
- 3. Process control with Transition temperature & Transition pressure
- 4. Cold spraying and Aero-sol deposition process, Functional materials coating: photocatalyst, SOFC, nano coating, intermetallic compound coating, etc.
- 5. Fundamental of Friction Stir Welding
- 6. Joining between disimillar materials by FSW
- 7.5. Friction spot welding, practical applications of FSW
- 8. Examination
- 1. Fundamental of surface modification process and technology
- 2. Fundamentals of thermal spray process, Splat formation problem
- 3. Process control with Transition temperature & Transition pressure
- 4. Cold spraying and Aero-sol deposition process, Functional materials coating: photocatalyst, SOFC, nano coating, intermetallic compound coating, etc.
- 5. Fundamental of Friction Stir Welding
- 6. Joining between disimillar materials by FSW
- 7.5. Friction spot welding, practical applications of FSW
- 8. Examination

#### Self Preparation and Review

#### **Related subjects**

Basic knowledge on materials joining process is desirable.

Basic knowledge on materials joining process 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

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#### (M41630130)Modeling and Analysis of Dynamical Control Systems[Modeling and Analysis of Dynamical Control Systems]

Subject name[English]	Modeling and Analysis of Dynamical Control Systems[Modeling and Analysis of Dynamic					
	Control Systems]					
Schedule number	M41630130	Subject area	Advanced Mechanical Engineering	Required or elective	Elective	
Time of starting a course	Spring1 term	Day of the week,period	Thu.2~2	Credit(s)	1	
Faculty	Graduate Program	Graduate Program for Master's Degree			1~	
Department Offered	Mechanical Engin	Mechanical Engineering			M1, M2	
Charge teacher name[Roman alphabet mark]	寺嶋 一彦 TERA	ASHIMA Kazuhiko				
Numbering						

#### ----

#### **Objectives of class**

Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied. Vibration control with transfer is introduced.

Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied. Vibration control with transfer is introduced.

#### Contents of class

We provide the following schedule. Because this course is for master students, we can consider the requests from the master students.

1st week: Modelling and identification
2nd week: Nonlinear optimal control
3rd week: LQ control
4th week: Observer
5th week: Kalman filter
6th week: Vibration control - Input shaping and Hybrid shape control
7th week: Summary
8th week: Examination (Report)
We provide the following schedule. Because this course is for master students, we can consider the requests from the master students.
1st week: Modelling and identification

2nd week: Nonlinear optimal control 3rd week: LQ control 4th week: Observer 5th week: Kalman filter 6th week: Vibration control – Input shaping and Hybrid shape control 7th week: Summary 8th week: Examination (Report) Self Preparation and Review

#### **Related** subjects

Fundamentals of linear algebra, differential equation, mechanics, measurement and control theory, and robotics. Fundamentals of linear algebra, differential equation, mechanics, measurement and control theory, and robotics.

#### Notes for textbook

Handouts will be prepared.

Reference: Applied Nonlinear Control: Jean-Jacques E.Slotine, Weiping Li;Prentice Hall International Inc.(1991) Handouts will be prepared.

Reference: Applied Nonlinear Control: Jean-Jacques E.Slotine, Weiping Li;Prentice Hall International Inc.(1991)
Notes for reference
Goals to be achieved
(1) Understand Analysis methods of Nonlinear Dynamical Systems
(2) Understand Modeling and identification
(3) Understand Optimal control
(4) Understand LQ control
(5) Understand Estimation – observer and Kalman filter –
(1) Understand Analysis methods of Nonlinear Dynamical Systems
(2) Inderstand Modeling and identification
(3) Inderstand Optimal control
(4) Understand LQ control
(5) Understand Estimation – observer and Kalman filter –
Evaluation of achievement
Report (100 %)
A Seave of the veneration 20 av higher
A: Score of the report is av or nigner.
D. Score of the report is 63 or higher.
C. Score of the report is 55 or higher.
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.
Examination
レポートで実施
By Report
Details of examination
Other information
Tel. 0532-44-6699
E-mail:terasima@me.tut.ac.jp
Tel. 0532-44-6699
E-mail:terasima@me.tut.ac.jp
Reference URL
Students who are interesting with nonlinear systems and control are welcome.
Basic control theory and mathematical knowledge are required.
Students who are interesting with nonlinear systems and control are welcome.
Basic control theory and mathematical knowledge are required.
Office hours
Thursday 4-6pm (Terashima D-510)
Thursday 4–6pm (Terashima D–510)
Relations to attainment objectives of learning and education
(D1) Ability for solving problems with expertise
(D1) Ability for solving problems with expertise
Key words
Optimal control, LQ control, Observer , Kalman filter, Vibration control
Optimal control, LQ control, Observer , Kalman filter, Vibration control

# (M41630220)Advanced Mechanical Systems Design II[Advanced Mechanical Systems Design II]

Subject name[English]	Advanced Mecha	nical Systems Desig	n II[Advanced Mec	hanical Systems De	sign II]		
Schedule number	M41630220	Subject area	Advanced	Required or	Elective		
			Mechanical	elective			
			Engineering				
Time of starting a course	Spring term	Dav of the	Mon.4~4	Credit(s)	2		
	opinig term	week.period		0.0110(0)	-		
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~		
Department Offered	Mechanical Engin	eering		Beggining	M1. M2		
				grade	,		
Charge teacher name[Roman	S1系教務委員1	kei kvomu Iin-S		• • • • •			
alphabet mark]		·····					
Numbering							
Objectives of class	<u></u>						
		. <b>6</b>		. <b>.</b>			
The seminar aims to provide a br	oad understanding	of the mechanical e	ngineering available	e for the master the	sis research of a		
student.							
		-f h:= /h==	harde waarde de	ala analaha ar t			
The class provides both of funda	mental knowledge	or nis/ner master t	nesis research wo	rk and the most adv	vanced results in		
the related field by reading rese	arch papers and n	nonographs. The co	ntents of the clas	s depend on the s	upervisor. To be		
announced by individual supervise	ors.						
Self Preparation and Review							
Related subjects							
Notes for textbook							
Textbook or material will be made	available from the	supervisors.					
Notes for reference							
Goals to be achieved							
To acquire fundamental knowledg	e of individual rese	arch fields					
To acquire the ability to find prob	lems the ability to	solve the problems	and the presentat	ion skill			
To acquire the ability to find prob	ionis, the ability to	solve the problems,					
Evolution of achievement							
Coursework, presentation and/or	report.						
その他							
None during exam period							
Details of examination							
Other information							
Reference URL	Reference URL						
Office hours							
Polations to attainment abjectives of learning and advection							
Relations to attainment objectives of learning and education							
Key words							

#### (M41630240)Advanced Materials and Manufacturing Process II[Advanced Materials and Manufacturing Process II]

		B I TOOODO MD Kataliou					
Subject name[English]	Advanced Mate	rials and Manufactur	ring Process II[A	dvanced Materials ai	nd Manufacturing		
	Process II		1	1	1		
Schedule number	M41630240	Subject area	Advanced	Required or	Elective		
			Mechanical	elective			
			Engineering				
Time of starting a course	Spring term	Dav of the	Tue.4~4	Credit(s)	2		
		week period					
Feaulty	Graduate Progra	Graduata Bragram for Master's Dagras			1~		
Department Offened	Machanical Engl	ann for Master's Degre		Deggining	M1 M2		
Department Onered	wechanical Engl	liteering		Deggining	1011, 1012		
	graue graue graue						
Charge teacher namelikoman	n SI条教務安員 Ikei kyomu lin-S						
alphabet mark	alphabet mark]						
Numbering							
Objectives of class							
This lecture aims to provide a br	and understanding	r of the materials and	d manufacturing n	rocecc available for t	he master thesis		
research work of a student		g of the materials and	i manuracturing p	inocess available for t			
		<b>.</b> <i>/</i>					
The class provides both of funda	amental knowledge	e of his/her master t	hesis research w	ork and the most ad	vanced results in		
the related field by reading rese	arch papers and	monographs. The co	ontents of the cl	ass depend on the s	supervisor. To be		
announced by individual supervise	ors.						
Self Preparation and Review							
-							
<b>B</b> 1 1 1 1							
Related subjects							
Notes for textbook							
Textbook or material will be made	available from th	e supervisors					
Notes for reference							
Goals to be achieved							
To acquire fundamental knowledg	e of individual res	earch fields.					
To acquire the ability to find prob	lems, the ability t	o solve the problems	and the presenta	tion skill.			
Evaluation of achievement							
	veneut						
Coursework, presentation and/or	report.						
Examination							
その他							
None during exam period							
Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objective	s of learning and	education					
Key words							

# (M41630260)Advanced System, Control and Robotics II[Advanced System, Control and Robotics II]

Subject name[English]	Advanced System	. Control and Robo	tics II[Advanced Sv	stem. Control and F	Robotics II]		
Schedule number	M41630260	Subject area	Advanced	Required or	Elective		
			Mechanical	elective			
			Engineering				
Time of starting a course	Spring term	Dav of the	Thu.4~4	Credit(s)	2		
-		week,period					
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~		
Department Offered	Mechanical Engine	eering		Beggining	M1, M2		
				grade			
Charge teacher name[Roman	S1系教務委員 1	kei kyomu Iin−S					
alphabet mark]							
Numbering							
Objectives of class							
This lecture aims to provide a bro	oad understanding c	of the control and ro	botics available for	the master thesis	research work of		
a student.	0						
Contents of class							
The class provides both of funda	amental knowledge	of his/her master t	hesis research wor	k and the most ad	vanced results in		
the related field by reading rese	arch papers and m	nonographs. The co	ontents of the clas	s depend on the s	upervisor. To be		
announced by individual supervise	ors.	<u> </u>					
Self Preparation and Review							
-							
Related subjects							
Natao fay tauth cale							
l extbook or material will be made	available from the	supervisors.					
Notes for reference							
Goals to be achieved	<b>C I I I I I</b>						
To acquire fundamental knowledg	e of individual resea	arch fields.					
To acquire the ability to find prob	lems, the ability to	solve the problems	and the presentation	on skill.			
Evaluation of achievement							
Coursework, presentation and/or	report.						
Examination							
その他							
None during exam period							
Details of examination							
Other information							
Deference LIDI							
Office hours							
Relations to attainment objectives of learning and education							
1							
Key words							

# (M41630280)Advanced Energy and Environmental Engineering II[Advanced Energy and Environmental Engineering II]

Cubicat pama[English]							
Subject name[English]	Engineering II]	y and Environment	ai Engineering IIL	Advanced Energy ar	id Environmental		
Schedule number	M41630280	Subject area	Advanced	Required or	Elective		
			Mechanical	elective			
Time of starting a source	Sauling town	Day of the	Engineering	Our dit(a)	0		
lime of starting a course	Spring term	Day of the week period	Fri.4~4	Creat(s)	2		
Faculty	Graduate Program	n for Master's Degr	ee	Subject grade	1~		
Department Offered	Mechanical Engin	eering		Beggining	M1, M2		
				grade			
Charge teacher name[Roman	S1系教務委員 1kei kyomu lin-S						
alphabet markj Numbering							
Objectives of class		- <b>f</b> 4l					
This lecture aims to provide a bro	oad understanding	of the energy and e	nvironmentai engir	teering available for t	the master thesis		
Contents of class							
The class provides both of funda	amental knowledge	of his/her master t	thesis research w	ork and the most ad	vanced results in		
the related field by reading rese	earch papers and r	nonographs. The co	ontents of the cla	iss depend on the s	upervisor. To be		
announced by individual supervise	ors.						
Self Preparation and Review							
Related subjects							
Notes for textbook							
Textbook or material will be made	e available from the	supervisors.					
Notes for reference							
Goals to be achieved							
To acquire fundamental knowledg	e of individual rese	arch fields.					
To acquire the ability to find prob	lems, the ability to	solve the problems	and the presentat	tion skill.			
Evaluation of achievement							
Coursework, presentation and/or	report.						
Examination							
その他							
None during exam period	None during exam period						
Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objectives of learning and education							
Key words							

# (M41630310)Vibration Engineering[Vibration Engineering]

Subject name[English]	Vibration Enginee	ring[Vibration Engin	eering]			
Schedule number	M41630310	Subject area	Advanced	Required or	Elective	
			Mechanical	elective		
			Engineering	0.000.000		
Time of starting a course	Spring1 term	Day of the	Tue.2~2	Credit(s)	1	
		week,period				
Faculty	Graduate Program	n for Master's Degre	ee	Subject grade	1~	
Department Offered	Mechanical Engine	eering		Beggining	M1, M2	
		grade				
Charge teacher name[Roman	河村 庄造 KAWA	MURA Shozo				
alphabet mark]						
Numbering						
Objectives of class						
This lecture will provide the kno	owledge of modal a	analysis method and	d component mode	synthesis method	I to treat a huge	
degree of freedom system.						
This lecture will provide the kno	owledge of modal a	analysis method and	d component mode	synthesis method	I to treat a huge	
degree of freedom system.						
Contents of class						
Modal analysis for multi degree of	f freedom system					
1: Introduction of modal analysis,	undamped system					
2: A system with proportional viso	cous damping (1)					
3: A system with proportional viso	cous damping (2)					
4: Compensate of higher vibration	1 modes					
Component mode synthesis meth	ıod					
5: Formulation of sub-systems	. (1)					
6: Modal synthesis using constrain	nt modes (1)					
7: Modal synthesis using constrain	nt modes (2)					
8: Modal synthesis using non-com	straint modes					
Modal analysis for multi degree of	f freedom system					
1: Introduction of modal analysis,	undamped system					
2: A system with proportional viso	cous damping $(1)$					
3: A system with proportional viso	20US Uamping (2/					
4. Compensate of higher vibration	TIIIUues					
Company made synthesis meth	امت					
5. Exemplation of sub-systems	100					
5: Formulation of sub-systems	nt modec (1)					
7. Modal synthesis using constrain	nt modes (2)					
8. Modal synthesis using non-con	istraint modes					
Self Preparation and Review						
Self–preparation and review are r	iecessary.					
Self-preparation and review are r	iecessary.					
Related subjects						
Dynamics, Vibration engineering,	Mechanical vibration	n				
Dynamics, Vibration engineering,	Mechanical vibratio	n				
Notes for textbook						
Handouts will be prepared (downl	oad by yourself)					
Handouts will be prepared (downl	oad by yourself)					
Notes for reference						
Goals to be achieved						
(1) Understand the modal analysis	s for multi degree o	f freedom system				
(2) Understand the component m	ode synthesis meth	od				
(1) Understand the modal analysis	s for multi degree o	f freedom system				
(2) Understand the component m	ode synthesis meth	od				
Evaluation of achievement						
Method: report (full score 100).						

Level: achievement in the case upper 55 points. Level A: upper 80 points, Level B: upper 65 points, Level C: upper 55 points

Method: report (full score 100).

Level: achievement in the case upper 55 points.

Level A: upper 80 points, Level B: upper 65 points, Level C: upper 55 points

Examination レポートで実施

By Report

# Details of examination

#### Other information

Contact person: Prof. Shozo Kawamura E-Mail:kawamura@me.tut.ac.jp Contact person: Prof. Shozo Kawamura E-Mail:kawamura@me.tut.ac.jp **Reference URL** 

# Office hours

Ask by E-mail.

Ask by E-mail.

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

(D) 広範囲の知識を有機的に連携させた研究開発方法論の体得 広範囲の知識の連携による研究開発に係る方法論を体得し、研究開発の設計立案と実践能力

#### Key words

Modal analysis, Component mode synthesis method Modal analysis, Component mode synthesis method

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

Outcomposition         Subject area         Advanced Mechanical Engineering         Required or isotive         Elective           The of starting a course         Spring term         Day of the True of starting a course         Spring term         Day of the True2~2         Oredit(a)         2           Faulty         Graduate Program for Master's Degree         Subject grade         2~           Department Offered         Mechanical Mechanical Engineering         M2           Ohrego teacher name[Roman alphabet mark]         #/6         = TERASHIMA Kazuhiko           Numbering         M2           Objectives of olass         Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied.           Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied.           Vibration control with transfer is introduced.         Contents of class           Vibration control with transfer is introduced.         Contents of class           Vibration control         Howek: Kontention control           Yearch Modelling and identification         Yearch Modelling and identification           Yearch Modelling and identification </th <th>Subject name[English]</th> <th colspan="6">Modeling and Analysis of Dynamical Control Systems[Modeling and Analysis of Dynamical</th>	Subject name[English]	Modeling and Analysis of Dynamical Control Systems[Modeling and Analysis of Dynamical					
Tens of starting a course         Spring term         Day         of         the chanical Engineering         elective Thu 2~2         Credit(s)         2           Faculty         Graduato Program for Master's Degree         Subject grade         2~           Department Offered         Mechanical Engineering         Beggining grade         M2           Charge tascher name[Roman alphabet.mat/]         M2         M2         M4           Numbering         Close         M2         M2           Cylicatives of class         Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied.           Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied.           Cortents of class         Evaluation on consider the requests from the master students.           Ist week: Modelling and identification 2/d week: Nonlinear optimal control 2/d week: Nonlinear optimal control 2/d week: Control 4/d week: Control	Schedule number	M41630360	Subject are	a	Advanced	Required or	Elective
The of starting a course         Spring term         Dev         of the Thu 2~2         Credit(s)         2           Faculty         Graduate Preparation for Master's Degree         Subject grade         2~           Department Offered         Mechanical Engineering         Begaining         M2           Charge teacher name/Roman alphabet mark]         \$#4         -#5         TERASHIMA Kazuhiko           Mumbering         Image teacher name/Roman alphabet mark]         \$#4         -#5           Outgettives of class         Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied. Vibration control with transfer is introduced.           Contents of class         Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied. Vibration control with transfer is introduced.           Contents of class         We provide the following schedule. Because this course is for master students, we can consider the requests from the master students.           1st week: Modelling and identification         2m/metric           2m/metric         We provide the following schedule. Because this course is for master students, we can consider the requests from the master students.           1s					Mechanical	elective	
Time of starting a course         Spring term         Day of the         Thu2~2         Credit(s)         2           Faculty         Graduate Program for Master's Degree         Subject grade         2~           Department Offred         Mechanical Engineering         Beginng         M2           Charge teacher name(Remand alphabet mart)         等场 一変 TERASHIMA Kazuhiko         grade         2~           Objectives of class         Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control with transfer is introduced.         With transfer is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied.           Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control with transfer is introduced.         Time of studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied.           Vibration control with transfer is introduced.         Contents of class         Secure 1         Secure 2         Secure 2<					Engineering		
Image:	Time of starting a course	Spring term	Day of	the	Thu.2~2	Credit(s)	2
Department Offered         Mechanical Engineering         Beggining grade         M2           Charge teacher name[Roman alphabet mark]	Faculty	Graduate Progra	m for Master's	u s Degro	e	Subject grade	2~
Charge teacher namejRoman alphabet mark]         中海 一貫 TERASHIMA Kazuhiko           Objectives of olass         Objectives of olass           Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied. Vibration control with transfer is introduced.           Fundamental thory of Modern control engineering is lectured. First, modeling and identification is introduced, and modern control thory is studied based on nonlinear systems, and LQ control and estimation on observer and Kalman filter is studied. Vibration control with transfer is introduced.           Contents of class         We provide the following schedule. Because this course is for master students, we can consider the requests from the master students.           1st week: Modelling and identification 2nd week Nonlinear optimal control 3rd week. Observer 5th week: Kalman filter 6th week: Vibration control – Input shaping and Hybrid shape control 7th week: Summary 8th week: Examination (Report) 8th week: Kalman filter 6th week: Nonlinear optimal control 3rd week. LO control 4th week: Observer 5th week: Kalman filter 6th week: Nonlinear optimal control 3rd week. LO control 4th week: Observer 5th week: Kalman filter 6th week: Nonlinear optimal control 3rd week. LO control 4th week: Summary 8th week: Samination (Report) 8th week: Samination (Report) 8th week: Samination control - Input shaping and Hybrid shape control 7th week: Summary 8th week: Samination control - Input shaping and Hybrid shape control 7th week: Summary 8th week: Samination control - Input shaping and Hybrid shape control 7th week: Summary 8th week: Samination control 7th week: Summary 8th week: Samination Cheport) 8th Perepe	Department Offered	Mechanical Engir	Mechanical Engineering				M2
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7th week: Summary         8th week: Examination (Report)         Self Preparation and Review         Related subjects         Fundamentals of linear algebra, differential equation, mechanics, measurement and control theory, and robotics.         Fundamentals of linear algebra, differential equation, mechanics, measurement and control theory, and robotics.         Notes for textbook         Handouts will be prepared.         Reference:         Applied Nonlinear Control: Jean-Jacques E Sloting, Weiping LiPrentice Hall International Inc (1991)	6th week: Vibration control - Inpu	it shaping and Hyb	rid shape con	trol			
8th week: Examination (Report)         Self Preparation and Review         Related subjects         Fundamentals of linear algebra, differential equation, mechanics, measurement and control theory, and robotics.         Fundamentals of linear algebra, differential equation, mechanics, measurement and control theory, and robotics.         Notes for textbook         Handouts will be prepared.         Reference:         Applied Nonlinear Control: Jean-Jacques E Sloting, Weiping LiPrentice Hall International Inc (1991)	7th week: Summary						
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Reference: Applied Nonlinear Control: Jean-Jacques E Slotine, Weining LiPrentice, Hall International Inc (1991)	Handouts will be prepared.						
Applied Nonlinear Control: Jean-Jacques E Slotine, Weining Li:Prentice Hall International Inc (1991)	Peference:						
	Applied Nonlinear Control: Jean	Jacques E Slotine	Weiping I i Pre	entice	Hall International I	nc (1991)	

Handouts will be prepared.
Deference
Applied Neplinear Control: Jean-Jacques E Sloting, Waining Li:Prantice Hall International Inc (1901)
Notae for reference
Goale to be achieved
(1) Inderstand Analysis methods of Nonlinear Dynamical Systems
(1) Understand Modeling and identification
(3) Inderstand Optimal control
(4) Inderstand ( ) Control
(5) Inderstand Extination – observer and Kalman filter –
(1) Understand Analysis methods of Nonlinear Dynamical Systems
(2) Inderstand Analysis mediators on commean bynamical bystams
(3) Linderstand Modeling and Identification
(5) Inderstand Equivinition - observer and Kalman filter -
Evaluation of achievement
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
Examination
レポートで実施
By Report
Details of examination
Other information
Tel. 0532-44-6699
E-mail:terasima@me.tut.ac.jp
Tel. 0532-44-6699
E-mail:terasima@me.tut.ac.jp
Reference URL
Students who are interesting with nonlinear systems and control are welcome.
Basic control theory and mathematical knowledge are required.
Students who are interesting with nonlinear systems and control are welcome.
Basic control theory and mathematical knowledge are required.
Office hours
Thursday 4-6pm (Terashima D-510)
Thursday 4-6pm (Terashima D-510)
Relations to attainment objectives of learning and education
(D1) Ability for solving problems with expertise
(D1) Ability for solving problems with expertise
Key words
Optimal control, LQ control, Observer , Kalman filter, Vibration control
Optimal control, LQ control, Observer , Kalman filter, Vibration control

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

Subject name[English]	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on					
	Electrical and Elec	ctronic Information	Engineering]			
Schedule number	M42610020	Subject area	Advanced	Required or	Required	
			Electrical and	elective		
			Electronic			
			Engineering			
Time of starting a course	2Years	Day of the	Intensive	Credit(s)	6	
		week,period			-	
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~2	
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining grade	M1, M2	
Charge teacher name[Roman	S2系教務委員, 2	2系各教員 2kei kyor	mu Iin−S, 2kei kakuk	youin		
alphabet mark]						
Numbering						
Objectives of class						
The thesis research aims to prov	vide a practical exp	perience of research	n work, and to acqu	ire his/her researd	ch skill with deep	
understanding of the electrical an	d electronic inform	ation engineering.				
Contents of class						
The research subject depends or	n the supervisor an	nd the research gro	up you belong to. E	very student will h	nave an individual	
research subject. For more detail	s, please contact w	ith your supervisor.				
Sen Preparation and Review						
Related subjects						
Notes for textbook						
Reference and material will be av	ailable from the sup	pervisor.				
Notes for reference						
Goals to be achieved						
To get something new on individu	al research fields					
To develop his/her research skill	including the planni	ing and the present:	ation.			
Evaluation of achievement	o ero piulii					
Presentation, Thesis,Coursework,	and Outcomes are	evaluated generally	r.			
Examination						
その他						
None during exam period						
Details of examination						
Other information	Other information					
Reference URL						
Office hours						
Relations to attainment objective	s or learning and e	ducation				
Key words						

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

Subject name[English]	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on					
	Electrical and Electricae and Electricae and Electricae and Electr	ctronic Information	Engineering]	1		
Schedule number	M42610020	Subject area	Advanced	Required or	Required	
			Electrical and	elective		
			Electronic			
			Engineering			
Time of starting a course	2Years	Dav of the	Intensive	Credit(s)	6	
		week,period			-	
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~	
Department Offered	Electrical and Elec	ctronic Information	Engineering	Beggining grade	M1, M2	
Charge teacher name[Roman	S2系教務委員, 2	2系各教員 2kei kyor	mu Iin−S, 2kei kakuk	youin		
alphabet mark]						
Numbering						
Objectives of class						
The thesis research aims to prov	vide a practical exp	perience of research	n work, and to acqu	iire his/her researd	ch skill with deep	
understanding of the electrical an	d electronic inform	ation engineering.				
Contents of class						
The research subject depends or	n the supervisor an	nd the research gro	up you belong to. E	very student will h	ave an individual	
research subject. For more detail	s, please contact w	itn your supervisor.				
Son Freparauon and Review						
Related subjects						
Notes for textbook						
Notes for textbook Reference and material will be available from the supervisor						
Notes for reference	anabio nom the sup					
Goals to be achieved						
To get something new on individu	al research fields.					
To develop his/her research skill	including the planni	ing and the presenta	ation.			
Evaluation of achievement						
Presentation, Thesis, Coursework	, and Outcomes are	e evaluated generall	y.			
Examination						
その他						
None during exam period						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	s of learning and e	ducation				
Key words						

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

Subject name[English]	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on					
	Electrical and Electronic Information Engineering]					
Schedule number	M4261002T	Subject area	Advanced	Required or	Required	
			Electrical and	elective		
			Electronic			
			Engineering			
Time of starting a course	Year	Dav of the	Intensive	Credit(s)	6	
		week,period			-	
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	2~	
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining grade	M2	
Charge teacher name[Roman	S2系教務委員, 2	2系各教員 2kei kyor	mu Iin−S, 2kei kakuk	youin		
alphabet mark]						
Numbering						
Objectives of class						
The thesis research aims to prov	vide a practical exp	perience of research	n work, and to acqu	ire his/her researd	ch skill with deep	
understanding of the electrical an	d electronic inform	ation engineering.				
Contents of class						
The research subject depends o	n the supervisor ar	nd the research gro	up you belong to. E	very student will h	nave an individual	
research subject. For more detail	s, please contact w	itn your supervisor.				
Self Preparation and Review						
Palatad aubia ata						
Notes for textback						
Reference and material will be av	ailable from the sur	pervisor				
Notes for reference						
Goals to be achieved						
To get something new on individu	al research fields.					
To develop his/her research skill	including the plann	ing and the presenta	ation.			
Evaluation of achievement						
Presentation, Thesis, Coursework	, and Outcomes are	e evaluated generall	у.			
Examination						
その他						
None during exam period						
Details of examination						
Uther Information						
Keterence UKL						
Relations to attainment objectives of learning and education						
relations to attainment objectives of learning and education						
Key words						

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

Subject name[English]	Seminar on Electrical and Electronic Information Engineering[Seminar on Electrical and					
	Electronic Information Engineering]					
Schedule number	M42610040	Subject area	Advanced	Required or	Required	
			Electrical and	elective		
			Electronic			
			Information			
			Engineering			
Time of starting a course	Year	Day of the week.period	Intensive	Credit(s)	6	
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	2~2	
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	M2	
Charge teacher name[Pomen	S2系教務委員 2	o玄久救昌 วkai kvor	mu lin-S. 2kei kakuk	grade		
alphabet mark]				youn		
Numbering						
Objectives of class						
The seminar aims to provide a h	road understanding	of theoretical and	experimental appro	oches related to t	he electrical and	
electronic information engineering	for the research w	ork of his/her mast	er thesis			
Contents of class	··········					
The class provides both of fundar	mental knowledge o	n the research work	of master thesis a	nd the most advan	ced results in the	
related field by reading research	papers and monogra	aphs. Contents of th	ne 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 a	nnounced by individ	ual supervisors.		
Notes for reference						
Goals to be achieved						
To acquire fundamental knowledg	e on individual rese	arch fields				
To acquire the ability of finding a	problem, the ability	of solving the probl	lem and the present	ation skill.		
Evaluation of achievement		5 1				
Coursework, presentation and/or	report.					
Examination						
その他						
None during exam period						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objectives of learning and education						
Key worde						
Nay words						

(M42610050)Seminar on Electrical and Electronic Information Engineering 1A[Seminar on Electrical and Electronic Information Engineering 1A]

Subject name[English]	Seminar on Electrical and Electronic Information Engineering 1A[Seminar on Electrical and					
	Electronic Information Engineering 1A]					
Schedule number	M42610050	Subject area	Advanced	Required or	Required	
			Electrical and	elective		
			Electronic			
			Information			
			Engineering			
Time of starting a course	Year	Day of the	Intensive	Credit(s)	4	
		week,period				
Faculty	Graduate Program	n for Master's Degr	ee	Subject grade	1~	
Department Offered	Electrical and Elec	ctronic Information	Engineering	Beggining grade	M1, M2	
Charge teacher name[Roman	S2系教務委員, 2	2系各教員 2kei kyc	mu Iin−S, 2kei kakul	kyouin		
alphabet mark						
Numbering						
Objectives of class						
The seminar aims to provide a b	road understanding	of theoretical and	l experimental appro	ooches related to t	the electrical and	
electronic information engineering	g tor the research w	vork of his/her mas	ter thesis.			
					1 10 1 11	
I he class provides both of funda	nental knowledge o	n the research wor	k of master thesis a	ind the most advan	ced results in the	
related field by reading research	papers and monogra	aphs. Contents of t	he class depend on	the supervisor. To	be announced by	
Individual supervisors.						
Sell Freparation and Review						
<b>D</b>						
Related subjects						
		·				
l extbook or material will be made	available from the	supervisor. To be	announced by individ	dual supervisors.		
NOTES FOR REFERENCE						
Or de la la collana d						
		and Calde				
To acquire fundamental knowledg	e on individual rese	arch fields.	مراجع مسط المعام مسما	tation okill		
For acquire the ability of finding a	problem, the ability	of solving the prot	nem and the presen	Lation Skill.		
Coursework presentation and/or	report					
Examination						
Examiniauon その他						
None during exam period						
Details of examination						
Other information						
Pafaranaa IIDI						
Relations to attainment objectives of learning and education						
Key words						

# (M42630110)Methodology of R & D 2[Methodology of R & D 2]

Subject name[English]	Methodology of R & D 2[Methodology of R & D 2]						
Schedule number	M42630110	Subject area	Advanced	Required or	Elective		
	Electrica		Electrical and	elective			
	Electronic		Electronic				
	Information		Information				
			Engineering				
Time of starting a course	Spring term	Day of the	Tue.3~3	Credit(s)	2		
		week,period			1		
Faculty Demostry and Officers d	Graduate Progran	n for Master's Degre		Subject grade	~ M1_M2		
Department Offered	Electrical and Ele	ctronic information	Engineering	grade	MIT, MZ		
Charge teacher name[Roman	S2系教務委員 2	kei kyomu Iin-S					
alphabet mark]							
Numbering							
Objectives of class							
The class aims to provide a bai	sic understanding	of R&D methodolog	w related to the e	lectrical and elect	ronic information		
engineering for the research work	of his/her master	thesis					
Contents of class							
The class provides some fundam	ental tins to condu	ict R&D work effect	ively Contents of t	he class depend o	n the supervisor		
To be announced by individual sur	pervisors	SE HOD WORK SHEEL	avery. Contents Of I				
Self Preparation and Review							
Polotod subjects							
Natao Cantao dha ala							
Notes for textbook							
Reference and material will be available	ailable from the sup	ervisor.					
Notes for reference							
Goals to be achieved							
To acquire the ability of identify	ying and formulatir	ng research probler	n, planning and imp	plementing specific	research tasks,		
troubleshooting and communicating outcomes.							
Coursework and presentation are	evaluated generally	y.					
Examination							
その他							
None during exam period							
Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objectives of learning and education							
Kev words							
nay worus							

#### (M42630150)Physics for Electronics 2[Physics for Electronics 2]

Subject name[English]	Physics for Electronics 2[Physic	s for Electronics	2]		
Schedule number	M42630150	Subject area	Advanced Electrical and Electronic Information Engineering	Required or elective	Elective
Time of starting a course	Spring term	Day of the week,period	Wed.2~2	Credit(s)	2
Faculty	Graduate Program for Master's [	Subject grade	1~		
Department Offered	Electrical and Electronic Information Engineering			Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark] Numbering	松田 厚範, 服部 敏明, 石山 Takeshi, TAKAGI Hiroyuki	武,高木 宏幸1	MATSUDA Atsunori	, HATTORI Tos	shiaki, ISHIYAMA

#### **Objectives of class**

Objectives of this subject are to understand the fundamental aspects on functional materials, photonics, electrodics, spin electronics, and also to have overall knowledge on the latest technologies on these physical phenomena.

Objectives of this subject are to understand the fundamental aspects on functional materials, photonics, electrodics, spin electronics, and also to have overall knowledge on the latest technologies on these physical phenomena.

## Contents of class

"Physics for Electronics 1" is composed of four topics of functional materials, photonics, electrodics, and spin electronics, which will be delivered for three times for each by four professors whose expertise lie on the individual categories.

The category of "Functional materials" is made to learn preparation, characterization and applications of functional materials for electronics and ionics based on physics and chemistry. The contents are 1) Fundamentals of amorphous and crystal, 2) Structure and property of glasses, 3) New preparation techniques of advanced materials, 4) Functional materials for ionis including Li-ion battery and fuel cell, and 5) Functional materials for optics including coatings, micro-optical components, and photonic devices.

The category of "electrodics" is electrochemical reaction on electrode. The contents are 1) fundamentals of thermodynamics in aqueous solution, 2) fundamental of electrical double layer 3) fundamental of adsorption, 4) fundamentals of electrochemical reaction, and 5) applications of chemical sensor.

The category of "photonics" is devoted to the understanding of interactions between photon (light wave) and materials based on the quantum theory and also to industrial applications of photonic devices. 1) Optoelectronic devices, 2) optical processes in semiconductors and exciton, 3) nanomaterial.

The category of "spin electronics" covers a wide area from fundamentals to applications of magnetic materials and magnetics. 1) Origin of magnetics, 2) Soft and hard magnetic materials, 3) Major applications of magnetics and magnetic materials, 4) Interaction phenomena among spins and various physical quantities, 5) Micro-magnetic devices and systems, 6) Spintronics and spin photonics

"Physics for Electronics 1" is composed of four topics of functional materials, photonics, electrodics, and spin electronics, which will be delivered for three times for each by four professors whose expertise lie on the individual categories.

The category of "Functional materials" is made to learn preparation, characterization and applications of functional materials for electronics and ionics based on physics and chemistry. The contents are 1) Fundamentals of amorphous and crystal, 2) Structure and property of glasses, 3) New preparation techniques of advanced materials, 4) Functional materials for ionis including Li-ion battery and fuel cell, and 5) Functional materials for optics including coatings, micro-optical components, and photonic devices.

The category of "electrodics" is electrochemical reaction on electrode. The contents are 1) fundamentals of thermodynamics in aqueous solution, 2) fundamental of electrical double layer 3) fundamental of adsorption, 4) fundamentals of electrochemical reaction, and 5) applications of chemical sensor.

The category of "photonics" is devoted to the understanding of interactions

between photon (light wave) and materials based on the quantum theory and also to industrial applications of photonic devices. 1) Optoelectronic devices, 2) optical processes in semiconductors and exciton, 3) nanomaterial.

The category of "spin electronics" covers a wide area from fundamentals to applications of magnetic materials and magnetics. 1) Origin of magnetics, 2) Soft and hard magnetic materials, 3) Major applications of magnetics and magnetic materials, 4) Interaction phenomena among spins and various physical quantities, 5) Micro-magnetic devices and systems, 6) Spintronics and spin photonics

#### Self Preparation and Review

Students must perform their preparation and review of this subject based on the course materials with following the instruction of the teachers.

Students must perform their preparation and review of this subject based on the course materials with following the instruction of the teachers.

#### **Related** subjects

Physics for Electronics, Analysis of Inorganic Materials, Advanced Materials for Electronics, Functional Materials for Optical Applications, Analysis of Materials at Interface.

Physics for Electronics, Analysis of Inorganic Materials, Advanced Materials for Electronics, Functional Materials for Optical Applications, Analysis of Materials at Interface.

Textbook1	Book title	Physical Chemist	ry	ISBN	0198700725	
	Author	Atkins	Publisher	Oxford	Publish year	2006
				University		
				Press		
Textbook2	Book title	Inorganic Chemistry			ISBN	0199264635
	Author	Shriver	Publisher	Oxford	Publish year	2006
				University		
				Press		

#### Notes for textbook

None

None

#### Notes for reference

#### Goals to be achieved

(1) To understand fundamental aspects on functional materials, photonics, electrodics and spin electronics.

- (2) To get the knowledge on the latest technologies on these physical and chemical phenomena.
- (1) To understand fundamental aspects on functional materials, photonics, electrodics and spin electronics.
- (2) To get the knowledge on the latest technologies on these physical and chemical phenomena.

#### **Evaluation of achievement**

The final evaluation will be the sum of four categories (25%); functional materials, photonics, electrodics, spin electronics.

The final evaluation will be the sum of four categories (25%); functional materials, photonics, electrodics, spin electronics.

#### Examination

# 試験期間中には何も行わない

# None during exam period **Details of examination**

Taking examination and submission of report will be explained and required by the teachers during their classes. Taking examination and submission of report will be explained and required by the teachers during their classes.

#### Other information

Functional materials; Atsunori Matuda : matsuda@ee.tut.ac.jp

Electrodics; Toshiaki Hattori : thattori@ee.tut.ac.jp

Photonics; Takeshi Ishiyama: ishiyama@ee.tut.ac.jp

Spin electronics: Hiroyuki Takagi : takagi@ee.tut.ac.jp

Functional materials; Atsunori Matuda : matsuda@ee.tut.ac.jp

Electrodics; Toshiaki Hattori : thattori@ee.tut.ac.jp

Photonics; Takeshi Ishiyama: ishiyama@ee.tut.ac.jp

Spin electronics: Hiroyuki Takagi : takagi@ee.tut.ac.jp

#### Reference URL

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

Office hours

one hour after every classes one hour after every classes

Relations to attainment objectives of learning and education

#### Key words

functional materials, photonics, spin electronics, ionics, micro-optics, electrodics functional materials, photonics, spin electronics, ionics, micro-optics, electrodics

# (M42630190)Electrical Technology and Materials 2[Electrical Technology and Materials 2]

1

Subject name[English]	Electrical Lechno	ology and Materials 2	LEIECTRICAL LECHNOL	ogy and Materials 2	(J
Schedule number	M42630190	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.1~1	Credit(s)	2
Faculty	Graduate Progra	m for Master's Degre	e	Subject grade	1~
Department Offered	Electrical and Ele	ectronic Information	Engineering	Beggining grade	M1, M2
Charge teacher name[Roman alphabet mark]	須田 善行,稲田	3 亮史,村上 義信 5	SUDA Yoshiyuki, INA	ADA Ryoji, MURAK	AMI Yoshinobu
Numbering					
Objectives of class					
This lecture is implemented as a	n introduction to	electrical energy sys	tems and intended	for students and	other engineering
disciplines. It is being useful as re	eference and self-	study guide for the	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	electrical energy sys	tems and intended	for students and	other engineering
disciplines. It is being useful as re	eference and self-	study guide for the	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 electr	ical energy engine	ering			
2. Three-phase systems					
3. Power electronics					
Sub Course 2(R. Inada)					
1. Introduction of Electrochemica	I Energy Conversion	on Devices			
2. Lithium-Ion Secondary Batterie	es				
3. Recent Trend in Electrochemic	al Energy Convers	ion Devices			
Sub Course 3(Yo. murakami)	<b>o</b> .				
1. Introduction of Electric Energy	Systems				
2. High Voltage Engineering and E	ectrical Insulation	l Last Topolation - M. H 1			
Sub Course 1/V and 2	ectrics and Electri	ical Insulating Materi	ais.		
1 Fundamental concept of electric	ical energy engine	ering			
2 Three-phase systems	ical clicigy eligilie				
3 Power electronics					
Sub Course 2(R. Inada)					
1. Introduction of Electrochemica	I Energy Conversio	on Devices			
2. Lithium-Ion Secondary Batterio	es				
3. Recent Trend in Electrochemic	al Energy Convers	ion Devices			
Sub Course 3(Yo. murakami)					
1. Introduction of Electric Energy	Systems				
2. High Voltage Engineering and E	lectrical Insulation	I			
3. Fundamental Properties of Diel	ectrics and Electri	ical Insulating Materi	als.		
Self Preparation and Review					
Related subjects					
Dasic electrical power engineering	g course is prerequ	uisite.			
Dasic electrical power engineering	g course is prerequ	uisite.			
Materials will be propored by the	laaturar				
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

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### 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

### (M42630230)LSI Process 2[LSI Process 2]

					1
Subject name[English]	LSI Process 2LLS	I Process 2		1	1
Schedule number	M42630230	Subject area	Advanced	Required or	Elective
			Electrical and	elective	
		Elect			
			Information		
			Engineering		
Time of starting a course	Spring term	Day of the		Credit(e)	2
	opinig torm	weak pariod	100.1	01001007	2
Facultar	Cuaduata Duamuan	week,period		Cubicat made	1
		Tor Master's Degre		Subject grade	
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	MT, MZ
		· · · · · · · · ·		grade	
Charge teacher name <u>l</u> Roman	澤田 和明, 村	上 裕二, 関口 賞	〔人,髙橋 一浩 S	AWADA Kazuaki,	MURAKAMI Yuji,
alphabet mark]	SEKIGUCHI Hirot	o, TAKAHASHI Kazı	uhiro		
Numbering					
Objectives of class					
Currently a since sint of door words			stand dealers include		
From the viewpoint of deep unde	rstanding of LSI pr	ocesses, semicondu	ctors devices inclu-	ding material desgli	h and an example
of latest device will be lectured.					
From the viewpoint of deep unde	rstanding of LSI pr	ocesses, semicondu	ctors devices inclu	ding material desgiı	n and an example
of latest device will be lectured.					
Contents of class					
Integrated circuits					
Sensor processing					
Ontical devices					
MEMS/NEMS					
Current topics in IC/MEMS/sens	or				
Integrated circuits					
Sensor processing					
Optical devices					
MEMS/NEMS					
Latest MOS FETs					
Current tonics in IC/MEMS /come					
Gurrent topics in 10/ MEM3/ sens	or				
Self Preparation and Review					
Related subjects					
The basic knowledge on the quan	tum mechanics the	ermodynamics and e	electronics are desir	ahle	
The basic knowledge of the quart		annouynannos, anu c			
Semiconductor Physics, Master c	ourse				
The basic knowledge on the quan	tum mechanics, the	ermodynamics, and e	electronics are desir	rable.	
Semiconductor Physics, Master o	ourse				
Notes for textbook					
Physics of Semiconducetr Device					
S M Star Willy					
Division of Consistentia and Device					
Physics of Semiconducour Device	5				
S.M.Sze, Willy					
Notes for reference					
Goals to be achieved					
(1) To understand fundamental as	spects on I SI proce	ss. and semiconduc	tor devices includin	g material design	
(2) To get the knowledge on the l	atest technologies	on   SI process		J	
(1) To understand fundamental as	ments on I SI proce	es and semiconduc	tor devices includin	a material design	
(2) To get the knowledge on the l	atast technologies			is material design.	
L2/10 get the knowledge on the I	arest recritiologies	on Loi process.			
Reports (100%)					

Reports (100%)
Examination
レポートで実施
By Report
Details of examination
Other information
K.Sawada (C-605)
sawada@ee.tut.ac.jp
Yu.Murakami (C-606)
ymurakami@ee.tut.ac.jp
H. Sekiguchi (C-610)
sekiguchi@ee.tut.ac.jp
ext. 6744
K. Takahashi (C-406)
takahashi@ee.tut.ac.jp
ext. 6755
K.Sawada (C-605)
sawada@ee.tut.ac.jp
Yu.Murakami (C−606)
ymurakami@ee.tut.ac.jp
H. Sekiguchi (C-610)
sekiguchi@ee.tut.ac.jp
ext. 6744
K. Takahashi (C=406)
takahashi@ee.tut.ac.jp
ext. 6755
http://www.tut.ac.jp/english/introduction/02EE.pdf
(department)
nttp://www.int.ee.tut.ac.jp/
(devision)
nttp://www.tut.ac.jp/englisn/researcn/researcn_nignlights.ntml
(research activities)
(department)
nttp://www.int.ee.tut.ac.jp/
(devision)
nttp://www.tut.ac.jp/englisn/researcn/researcn_nignlights.ntml
book an appointment by e-mail, phone, etc.
Bolotions to attainment objectives of learning and education
Key words

#### (M42630250)Information and Communication Technology 2[Information and Communication Technology 2]

Subject name[English]	Information and Communication Technology 2[Information and Communication Technology 2]						
Schedule number	M42630250	Subject area	Advanced Electrical and Electronic Information Engineering	Required or elective	Elective		
Time of starting a course	Spring term	Day of the week,period	Mon.3~3	Credit(s)	2		
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~		
Department Offered	Electrical and Elec	ctronic Information	Beggining grade	M1, M2			
Charge teacher name[Roman alphabet mark]	大平 孝,上原 秀	大平 孝, 上原 秀幸, 竹内 啓悟 OHIRA Takashi, UEHARA Hideyuki, TAKEUCHI Keigo					
Numbering							

#### **Objectives of class**

Students select between the following two courses:

The first course is intended for learning how to design microwave circuits needed for advanced wireless communication systems and wireless power transmission systems. The distributed constant element theory is addressed to characterize linear circuits at high frequencies. Based on this technique, students challenge synthesis of a variety of microwave signal and power processing functions.

The second course is intended for learning mainly medium access control, multi-hop communications and other topics related to wireless networks. Students are required to give solutions of the problems which cause performance degradation. Students select between the following two courses:

The first course is intended for learning how to design microwave circuits needed for advanced wireless communication systems and wireless power transmission systems. The distributed constant element theory is addressed to characterize linear circuits at high frequencies. Based on this technique, students challenge synthesis of a variety of microwave signal and power processing functions.

The second course is intended for learning mainly medium access control, multi-hop communications and other topics related to wireless networks. Students are required to give solutions of the problems which cause performance degradation.

#### **Contents of class**

Course 1 provided by Prof. Ohira:

- 1. Transmission lines
- 2. Scattering matrix
- 3. Mizuhashi Smith chart

#### Course 2 provided by Prof. Uehara:

1. Medium access control protocols

- 2. Multi-hop communications
- 3. Ad hoc and sensor networks
- Course 1 provided by Prof. Ohira:
- 1. Transmission lines
- 2. Scattering matrix
- 3. Mizuhashi Smith chart

### Course 2 provided by Prof. Uehara:

- 1. Medium access control protocols
- 2. Multi-hop communications

### 3. Ad hoc and sensor networks

#### Self Preparation and Review

#### **Related subjects**

#### Course 1:

Deep understanding on electromagnetic field theory, linear passive and reciprocal circuit theory, and sophisticated experience on complex and matrix mathematics are prerequisite.

#### Course 2:

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.

Course 1:

Deep understanding on electromagnetic field theory, linear passive and reciprocal circuit theory, and sophisticated experience on complex and matrix mathematics are prerequisite.

#### Course 2:

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

Course 1: Lecture on the blackboard without resorting to textbooks.

Course 2: Instruct in 1st class.

Course 1: Lecture on the blackboard without resorting to textbooks.

Course 2: Instruct in 1st class.

#### Notes for reference

Goals to be achieved

Course 1:

- Understand the distributed constant elements and concept of scattering matrix.
  - Derive frequency responses on linear RF circuits exploiting Mizuhashi Smith chart.
  - Characterize various kinds of high frequency functional circuits and compose them based upon given specifications.
  - 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

Course 1:

Course 2:

- Understand the distributed constant elements and concept of scattering matrix.
- Derive frequency responses on linear RF circuits exploiting Mizuhashi Smith chart.
- Characterize various kinds of high frequency functional circuits and compose them based upon given specifications.

Course 2:

- 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**

Course 1: Marks are based on the final test.

Course 2: Marks are based on reports and presentations. Course 1: Marks are based on the final test.

Course 2: Marks are based on reports and presentations.

Examination 定期試験を実施(対面)

Examination(Face to Face)

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

microwave, circuit, electromagnetic field, Smith chart, scattering matrix, distributed constant element, wireless networks, medium access control, multi-hop

microwave, circuit, electromagnetic field, Smith chart, scattering matrix, distributed constant element, wireless networks, medium access control, multi-hop

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

Subject name[English]	C		I Fund the	· · · · · · · · · · · · · · · · · · ·	L. C	
	Seminar on Computer Science and Engineering I[Ser			ILSeminar on Computer Science and		
	Engineering I					
Schedule number	M43610010	Subject area	Advanced	Required or	Required	
			Computer	elective		
			Science and			
			Engineering			
Time of starting a course	Year	Day of the	Intensive	Credit(s)	4	
		week,period				
Faculty	Graduate Progra	m for Master's Degr	ee	Subject grade	1~	
Department Offered	Computer Scien	ce and Engineering		Beggining	M1, M2	
-				grade		
Charge teacher name[Roman	S3系教務委員,	3系各教員 3kei kyo	mu Iin-S, 3kei kakuł	kyouin	l.	
alphabet mark]		-		-		
Numbering						
Objectives of class						
The course is intended for stud	lents to study ba	asic materials in dep	oth, related to his/	her research subj	ects in computer	
science and engineering.						
It is also aimed for students to a	acquire various sk	ills, required in gene	ral research work, s	such as those for	oral presentation,	
and technical discussion and writ	ing.					
Contents of class						
While specific contents depend	on the research :	areas students are i	nvolved in it is us	ually the case for	students to read	
relevant textbooks/research pan	ers and report on	them, as well as to n	resent and discuss	on the research wo	ork of their own	
Self Preparation and Review					and of their own.	
Consult with your advisor						
Consult with your advisor.						
Related subjects						
Consult with your advisor.						
Notes for textbook						
Notes for reference						
Notes for reference						
Goola to be achieved						
GUAIS LU DO ACTIOVOD						
To acquire abilities for technical	readings in English	ı, logical thinking/exp	lanation, and clear p	presentation.		
To acquire abilities for technical Evaluation of achievement	readings in English	ı, logical thinking/exp	lanation, and clear p	presentation.		
To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into	readings in English accout various fa	, logical thinking/exp ctors overall, such a	lanation, and clear p s technical explana	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on.	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p s technical explana	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical i <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b>	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p s technical explana	presentation. tion, question ansv	vering, discussion	
To acquire abilities for technical i <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p s technical explana	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p s technical explana	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他 None during exam period Details of examination	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p s technical explana	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他 None during exam period <b>Details of examination</b>	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p s technical explana	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他 None during exam period <b>Details of examination</b>	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical in Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他 None during exam period <b>Details of examination</b> <b>Other information</b>	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他 None during exam period Details of examination Other information Reference URL	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical <b>Evaluation of achievement</b> Will be evaluated by taking into involvements and so on. <b>Examination</b> その他 None during exam period <b>Details of examination</b> <b>Other information</b> <b>Reference URL</b>	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours	readings in English accout various fa	ı, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objective	readings in English accout various fa	n, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objective	readings in English accout various fa accout various fa	n, logical thinking/exp ctors overall, such a	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objective	readings in English accout various fa be of learning and	, logical thinking/exp ctors overall, such a education	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objective	readings in English accout various fa be of learning and	, logical thinking/exp ctors overall, such a education	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objective	readings in English accout various fa	, logical thinking/exp ctors overall, such a education	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objective	readings in English accout various fa	, logical thinking/exp ctors overall, such a education	lanation, and clear p	presentation. tion, question answ	vering, discussion	
To acquire abilities for technical To acquire abilities for technical Evaluation of achievement Will be evaluated by taking into involvements and so on. Examination その他 None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objective	readings in English accout various fa	, logical thinking/exp ctors overall, such a education	lanation, and clear p	presentation. tion, question answ	vering, discussion	

#### (M43610020)Seminar on Computer Science and Engineering II[Seminar on Computer Science and Engineering II]

Subject name[English]	Seminar on Car	nnutor C	oiena		d Engineering IICo	eminar on C	`omn' ·	tor Science and
Subject name[English]	Seminar on Computer Science and Engineering IILS			seminar on Computer Science and				
Calcadada arrente		0.11			A share and t			De milios 1
Schedule number	M43610020	Subject	c area	3	Advanced	Required	or	Required
					Computer	elective		
					Science and			
					Engineering			
Time of starting a course	Year	Day	of	the	Intensive	Credit(s)		2
		week,pe	eriod					
Faculty	Graduate Program	n for Mas <sup>.</sup>	ter's	Degre	e	Subject gra	ade	2~
Department Offered	Computer Science	e and Eng	ginee	ring		Beggining		M2
						grade		
Charge teacher name[Roman	S3系教務委員,:	3系各教員	i∎ 3ke	ei kyor	nu Iin−S, 3kei kakuł	kyouin		
alphabet mark]								
Numbering								
Objectives of class								
The course is intended for stur	lents to study has	sic materi	iale i	n dan	th related to his/	her research	subi	acts in computer
science and engineering	ients to study ba	sic materi		n ucp		nei researei	Subje	
It is also simed for students to		الم المعادية	مرا ام	~~~~			. f	aval avacantation
It is also aimed for students to a	acquire various ski	lis, require	ea in	gene	ral research work, s	such as thos	e tor	oral presentation,
and technical discussion and writ	irig.							
Contents of class								
While specific contents depend	on the research a	reas stud	ents	are in	nvolved in, it is us	ually the cas	e for	students to read
relevant textbooks/research pape	ers and report on t	hem, as w	ell as	s to pi	resent and discuss	on the resea	rch wo	ork of their own.
Self Preparation and Review								
Consult with your advisor.								
Related subjects								
Consult with your advisor.								
Notes for textbook								
Consult with your advisor.								
Notes for reference								
Goals to be achieved								
To acquire abilities for technical	readings in English	logical th	inking	r/evn	anation and clear r	presentation		
Evaluation of achievement	country in English,	logiour cri	1111/11/18	5/ 0/0		bi escilitation.		
Will be evaluated by taking into	accout various for	toro ovor		uch o	toobnical ovalana	tion quantin		varing diaquasian
will be evaluated by taking into	accout various fac	Lors over	all, si	ucria	s technical explana	tion, question	i ansv	vening, discussion
Involvements and so on.								
その他								
None during exam period								
Details of examination								
Other information			-					
Reference URL								
000 1								
Uffice hours								
Relations to attainment objective	s of learning and e	ducation						
	-							
Key words								
INDY WUIUS								

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

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]							
Schedule number	M43610030	Subject area	Advanced Computer Science and Engineering	Required or elective	Required			
Time of starting a course	2Years	Day of the week,period	Intensive	Credit(s)	6			
Faculty	Graduate Program	n for Master's Degr	ee	Subject grade	1~2			
Department Offered	Computer Science	Computer Science and Engineering			M1, M2			
Charge teacher name[Roman alphabet mark]	S3系教務委員, 3系各教員 3kei kyomu Iin-S, 3kei kakukyouin							
Numbering								
<b>Objectives of class</b> The course is intended for students to foster their interests in research problems on computer science and engineering and to acquire ability for independent studies. It is also aimed for students to acquire, through thesis research, cooperativeness, a sense of responsibility, abilities for problem solving, research planning, decision making, outcome presentation and subject investigation, and to enhance their creativity and persistency, among others.								
<b>Contents of class</b> It is usually the case that thesis another. Consult with your advisor for any	research is carried further details.	out on individual ba	ses with specific co	ntents differing fro	m one student to			

#### Self Preparation and Review

#### **Related subjects**

Consult with your advisor for them.

#### Notes for textbook

Consult with your advisor for them.

#### Notes for reference

#### Goals to be achieved

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

#### **Evaluation of achievement**

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

### Examination

その他

### None during exam period

**Details of examination** 

#### Other information

**Reference URL** 

**Office hours** 

### Relations to attainment objectives of learning and education

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

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]					
Schedule number	M43610030	Subject area	Advanced	Required or	Required	
			Computer	elective		
			Science and			
			Engineering			
Time of starting a course	2Years	Day of the	Intensive	Credit(s)	6	
		week,period				
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	1~	
Department Offered	Computer Science	e and Engineering		Beggining grade	MT, MZ	
Charge teacher name[Roman	S3系教務委員 3	3系各教員 3kei kvoi	mu lin−S. 3kei kakuk	vouin		
alphabet mark]				Jeann		
Numbering						
Objectives of class	<b></b>					
The course is intended for stude	nts to foster their i	nterests in research	n problems on comp	uter science and e	ngineering and to	
acquire ability for independent stu	udies.					
It is also aimed for students to ac	cauire, through thes	is research. cooper	ativeness. a sense o	of responsibility, ab	ilities for problem	
solving, research planning, decisio	on making, outcome	presentation and s	ubject investigation,	and to enhance th	eir creativity and	
persistency, among others.						
Contents of class						
It is usually the case that thesis i	research is carried	out on individual ba	ses with specific co	ntents differing fro	m one student to	
another.						
Consult with your advisor for any	further details.					
Self Preparation and Review						
Consult with your advisor for the	m					
Related subjects						
Consult with your advisor for the	m.					
Notes for textbook						
Consult with your advisor for the	m.					
Notes for reference						
Goals to be achieved						
I o acquire abilities for doing res	search and develop	ment at technically	' high level, sophist	icated decision ma	king, and leading	
large scale research projects.						
Three faculty members will be	accimped to prepar	a the evaluation fo	r vour thesis rece	reh based on nu	bligation records	
master thesis and oral presentati	ion It will be then t	finalized by the fact	ilty meeting			
Examination			incy mooting.			
その他						
None during exam period						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	s of learning and e	ducation				

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

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]					
Schedule number	M4361003T	Subject area	Advanced Computer Science and	Required or elective	Required	
			Engineering			
Time of starting a course	Year	Day of the week,period	Intensive	Credit(s)	6	
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	2~	
Department Offered	Computer Scienc	e and Engineering		Beggining grade	M2	
Charge teacher name[Roman	S3系教務委員, 3	3系各教員 3kei kyor	mu Iin−S, 3kei kakuk	youin		
alphabet mark]						
Numbering						
Objectives of class						
The course is intended for studer	nts to foster their i	nterests in research	n problems on comp	uter science and e	ngineering and to	
acquire ability for independent stu	udies.					
It is also aimed for students to ac	quire, through thes	is research, cooper	ativeness, a sense o	of responsibility, ab	ilities for problem	
solving, research planning, decisio	on making, outcome	presentation and si	ubject investigation,	and to enhance tr	eir creativity and	
persistency, among others.						
Contents of class						
It is usually the case that thesis i	research is carried	out on individual ba	ses with specific co	ntents differing fro	m one student to	
another.						
Consult with your advisor for any	further details.					
Self Preparation and Review						
Consult with your advisor for the	m.					
Related subjects						
Consult with your advisor for the	m.					
Notes for textbook						
Consult with your advisor for the	m.					
Notes for reference						
Goals to be achieved						
To acquire abilities for doing res	search and develop	ment at technically	nign level, sophist	icated decision ma	King, and leading	
Fvaluation of achievement						
Three faculty members will be a	assigned to prepar	e the evaluation fo	r vour thesis resea	arch. based on pu	blication records.	
master thesis, and oral presentati	on. It will be then	finalized by the facu	Ity meeting.			
Examination						
その他						
None during exam period						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	s of learning and a	ducation				

#### (M43610040)Seminar on Computer Science and Engineering[Seminar on Computer Science and Engineering]

Subject name[English]	Seminar on C	omputer Science	and Engineering[Se	minar on Comput	ter Science and
	Engineering]				
Schedule number	M43610040	Subject area	Advanced	Required or	Required
			Computer	elective	
			Science and		
			Engineering		
Time of starting a course	Year	Day of th	e Intensive	Credit(s)	6
Feeultry	Graduata Brage	m for Mostor's Do	<i><b><i><sup><i>x</i></sup></i></b></i>	Subject mode	2~
Paculty Department Offered	Computer Solor	an for Master's De	gree	Boggining	2.0 M2
	Computer Scien	ce and Engineering		grade	IVIZ
Charge teacher name[Roman	S3系教務委員,	3系各教員 3kei k	yomu Iin−S, 3kei kaku	kyouin	
alphabet mark	<u> </u>				
Numbering					
Objectives of class					
The course is intended for stud	lents to study b;	asic materials in o	lepth, related to his/	her research subj	ects in computer
science and engineering.					
It is also aimed for students to a	acquire various sł	kills, required in ge	neral research work,	such as those for	oral presentation,
and technical discussion and writ	ing.				
Contents of class					
While specific contents depend	on the research	areas students ar	e involved in, it is us	ually the case for	students to read
relevant textbooks/research pape	ers and report on	them, as well as to	present and discuss	on the research wo	ork of their own.
Self Preparation and Review					
Consult with your advisor.					
Related subjects					
Consult with your advisor.					
Natao far tauthach					
Consult with your advisor.					
Notes for reference					
Goals to be achieved					
To acquire abilities for technical ı	readings in Englisł	n, logical thinking/e	xplanation, and clear	presentation.	
Evaluation of achievement					
Will be evaluated by taking into	accout various fa	ctors overall, such	as technical explana	ation, question answ	wering, discussion
involvements and so on.					-
Examination					
その他					
None during exam period					
Details of examination					
Other information					
Other Information					
Reference URL					
Office hours					
	<u> </u>				
Relations to attainment objective	s of learning and	education			

## (M43630020)System Design Project[System Design Project]

(M45050020/System Design From	Sustan Design				
Subject name[English]	System Design I	-roject_System Desig		De guine d	Floative
Schedule number	MI43630020	Subject area	Advanced	Required or	Elective
			Computer	elective	
			Science and		
<b>—</b>	<b>.</b>	-	Engineering	• • • • • •	•
Time of starting a course	Spring term	Day of the	Tue.4 ~ 4,Fri.4	Credit(s)	2
		week,period	~5		
Faculty	Graduate Progra	im for Master's Degre	e	Subject grade	1~
Department Offered	Computer Scien	ce and Engineering		Beggining	M1, M2
	00万些改委号			grade	
Charge teacher name[Roman	53糸软粉安貝	3kei kyomu lin-5			
Numbering					
Objectives of class					
The project is intended for stude	ents to foster thei	r interests in researd	ch problems on con	nputer science and	engineering and
to acquire ability for independent	studies.				
It is also aimed for students to a	cquire design abili	ty for their thesis res	search such as the	purpose, the backg	round knowledge,
the research topic, the plan/sche	edule and to prese	ent the progress.			-
Contents of class					
It is usually the case that the s	roject is carried	out on individual bac	es with specific co	ntents differing fro	m on student to
another	oject is carried (	out on mulvidual Das	es with specific CO	intering fro	m on student to
Consult with your odvicer for	further dataile				
Consult with your advisor for any	iurther details.				
Self Preparation and Review					
Consult with your advisor.					
Related subjects					
Consult with your advisor for the	m.				
Notes for textbook					
Consult with your advisor.					
Notes for reference					
Goals to be achieved					
To acquire design abilities for doi	ng research and d	evelopment at techni	cally high level and	leading large scale	
research projects			,		
Evaluation of achievement					
Will be evaluated by the restor	r preceptation	d report including t	he recearch nume	a background in	owledge receive
tonic plan/scheduling and program	, presentation an	a report including t	ne research purpo	se, background Kh	owieuge,research
topic,pian/scheduling and progres					
<b>—</b> • •					
Examination					
その他					
None during exam period					
Details of examination					
Other information					
Reference URI					
Office hours					
Relations to attainment objective	s of learning and	education			

#### (M43630080)Computers and Education[Computers and Education]

Subject name[English]	Computers and Education[Computers and Education]					
Schedule number	M43630080	Subject area	Advanced	Required or	Elective	
			Computer	elective		
			Science and			
			Engineering			
Time of starting a	Spring term	Day of the	Mon.5~5	Credit(s)	2	
course		week,period				
Faculty	Graduate Program for Master's De	Subject	1~			
				grade		
Department Offered	Computer Science and Engineerin	g		Beggining	M1, M2	
				grade		
Charge teacher	河合 和久 KAWAI Kazuhisa					
name[Roman alphabet						
mark]						
Numbering						

#### **Objectives of class**

The purpose of the class is to deepen and broaden students' knowledge of their own expertise in relation to the society in learning about computers and technology in education.

The purpose of the class is to deepen and broaden students' knowledge of their own expertise in relation to the society in learning about computers and technology in education.

#### Contents of class

Students will be offered some overviews of computers and education. Students will give some presentations on the following problems: (1) to make the teaching plan of their own research subjects for pupils or junior high school students, (2) to make a simulated class based on the plan, (3) to discuss the simulated class. At the end of term, students are required to submit an essay on computers and education.

1.Guidance, Lecture#1(Introduction to subject "Information".)

2.Lecture#2(Computer system for education. and Software as course material.)

3.Lecture#3(Cooperation with the period of integrated study.)

4.Lecture#4(Simulated class: plan and evaluation.)

5.Lecture#5(Keep an "Information" teacher. and Teaching plan.)

6.Lecture#6(Information sending and presentation.)

7.Lecture#7(Group work by collaboration and presentation.)

8.Lecture#8(Media literacy., Information ethics education. and Network.)

9.Presentations of Teaching Plans #1

10.Presentations of Teaching Plans #2

11.Lecture#9(Expression of information and multimedia. and Topics in information society.)

12.Lecture#10(Algorithm and programming. and Information retrieval and database.)

13.Simulated Classes #1

14.Simulated Classes #2

15.Simulated Classes #3

16.Presentations of Final Reports

Students will be offered some overviews of computers and education. Students will give some presentations on the following problems: (1) to make the teaching plan of their own research subjects for pupils or junior high school students, (2) to make a simulated class based on the plan, (3) to discuss the simulated class. At the end of term, students are required to submit an essay on computers and education.

1.Guidance, Lecture#1(Introduction to subject "Information".)

2.Lecture#2(Computer system for education. and Software as course material.)

3.Lecture#3(Cooperation with the period of integrated study.)

4.Lecture#4(Simulated class: plan and evaluation.)

5.Lecture#5(Keep an "Information" teacher. and Teaching plan.)

6.Lecture#6(Information sending and presentation.)

7.Lecture#7(Group work by collaboration and presentation.)

8.Lecture#8(Media literacy., Information ethics education. and Network.)

9.Presentations of T	eaching Plans #1					
10.Presentations of	Teaching Plans #2	a and multimadia and	Tonico in infor	mation assists()		
12 Lecture#10(Algor	ithm and program	ning and Information	retrieval and da	mation society./		
13.Simulated Classe	s #1					
14.Simulated Classe	s #2					
15.Simulated Classe	s #3					
16.Presentations of	Final Reports					
Self Preparation and	I Review					
Students are require	d to solve the pro	blems mentioned abo	ve.			
Students are require	ed to solve the pro	blems mentioned abo	ve.			
Related subjects						
Notes for textbook						
Students will be offe	red some overviev	ws of "JOUHOUKA K	Youikuhou" (	(the following referenc	e) using WWW.	
Students will be offe	red some overviev	vs of "JOUHOUKA K	Youikuhou" (	(the following referenc	e) using WWW.	1
Reference1	Book title	JOUHOUKA KYO JAPANESE ***	uikuhou (kai	TEI NI-HAN) *** in	ISBN	978-4-274- 20664-1
	Author	Yasushi Kuno, et al	Publisher	OHM-SHA	Publish year	2009
Notes for reference		u.				
Goals to be achieve	d					
At the end of the co	ourse, students will	be able to deepen a	nd broaden stud	dents' knowledge of th	eir own expertis	e in relation to
the society, and to r	epresent them usi	ng computers and tet	chilology in edu	cation.		
At the end of the co	ourse. students will	be able to deepen a	nd broaden stud	dents' knowledge of th	eir own expertis	e in relation to
the society, and to r	epresent them usi	ng computers and teo	chnology in edu	cation.		
Evaluation of achiev	ement					
Written reports 50%,	In class work 50%.					
Written reports 50%,	In class work 50%.					
Examination						
授業を実施						
Regular Class	on					
Other information						
Reference URL						
http://www.ita.cs.tu	t.ac.jp/~kawai/kpe/	/ (Some pages are wr	ritten in Japane	ese.)		
http://www.ita.cs.tu	t.ac.jp/ <sup>~</sup> kawai/kpe/	/ (Some pages are wr	ritten in Japane	ese.)		
Office hours						
Office hours; Wedne	sday 2nd period ar	nd Friday 2nd period i	n Room F1-206	3.		
Office hours; Wedne	sday 2nd period ar	nd Friday 2nd period i	n Room F1−206	ð.		
Relations to attainm	ent objectives of I	earning and educatio	n			

### (M43630160)Quantum Biology and Materials Science[Quantum Biology and Materials Science]

Subject name[English]	Quantum Biology and Materials Science[Quantum Biology and Materials Science]							
Schedule number	M43630160	Subject a	rea	Advanced	Required or	Elective		
				Computer	elective			
				Science and				
				Engineering				
Time of starting a course	Spring term	Day of week,per	the od	Tue.5~5	Credit(s)	2		
Faculty	Graduate Program	n for Maste	r's Degr	ee	Subject grade	1~		
Department Offered	Computer Scienc	e and Engir	Beggining grade	M1, M2				
Charge teacher name[Roman alphabet mark]	栗田 典之,後藤	栗田 典之, 後藤 仁志 KURITA Noriyuki, GOTO Hitoshi						
Numbering								
Objectives of class								
The objective of this class is to	understand basis h	ionhysical	henome	na in the organism	s based on the cor	acent of quantum		
chemistry, that is, molecular orbit	al (MO) theory.	lopity clour				loope of quantum		
In achieving this objective, studer	nts will be required	to attempt	to acqu	ire the elementary o	concepts in MO the	eory, and they will		
learn about the electronic proper	ties of biological mo	olecules suc	h as pro	teins, RNA and DN	Α.			
The objective of this class is to	understand basis b	oiophysical	henome	ena in the organism	s based on the cor	ncept of quantum		
chemistry, that is, molecular orbit	al (MO) theory.							
In achieving this objective, stude	nts will be required	d to attemp	t to aco	uire the elementary	y concepts in MO	theory, and learn		
Contents of class	r biological molecule	es such as	proteins	RINA and DINA.				
Considering the preliminary know	ledge of the partici	pates in thi	s class	some topics from t	he following things	will be chosen to		
be learned.			5 61466,					
(1) Basis and elementary concept	s for molecular orb	ital (MO) th	eory (1	and 2 weeks)				
(2) Applications of MO method to	small molecules (3	and 4 wee	(s)					
(3) MO calculations for amino aci	ds and their peptide	es (5 and 6	weeks)					
(4) MO calculations for DNA, RNA	A bases and base p	airs (7, 8 an	d 9 wee	ks)				
(5) MO calculations for complexes	s with proteins and	ligand mole	cules (1	0, 11 and 12 weeks)	)			
(6) MO calculations for DNA, RNA	A and their complex	es with pro	teins (13	3, 14 and 15 weeks)				
Considering the preliminary know	ledge of the partici	pates in thi	s class,	some topics from t	he following things	will be chosen to		
be learned.								
(1) Basis and elementary concept	s for molecular orb	ital(MO) th	eory (1s	and 2nd weeks)				
(2) Applications of MO method to	small molecules (3	rd and 4th	weeks)					
(3) MO calculations for amino aci	ds and their peptide	es (5th and	6th wee	ks)				
(4) MO calculations for DNA, RNA	A bases and base pa	airs (/th, 8t lizzand (10th	h and 9h	weeks)				
(6) MO calculations for DNA RNA	and their complex	ilgarid (100	i, i i uni a Feine (1'	nd 12th weeks) Athe 14th and 15th w	(peks)			
		tes with pro						
Self Preparation and Review								
Elementary concepts in MU theor	ry as well as blomol	iecules sucl	i as pro	eins, RNA and DNA	are required.			
Rasis knowledge about quantum o	hemistry and hiom	olecules su	ch as pr	oteins RNA and DN	A is required			
Notes for textbook	chemisery and biom	olecules su	511 do pi		A is required.			
教科書:資料配付								
参考書:								
"Molecular orbital calculations for	r amino acids and p	eptides", b	Anne-	Marie Sapse				
Reference book								
"Molecular orbital calculations for	r amino acids and p	eptides", b	∕ Anne−	Marie Sapse				
Notes for reference								

#### Goals to be achieved

The objective of this class is to understand basis biophysical phenomena in the organisms based on the concept of quantum chemistry.

The objective of this class is to understand basis biophysical phenomena in the organisms based on the concept of quantum chemistry.

#### Evaluation of achievement

授業で与えられた課題に対するレポート内容及びその発表内容(70%)、テスト(30%)の割合で、総合的に評価する。

[Evaluation basis] Students who attend all classes will be evaluated as follows:

- A: Achieved all goals and obtained total points of exam and reports, 80 or higher (out of 100 points).
- B: Achieved 80% of goals and obtained total points of exam and reports, 65 or higher (out of 100 points).
- C: Achieved 60% of goals and obtained total points of exam and reports, 55 or higher (out of 100 points).

#### Examination

レポートで実施

### By Report

Details of examination

#### Other information

連絡先 教員の居室:F棟 306 号室 電話番号:0532-44-6875 E-mail: kurita@cs.tut.ac.jp

#### **Reference URL**

#### Office hours

上記の E-mail による連絡により、適宜対応する。 Please check the schedule by E-mail in advance.

Relations to attainment objectives of learning and education

Key words

DNA, RNA, Protein, molecular orbital calculation DNA, Protein, molecular orbital calculation

(M43630220)Speech	and Language	Processing,	Advanced[Speech	and Language	Processing, Advanced]	
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Subject name[English]	Speech and Language P	rocessing, Advanced[Speed	ch and Language Pro	ocessing. Advand	ced]
Schedule number	M43630220	Subject area	Advanced	Required or	Elective
	M10000220		Computor	olective	LICOLIVO
				01001170	
			Science and		
			Engineering		
Time of starting a	Spring term	Day of the	Wed.2~2	Credit(s)	2
course		week,period			
Faculty	Graduate Program for M	aster's Degree		Subject	1~
	6	5		grade	
Department Offered	Computer Science and F	ngineering		Beggining	M1 M2
Department Onered	Computer Science and L			Degginnig	1011, 1012
<u>.</u>			070 //	grade	
Charge teacher	秋葉 友良,山本 一公,	AKIBA Tomoyoshi, YAMAN	IOTO Kazumasa		
name[Roman alphabet					
mark]					
Numbering					
Objectives of class					
Important topics on spol	ken / natural language pro	cessing will be discussed.			
Important topics on spol	ken / natural language pro	cessing will be discussed.			
Contents of class	<u> </u>				
(Vomomoto)					
Basic of spoken language	ge processing / Basic of	speech recognition / Algo	rithm for continuous	s speech recogr	ntion / Hid
Markov Model / Languag	ge model, parsing and deco	der/ Spoken dialog system	ns/		
(AKIDA)					
Basic of information re-	trieval / Basic of natural	language processing / Al	gorithms for string	matching and t	ext indexir
Basic of information real Modeling methods for se	trieval / Basic of natural entences and documents /	language processing / Al Automatic machine transla	gorithms for string ation	matching and t	ext indexir
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Basic of information re Modeling methods for se (Yamamoto) Basic of spoken languag Markov Model / Languag (Akiba) Basic of information re Modeling methods for se Self Preparation and Re Related subjects Information theory, Form Information theory, Form Notes for textbook Resumes will be provide •M.Gales & S.Young The application of hidden World Scientific •L.R. Rabiner, R.W. Scha Introduction to Digital Sp World Scientific •Richado Baeza-Yates, Modern Information Retr	trieval / Basic of natural entences and documents / ge processing / Basic of ge model, parsing and decc trieval / Basic of natural entences and documents / view hal language theory hal language theory d, which are based on: n Markov models in speech fer beech Processing Berthier Bibeiro-Neto rieval	language processing / Al Automatic machine transla speech recognition / Algor der/ Spoken dialog system language processing / Al Automatic machine transla	gorithms for string ation rithm for continuous ns/ gorithms for string ation	matching and t	ext indexir hition / Hid ext indexir
Basic of information re Modeling methods for se (Yamamoto) Basic of spoken languag Markov Model / Languag (Akiba) Basic of information re Modeling methods for se Self Preparation and Re Related subjects Information theory, Form Information theory, Form Notes for textbook Resumes will be provide •M.Gales & S.Young The application of hidden World Scientific •L.R. Rabiner, R.W. Scha Introduction to Digital Sp World Scientific •Richado Baeza-Yates, Modern Information Retr Addison Wesley	trieval / Basic of natural entences and documents / ge processing / Basic of ge model, parsing and decc trieval / Basic of natural entences and documents / view nal language theory nal language theory d, which are based on: n Markov models in speech fer peech Processing Berthier Bibeiro-Neto rieval	language processing / Al Automatic machine transla speech recognition / Algo der/ Spoken dialog system language processing / Al Automatic machine transla	gorithms for string ation rithm for continuous ns/ gorithms for string ation	matching and t	ext indexir hition / Hid ext indexir
Basic of information re Modeling methods for se (Yamamoto) Basic of spoken languag Markov Model / Languag (Akiba) Basic of information re Modeling methods for se Self Preparation and Re Related subjects Information theory, Form Information theory, Form Notes for textbook Resumes will be provide •M.Gales & S.Young The application of hidden World Scientific •L.R. Rabiner, R.W. Scha Introduction to Digital Sp World Scientific •Richado Baeza-Yates, Modern Information Retr Addison Wesley	trieval / Basic of natural entences and documents / ge processing / Basic of ge model, parsing and decc trieval / Basic of natural entences and documents / view nal language theory nal language theory d, which are based on: n Markov models in speech fer beech Processing Berthier Bibeiro-Neto ieval	language processing / Al Automatic machine transla speech recognition / Algor der/ Spoken dialog system language processing / Al Automatic machine transla	gorithms for string ation rithm for continuous is/ gorithms for string ation	matching and t	ext indexir hition / Hid ext indexir
Basic of information re Modeling methods for se (Yamamoto) Basic of spoken languag Markov Model / Languag (Akiba) Basic of information re Modeling methods for se Self Preparation and Re Related subjects Information theory, Form Notes for textbook Resumes will be provide •M.Gales & S.Young The application of hidden World Scientific •L.R. Rabiner, R.W. Scha Introduction to Digital Sp World Scientific •Richado Baeza-Yates, Modern Information Retr Addison Wesley	trieval / Basic of natural entences and documents / ge processing / Basic of ge model, parsing and decc trieval / Basic of natural entences and documents / view nal language theory nal language theory d, which are based on: n Markov models in speech fer peech Processing Berthier Bibeiro-Neto rieval	language processing / Al Automatic machine transla speech recognition / Algo der/ Spoken dialog system language processing / Al Automatic machine transla	gorithms for string ation rithm for continuous ns/ gorithms for string ation	matching and t	ext indexir hition / Hid ext indexir
Basic of information re Modeling methods for se (Yamamoto) Basic of spoken languag Markov Model / Languag (Akiba) Basic of information re Modeling methods for se Self Preparation and Re Related subjects Information theory, Form Information theory, Form Notes for textbook Resumes will be provide •M.Gales & S.Young The application of hidder World Scientific •L.R. Rabiner, R.W. Scha Introduction to Digital Sp World Scientific •Richado Baeza-Yates, Modern Information Retr Addison Wesley •Kevin Knight	trieval / Basic of natural entences and documents / ge processing / Basic of ge model, parsing and decc trieval / Basic of natural entences and documents / view hal language theory hal language theory d, which are based on: n Markov models in speech fer beech Processing Berthier Bibeiro-Neto rieval	language processing / Al Automatic machine transla speech recognition / Algo der/ Spoken dialog system language processing / Al Automatic machine transla	gorithms for string ation rithm for continuous ns/ gorithms for string ation	matching and t	ext indexir hition / Hid ext indexir

#### Resumes will be provided, which are based on:

•M.Gales & S.Young The application of hidden Markov models in speech recognition, World Scientific

•L.R. Rabiner, R.W. Schafer Introduction to Digital Speech Processing World Scientific

• Richado Baeza-Yates, Berthier Bibeiro-Neto Modern Information Retrieval Addison Wesley

•Kevin Knight A Statistical MT Tutorial Workbook

Reference1	Book title	The application of recognition	hidden Markov	ISBN		
	Author	M.Gales & S.Young	Publisher	World Scientific	Publish year	
Reference2	Book title Introduction to Digital Speech Processing				ISBN	
	Author	L.R. Rabiner, R.W. Schafer	Publisher	World Scientific	Publish year	
Reference3	Book title	Modern Information	n Retrieval		ISBN	
	Author	Richado Baeza- Yates, Berthier Bibeiro-Neto	Publisher	Addison Wesley	Publish year	
Reference4	Book title	A Statistical MT T	utorial Workbook	ISBN		
	Author	Kevin Knight	Publisher		Publish year	
		•				

### Notes for reference

#### Goals to be achieved

Basics: Understand the role of spoken language as an human interface / Understand hierarchical structure of spoken language / Understand the basic speech analysing methods. / Understand the basic concepts of information retrieval and natural language processing

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. / Understand the character encoding scheme for the world wide letters. / Understand the string matching methods and text indexing methods. / Understand the computational models for sentences, documents, and cross-language relations.

Applications: Understand the dictation system and the speedh dialog system / Understand the applications of speech technology including computer aided language learning system. / Understand the machine translation system.

Basics: Understand the role of spoken language as an human interface / Understand hierarchical structure of spoken language / Understand the basic speech analysing methods. / Understand the basic concepts of information retrieval and natural language processing

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. / Understand the character encoding scheme for the world wide letters. / Understand the string matching methods and text indexing methods. / Understand the computational models for sentences, documents, and cross-language relations.

Applications: Understand the dictation system and the speedh dialog system / Understand the applications of speech technology including computer aided language learning system. / Understand the machine translation 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 Details of examination

### Other information

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

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

#### **Reference URL**

http://www.cl.ics.tut.ac.jp/~akiba/ http://www.cl.ics.tut.ac.jp/~akiba/

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

#### (M43630280)Web Data Engineering 1[Web Data Engineering 1]

					1
Subject name[English]	Web Data Engineering 1 Web Data	Engineering 1			
Schedule number	M43630280	Subject area	Advanced	Required or	Elective
			Computer	elective	
			Science and		
			Engineering		
Time of starting a	Spring1 term	Day of the	Thu.2~2	Credit(s)	1
course		week.period			
Faculty	Graduate Program for Master's De	gree		Subject	1~
		0		grade	-
Department Offered	Computer Science and Engineering	Y		Beggining	M1 M2
Department Onered	Computer Science and Engineering	5		Deggining	1011, 1012
Ohanna taaahan	書野 瑞樹 AONO Masaki			grade	
Charge teacher	月到 加倒 AONO Masaki				
namelroman alphabet					
mark j					
Numbering					
Objectives of class					
Data engineering techno	logies for aggregated data (including	Web data) will be	e discussed.		
Main emphasis is on the	information retrieval and data minin	g technologies.			
Data Mining technologies	s include principal component analys	sis. supervised lea	arning such as classi	fication. unsupe	rvised learning
such as clustering and V	Veb mining technologies	,			
Multimedia data process	ing will also be discussed				
The objectives of this of	ass is to let students know the state	a-of-the art tech	nologias in data mini	ng and informat	ion retrieval
Contento of class		e of the art tech			ion recrieval.
Glasses will be held (the	oretically) 7.5 times. The last time w	III be kept for the	e exam.		
1. Information Retrieval					
Fundamental techniques	s to construct a search system, in	cluding how to l	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					
Eurodomontal mathada fa	er data mining og wall og Wah mining	are discussed			
i unuamentai metrious io	i uata mining as well as web mining	are discussed.			
We plan to do one or two	o assignments for data mining techn	iques inside.			
Please note that if this l	ecture is held at the same time with	Japanese course	e, the lecture might l	be in Japanese.	
The intelligent data engi	neering technologies for aggregated	data will be focu	sed, where the data	include both se	emi-structured
data. such as XML and	JSON, and unstructured data (e.g.	time series data	a and the Web) are	included, but s	tructured data
(such as SQL) are exclusion	ded	uut			

Main emphasis is on the state-of-the-art technologies on data mining and information retrieval.

For data mining technologies, both unsupervised and supervised learning methods will be discussed. The former includes principal component analysis, clustering, Web graph mining, and information filtering, while the latter includes classification and regression.

For information retrieval technologies, we start with traditional vector space (Bag-of-Words) models, ending with deep learning based models such as skip-gram (e.g. word2vec). Both linear and non-linear dimensional reduction techniques will be covered. In addition, multimedia retrieval (3D shapes, images, and videos) will be referred.

#### Self Preparation and Review

It is desirable to self-study as well as review fundamental data mining techniques such as clustering, classification, principal component analysis, and regression. It is recommended installing R/Python (also sometimes Java/C++) language into your computer, because some of the lecture materials are written in R/Python language. (R is favorable for simple visualization.) It is desirable to self-study as well as review fundamental data mining techniques such as clustering, classification, and regression. It should be noted that the knowledge on multivariate analysis techniques such as principal component analysis is a prerequisite to this class. It is recommended installing R/Python (also sometimes Java/C++) language into your computer, because some of the lecture materials are written in R/Python language.

**Related** subjects

#### Notes for textbook

Materials will be prepared by lecturers

References:

(1) C. D. Manning et al, Introduction to Information Retrieval, Cambridge Univ. Press

(2) J. Han and M. Kamber, Data Mining: Concepts and Techniques, 2nd ed, Morgan Kaufmann

Materials will be prepared by lecturers

#### References:

(1) C. D. Manning et al, Introduction to Information Retrieval, Cambridge Univ. Press

(2) J. Han and M. Kamber, Data Mining: Concepts and Techniques, 2nd ed, Morgan Kaufmann

Reference1	Book title	Information Retrie	val, Implementin	g and Evaluating	ISBN	978-0-262-
		Search Engines				02651-2
	Author	Stefan Buttcher,	Publisher	MIT Press	Publish year	2010
		Charles L.A.				
		Clarke, Gordon V.				
		Cormack				
Reference2	Book title	Data Mining: Conce	pts and Techniqu	es, Third Edition	ISBN	978-0-123-
						81479-1
	Author	Jiawei Han,	Publisher	Morgan	Publish year	2011
		Micheline		Kaufmann		
		Kamber, and Jian				
		Pei				
Reference3	Book title	Data Mining Pract	ical Machine Le	arning Tools and	ISBN	978-0-12-
		Techniques, Third E	dition			374856-0
	Author	Ian H. Witten,	Publisher	Morgan	Publish year	2011
		Eibe Frank, and		Kaufmann		
		Mark A. Hall				
Notes for reference						
Reference #4						
Title: <sup></sup> Modern Informat	ion Retrieval, t	he concepts and tech	nology behind se	arch, Second Editior	ו	

Authors:Ricardo Baeza-Yates, Bertier Ribeiro-Neto

Publisher: Addison Wesley

ISBN:978-0-321-41691-9

Year:2011

Reference #5

Title:「Google's PageRank and Beyond」

Authors: Amy N. Langville, Carl D. Meyer

Publisher: Princeton University Press

ISBN:978-0-691-12202-1 Year:2006

Reference #4

Title:<sup>[</sup>Modern Information Retrieval, the concepts and technology behind search, Second Edition] Authors:Ricardo Baeza-Yates, Bertier Ribeiro-Neto Publisher: Addison Wesley ISBN:978-0-321-41691-9 Year: 2011

#### Reference #5

Title: <sup>[</sup>Google's PageRank and Beyond] Authors: Amy N. Langville, Carl D. Meyer Publisher: Princeton University Press ISBN: 978-0-691-12202-1 Year: 2006

#### Goals to be achieved

To acquire the following knowledge that can make you

1. Implement fundamental data mining technologies.

2. Understand advanced technologies for information retrieval, including dimensional reduction.

3. Design, analyze, and evaluate the information retrieval and data mining technologies.

The following items have to be achieved:

1. Able to implement and apply fundamental data mining technologies.

2. Understand fundamental technologies for information retrieval, making full use of good indexing (such as dimensional reduction) after properly representing data objects to be retrieved.

3. Able to design, analyze, and evaluate both data mining and information retrieval technologies.

Evaluation of achievement

Exercise (20%) and Final exam (80%)

A: (>=80), B: (>=65), C: (>= 55) Exercise (20%) and Final exam (80%)

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**

http://www.kde.cs.tut.ac.jp/~aono/myLecture.html http://www.kde.cs.tut.ac.jp/~aono/myLecture.html

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.

### (M43630320)Bio-physical Information Systems 1[Bio-physical Information Systems 1]

Subject	Bio-physical Information Systems 1[Bio-physical Information Systems 1]					
name[English]	M40000000			A 1 1	De la la la	<b>E</b> L 11
Schedule number	M43630320		Subject area	Advanced	Required or	Elective
				Computer	elective	
				Science and		
				Engineering		
Time of starting a	Spring1 term		Day of the	Mon.4~4	Credit(s)	1
course			week,period			
Faculty	Graduate Pro	ogram for Master's De	gree		Subject grade	1~
Department Offered	Computer Sc	ience and Engineering	2		Beggining	M1, M2
-			-		grade	
Charge teacher	福村 直博 F	UKUMURA Naohiro				
name[Roman alphabet						
mark]						
Numbering						
Objectives of class						
This course lectures or	n advanced stu	udies on information i	processing in the	nervous systems a	nd computation	al models for
motor controls of the h	uman movemen	its		·····		
This course lectures or	advanced sti	idies on information i	processing in the	nervous systems a	nd computation	al models for
motor controls of the bi		uts		i vous systems di		
Contents of close		113.				
1 Introduction 1			have a sector of the	_		
1. Introduction to the co	omputational ne	euroscience in the mo	tor control system	n		
2. Information processin	ig in the motor	system of the brain				
3-4. Motor control mode	els of the huma	in arm movements				
5-6. Models for motor p	lanning in the h	numan arm movement	s			
7. Models for motor plan	nning in the hur	nan hand movements				
8. Examination						
1. Introduction to the co	omputational ne	euroscience in the mo	tor control systen	n		
2. Information processin	ig in the motor	system of the brain				
3-4. Motor control mode	els of the huma	in arm movements				
5-6. Models for motor p	lanning in the r	iuman arm movement	S			
/. Models for motor plan	nning in the hur	nan hand movements				
8. Examination						
Self Preparation and Re	oview					
Related subjects						
-						
Natao fan tauthaals						
NOTES IOL TEXTDOOK						
Reference1	Book title	Human Motor Conti	rol	1	ISBN	
	Author	David A.	Publisher	Academic Press	Publish year	2010
		Rosenbaum				
Notes for reference						
Goals to be achieved						
1. Understand the comp	utational proce	essing in the motor co	ontrol			
2. Understand the moto	r control model	ls of the human volun	tary movements			
3. Understand the mode	ls for motor nl	anning of the human v	oluntary movement	nts		
1. Understand the comp	utational proce	ssing in the motor co	ntrol			
2 Understand the moto	r control model	is of the human volum	tary movements			
3 Understand the mode	le for motor riv	anning of the human volum		ate		
5. Understand the mode	as for motor pla	aming of the numan v	olunitary movemen	11.5		
	BIIC					
Final examination (100%)	), A: 100-80, B	5: /9-65, C: 64-55, D	(tail): 54-0			
Final examination (100%), A: 100-80, B: 79-65, C: 64-55, D (fail): 54-0						

Examination
試験期間中には何も行わない
None during exam period
Details of examination
Other information
N. Fukumura (C611, Tel: 0532-44-6772, fukumura@cs.tut.ac.jp)
N Fukumura (C611 Tel: 0532-44-6772 fukumura@cs.tut.ac.in)
Deference I IDI
nttp://www.bmcs.cs.tut.acjp
http://www.bmcs.cs.tut.ac.jp
Office hours
Monday 16:20-17:50
Monday 16:20–17:50
Relations to attainment objectives of learning and education
D1
D1
Key worde

### (M43630330)Bio-physical Information Systems 2[Bio-physical Information Systems 2]

Subject name[English]	Bio-physical	Information Systems	2[Bio-physical In	formation Systems 2	2]	
Schedule number	M43630330		Subject area	Advanced	Required or	Elective
				Computer	elective	
				Science and		
				Engineering		
Time of starting a	Spring2 term		Day of the	Mon.4~4	Credit(s)	1
course			week,period			
Faculty	Graduate Pro	gram for Master's De	gree		Subject	1~
					grade	
Department Offered	Computer Sc	ience and Engineering	5		Beggining	M1, M2
					grade	
Charge teacher	堀川 順生 H	ORIKAWA Junsei				
name[Roman alphabet						
mark]						
Numbering						
Objectives of class	•					
In this course, we stud	dv information	processing in the ne	ervous svstem o	f animals and huma	ans. The cours	se consists of
structures of the nerve	us system m	chanisms of action	potentials and sv	naptic transmission	and mechanise	ms of sensory
information processing i	n the periphera	l and central nervous	svstem.		, and moonumor	
In this course, we stur	dv information	processing in the ne	ervous system o	f animals and huma	ans. The cours	se consists of
structures of the nervo	ous system m	chanisms of action	potentials and sv	naptic transmission	and mechanis	ms of sensory
information processing i	n the periphera	l and central nervous	svstem.		,	et concory
Contents of class			,			
1. Introduction to the in	formation proce	essing in the nervous	svstem			
2. Structures of the ner	vous system a	nd action potentials ar	nd synaptic trans	mission		
3. Information processin	g in the visual	system 1				
4. Information processin	g in the visual	system 2				
5. Information processin	g in the auditor	v svstem				
6. Information processin	g in the somet	sensory system				
7.5. Information process	ing in the olfac	tory and gustatory sv	stems			
8. Final examination						
e. i mar oxaniniación						
1 Introduction to the int	formation	ocina in the new second	system			
2 Structures of the rea		antion notontials a	ad avaantia transs	mission		
2. Structures of the her	vous system ar	iu action potentiais ar	ia synaptic transi	nission		
4 Information processin	g in the visual	system 2				
5 Information processin	g in the sudite	sysiciii Z				
6 Information processin		y system				
7.5 Information processin	g in the olfoc	tony and guestatony av	stems			
8 Final examination	ing in the ollac	tory and gustatory sy	5101115			
o. Final examination						
o (r D						
Self Preparation and Re	view					
Related subjects						
Bio-physical Information	n Systems 1					
Bio-physical Information	n Systems 1					
Notes for textbook						
Handouts referring the r	eference book	s are used.				
Handouts referring refer	ence books are	e used.				
Reference1	Book title	Neuroscience - Evo	loring the brain		ISBN	
						0007
	Author	Bear, Connors,	Publisher	Lippincott	Publish year	2007
		Paradiso		Williams &		
				Wilkins		
Reference2	Book title	Cognitive Neuroscie	ence - The biolog	y of the brain	ISBN	
	Author	Gazzaniga, Ivry,	Publisher	WW Norton &	Publish year	2008
						•
		Mangun		Co Incm		
--------------------------	------------------	---------------------------	------------------	------------------------	------------------	--------
Reference3	Book title	Neuroscience - The	biology of the	brain	ISBN	
	Author	Gazzaniga Ivrv	Dublisher	WW Norton &	Dublich vear	2008
	Addio	Mangun		Co Incm	i ubiisii yoai	2000
Notes for reference		mangan				
Goals to be achieved						
1 Understand the struc	stures of neuro	ns and the peripheral a	nd central ner	vous systems		
2. Understand neural an	nd synaptic med	chanisms for informatic	n processing a	and Hodgekin-Huxley e	quation	
3 Understand the neur	al information n	processing in the visual	auditory som	atosensory olfactory a	and gustatory sy	vstems
			, additory, con	accountery, endetery (		Jocomo
1 Understand the struc	tures of pouro	ne and the peripheral a	nd central ner	vous systems		
2 Understand neural ar	d cynantic mer	ns and the peripheral a		nd Hodgekin-Huvley e	quation	
2. Understand the neuro	al information n	recessing in the visual	auditory com	and Hougekin Huxley e	and guetatory of	ictome
5. Onderstand the neuro			, additory, son	acosensory, onactory a	and gustatory s	ystems
Further of achiever						
	ent					
[Evaluation basis] Stud	ents who atten	d all classes will be eva	aluated as folic	ows:		
A: Achieved all goals an	id obtained tota	al points of exam, 80 of	r higher (out of	r TUU points).		
B: Achieved 70 % of goa	als and obtained	d total points of exam,	65 or higher (d	out of 100 points).		
C: Achieved 60 % of goa	als and obtaine	d total points of exam,	55 or higher (d	out of 100 points).		
[Evaluation basis] Stude	ents who atten	d all classes will be eva	aluated as folic	ows:		
A: Achieved all goals an	d obtained tota	al points of exam, 80 oi	r higher (out of	f 100 points).		
B: Achieved 70 % of goa	als and obtained	d total points of exam,	65 or higher (c	out of 100 points).		
C: Achieved 60 % of goa	als and obtaine	d total points of exam,	55 or higher (o	out of 100 points).		
Examination						
正期試験を美他(対面)	<b>`</b>					
Examination(Face to Fa	ice)					
Details of examination						
Oth an information						
	T-1-0520 44	6001 havilana @aatat	:			
Junsel Horikawa (F407,	Tel: 0532-44-0	0891, horikawa@cs.tut.a	ac.jp)			
Junsei Horikawa (F407,	Tel: 0532-44-0	6891, horikawa@cs.tut.a	ac.jp)			
Reference URL						
Office hours						
Monday 16:20-17:50						
Monday 16:20-17:50						
Relations to attainment	t objectives of	learning and education				
Key words						

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

Subject name[English]	Seminar on Environmental and Life Science [Seminar on Environmental and Life Science ]						Life Science I]
Schedule number	M44610010	Subje	ct are	a	Advanced	Required or	Required
		-		Environmental	elective		
					and Life		
					Sciences		
Time of starting a course	Year	Day week	of period	the	Intensive	Credit(s)	3
Faculty	Graduate Program	n for Ma	aster's	Degre	ee	Subject grade	1~
Department Offered	Environmental an	d Life S	cience	es		Beggining	M1, M2
						grade	
Charge teacher name[Roman	S4系教務委員, 4	S4系教務委員, 4系各教員 4kei kyomu Iin−S, 4kei kakukyouin					
alphabet mark]							
Numbering							
Objectives of class							
This course will provide the stu	udents with opport	unities	to stu	udy or	n his/her research	subjects on enviro	onmental and life
sciences by reading textbooks a	nd scientific paper	s under	the g	uidano	ce of his/her superv	visor. The aim of th	ne lessen for the
students is to learn knowledge ar	nd presentation skil	ls requi	red fo	r his/ł	ner research in the s	eminar as well as t	o deepen his/her
understanding of environmental a	ind life sciences.						
Contents of class							
The students will be required to	read textbooks and	l papers	s writt	en by	other language than	Japanese, especia	lly English, which
are suggested by his/her supervi	sor, and to report a	nd disc	uss de	eply o	on his/her research	subject in the semi	nar.
Self Preparation and Review							
Related subjects							
Seminar on Environmental and Li	fe Science II						
Thesis Research on Environment	al and Life Science						
All other relevant subjects in Adv	vanced Environmen	tal and	Life So	cience	S		
Notes for textbook							
Supervisor will recommend textb	ooks, papers, and re	esearch	mater	rials to	o students.		
Notes for reference							
Goals to be achieved							
lo acquire basic knowledge on ei	nvironmental and lif	e scien	ces				
To understand the contents of so	cientific papers in a	given f	ield of	envir	onmental and life sci	ences	
Evaluation of appiorament	er presentations re	ievant t	to pap	ers ne	/ she has read.		
The evaluation is based on the	coores of reading	taythaa	ke and		atifia nanara disqua	sions reports and	presentations of
his/her research in the seminar	His/her supervisor	evaluat	es the	score	nunic papers, discus	sions, reports and	presentations of
Examination		evaluat	00 010	30010			
その他							
None during exam period							
Details of examination							
Other information							
Supervisor(s)							
Reference URL							
http://ens.tut.ac.jp/en/							
Office hours							
Students are encouraged visiting	by appointment.						
Relations to attainment objective	es of learning and e	ducatio	n				
Kanada							
Environmental science and techn	lology, life science,	materia	IS SCIE	nce a	na engineering, appli	ea chemistry	

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

Subject name[English]	Seminar on Environmental and Life Science II[Seminar on Environmental and Life Science II]						d Life Science II]
Schedule number	M44610020	Subject	area		Advanced	Required or	Required
	1111010020				Environmental	elective	Roquirou
					and Life	0.000110	
					Sciences		
Time of starting a course	Year	Dav o	of the		Intensive	Credit(s)	3
	1 out	week pe	riod			010010(0)	0
Faculty	Graduate Program	n for Mast	er's Der	gre	e	Subject grade	2~
Department Offered	Environmental an	d Life Scie	ences	8. <del>-</del>	•	Beggining	 M2
						grade	
Charge teacher name[Roman	S4系教務委員.4	1系各教員	4kei kv	nu Iin-S. 4kei kakuk	vouin		
alphabet mark]							
Numbering							
Objectives of class							
Based on the Seminar on Enviro	nmental and Life S	cience I, t	his cou	irse	will further provide	e the students with	n the opportunity
to study on his/her research sub	ject in environment	tal and life	scienc	es	by reading textbook	s and papers unde	r the guidance of
his/her supervisor. The student	s will learn the kn	owledge a	ind the	pr	esentation skills re	quired for his/her	research in the
seminar.							
The students will be required to	read textbooks and	l papers w	ritten b	у с	other language than	Japanese, especia	Illy English, which
are suggested by his/her supervi	sor, and to report a	and discuse	s deeply	y or	n his/her research s	subject in the semi	nar.
Self Preparation and Review							
Related subjects							
Seminar on Environmental and Li	fe Science I						
Thesis Research on Environment	al and Life Science						
All other relevant subjects in Adv	/anced Environmen <sup>-</sup>	tal and Life	e Scien	ces	3		
Notes for textbook							
Supervisor will recommend textb	ooks, papers, and re	esearch m	aterials	to	students.		
Notes for reference							
Goals to be achieved							
To acquire basic knowledge on er	nvironmental and lif	e science					
To understand the contents of so	cientific naners in a	given field	- d of env	<i>i</i> ro/	nmental and life sci	ences	
To be able to make oral and post	er presentations re	levant to i	papers I	he/	she has read.		
Evaluation of achievement			supere :				
The evaluation is based on the	scores of reading	textbooks	and sc	ien	tific papers discus	sions, reports and	presentations of
his/her research in the seminar	His/her supervisor	evaluates	the scc	ores	s		
Examination		oraldatee					
その他							
None during exam period							
Details of examination							
Other information							
Supervisor(s)							
nttp://ens.tut.ac.jp/en/							
Chudents	h						
Students are encouraged visiting	by appointment.	ducation					
	es of learning and e	ducation					
Kov words							
rey words	alamı lifa!	. ا - ا: مهمه	l		d anaina arity ar P	ad alaamiatuu i	
Environmental science and techn	lology, life science,	materials :	science	an	u engineering, applie	eu chemistry	

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

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

#### **Objectives of class**

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

#### **Contents of class**

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

#### Related subjects

Seminar on Environmental and Life Science I

Seminar on Environmental and Life Science II

Notes for textbook

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

Notes for reference

## Goals to be achieved

To acquire basic knowledge on environmental and life sciences

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

To be able to make safety control in experimental work

#### Evaluation of achievement

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

#### etc). Examination

その他

None during exam period

#### **Details of examination**

Other information

Supervisor

Reference URL

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

# Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

# Key words

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

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

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

#### **Objectives of class**

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

#### **Contents of class**

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

#### Related subjects

Seminar on Environmental and Life Science I

Seminar on Environmental and Life Science II

Notes for textbook

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

Notes for reference

## Goals to be achieved

To acquire basic knowledge on environmental and life sciences

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

To be able to make safety control in experimental work

#### Evaluation of achievement

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

#### etc). Examination

その他

None during exam period

#### **Details of examination**

Other information

Supervisor

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

# Key words

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

Subject name[English]	Thesis Researc	h on Environmental a	and Life Science[The	esis Research on E	nvironme	
	Life Science]			<del></del>		
Schedule number	M44610033	Subject area	Advanced Environmental and Life Sciences	Required or elective	Require	
Time of starting a course	1.5Years	Day of the	Intensive	Credit(s)	6	
Faculty	Graduate Progra	am for Master's Degr	ee	Subject grade	2~2	
Department Offered	Environmental a	Beggining grade	M2			
Charge teacher name[Roman alphabet mark]	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyouin					
Numbering						
Objectives of class						
☆保証科目のためシラバス入力	不要					
Contents of class						
Self Preparation and Review						
Related subjects						
Natao fay tauth a sh						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Examination						
その他						
Details of examination						
Other information						
Other information						
Other information						
Other information Reference URL						
Other information Reference URL						
Other information Reference URL Office hours						
Other information Reference URL Office hours						
Other information Reference URL Office hours Relations to attainment objective	es of learning and	education				
Other information Reference URL Office hours Relations to attainment objective	es of learning and	education				
Other information Reference URL Office hours Relations to attainment objective	es of learning and	education				
Other information Reference URL Office hours Relations to attainment objective	es of learning and	education				
Other information Reference URL Office hours Relations to attainment objective	es of learning and	education				

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

Subject name[English]	Thesis Research on Environmental and Life Science[Thesis Research on Environmental and Life Science]						
Schedule number	M4461003T	Subject area	Advanced Environmental and Life Sciences	Required or elective	Required		
Time of starting a course	Year	Day of the	Intensive	Credit(s)	6		
		week,period					
Faculty	Graduate Program	n for Master's Degre	e	Subject grade	2~		
Department Offered	Environmental and	d Life Sciences		Beggining	M2		
				grade			
Charge teacher name[Roman alphabet mark]	S4系教務委員, 4	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyouin					
Numbering							

## **Objectives of class**

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

#### **Contents of class**

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

#### Related subjects

Seminar on Environmental and Life Science I

Seminar on Environmental and Life Science II

Notes for textbook

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

Notes for reference

## Goals to be achieved

To acquire basic knowledge on environmental and life sciences

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

To be able to make safety control in experimental work

#### Evaluation of achievement

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

#### etc). Examination

その他

None during exam period

## **Details of examination**

Other information

Supervisor(s)

Reference URL

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

# Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

# Key words

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

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

Subject name[English]	Seminar on Environmental and Life Science[Seminar on Environmental and Life Science]						_ife Science]
Schedule number	M44610040	Subje	ct are	a	Advanced	Required or	Required
				Environmental	elective		
					and Life		
					Sciences		
Time of starting a course	Year	Day week.	of period	the	Intensive	Credit(s)	6
Faculty	Graduate Progran	n for Ma	aster's	Degre	e	Subject grade	2~
Department Offered	Environmental and	d Life S	cience	es		Beggining	M2
						grade	
Charge teacher name[Roman	S4系教務委員, 4	1系各教	【員 4k	ei kyo	mu Iin−S, 4kei kakuk	youin	
alphabet mark]							
Numbering							
Objectives of class							
This course will provide the stu	idents with the op	portunit	y to :	study	on his/her researd	n subject in enviro	onmental and life
sciences by reading textbooks ar	nd papers under the	e guidan	ce of	his/he	er supervisor. The st	udents will learn th	ne knowledge and
the presentation skills required for	or his/her research	in the s	semina	ar.			
Contents of class							
The students will be expected	to read textbooks	and p	apers	writt	en by foreign langu	age that are indic	ated by his/her
supervisor, and report and discus	s deeply on his/he	r resear	ch sub	oject i	n the seminar.		
Self Preparation and Review							
Related subjects							
Thesis Research on Environment	al and Life Science						
All other relevant subjects in Adv	anced Environment	tal and l	Life So	cience	s		
Notes for textbook							
Supervisor will recommend textb	ooks and papers to	student	ts.				
Notes for reference							
Goals to be achieved							
To acquire basic knowledge on e	nvironmental and lif	e sciend	ces				
To understand the contents of se	cientific papers in a	given fi	ield of	envir	onmental and life sci	ences	
To be able to make oral and post	er presentations re	levant t	o pape	ers he	∕she has read.		
Evaluation of achievement							
The evaluation is based on the	scores of reading	papers,	discu	ssions	, reports and prese	ntations of his/her	r research in the
seminar. His/her supervisor evalu	ates the scores.						
Examination							
その他							
None during exam period							
Details of examination							
Other information							
Supervisor							
Reference URL							
http://ens.tut.ac.jp/en/							
Office hours							
Students are encouraged visiting	by appointment.						
Relations to attainment objective	es of learning and e	ducatio	n				
1							
Key words							
Noy words							
L							

## (M44630050)Applied Physical Chemistry I[Applied Physical Chemistry I]

Subject	Applied Physical Chemistry I[Appl	lied Physical Che	mistry I]				
name[English]	1111000050						
Schedule number	M44630050	Subject area	Advanced Environmental and Life Sciences	Required or elective	Elective		
Time of starting a course	Spring1 term	Day of the week,period	Tue.4~4	Credit(s)	1		
Faculty	Graduate Program for Master's D	Subject grade	1~				
Department Offered	Environmental and Life Sciences	Beggining grade	M1, M2				
Charge teacher	aacher 松本 明彦 MATSUMOTO Akihiko						
name[Roman							
alphabet markj							
Numbering							
adsorption and separat materials and basic pri based on the molecular Intermolecular interar adsorption and separat materials and basic pri based on the molecular <b>Contents of class</b> [1] 1.Composite materi [2] (Continued) [3] 2.Formation of inter [4] 3.Molecular interact [6] 4.Adsorption and re [7] Control of interface [8] Examination [1] 1.Composite materi [2] (Continued) [3] 2.Formation of inter [4] 3.Molecular interact [5] 3–3 Induced interact [6] 4.Adsorption and re [4] 3.Molecular interact [5] 3–3 Induced interact [6] 4.Adsorption and re [7] Control of interface [8] Examination	tion features of molecules by porous nciple of the intermolecular interact r interaction. ction plays a key role in interfacial of tion features of molecules by porous nciple of the intermolecular interact r interaction. ials overview rface and interfacial free energy tion 3–1 Electrostatic interaction slated phenomena e interaction by regulation of the ch ials overview rface and interfacial free energy tion 3–1 Electrostatic interaction slated phenomena e interaction by regulation of the ch ials overview	s solids. This cont tion. The adsorpt characteristics su s solids. This cont tion. The adsorpt –2 Orientation in memical structure	urse deals with funda ion and separation p ich as a mechanical p urse deals with funda ion and separation p teraction, of the interface teraction,	Imental aspect of henomena are a property of com Imental aspect of henomena are a	of the composite also implemented posite materials, of the composite also implemented		
Self Preparation and R	leview						
Related subjects							
Basic understanding or	n physical chemistry is expected.						
Reference handouts wi	ill he provided in the class						
Reference handouts wi	ill be provided in the class.						
(Reference books) [For molecular interact 1. Intermolecular and S 2. Interface chemistry: 3. Physical Chemistry	tion] Surface Forces, 3rd Ed.: J. N. Israela D. H. Everett, Basic Principles of C of Surfaces, 7th Ed.: A. Adamson, W	nchivili, Academic Colloid Science, R /ilev-Intercience	Press (2011). oyal Society of Chen (1997), or its old edit	nistry(1988). ion.			

Reference I	Book title	Intermolecular and	Surface Forces,	3rd Ed.	ISBN	
	Author	J. N. Israelachivili	Publisher	Academic Press	Publish vear	2011
Reference2	Book title	Intermolecular and Revised Third Editio	J Surface Fore	ces, Third Edition:	ISBN	978- 0123919274
	Author	Jacob N. Israelachvili	Publisher	Academic Press	Publish vear	2011
Reference3	Book title	Basic Principles of	Colloid Science		ISBN	
	Author	D.H. Everett	Publisher	The Royal Society of Chemistry	Publish year	1988
Reference4	Book title	Physical Chemistry	of Surfaces, 7tł	n Ed.	ISBN	
	Author	A. Adamson	Publisher	Wiley-Intercience	Publish	1977
1) Understanding of 2) Understanding of <b>Evaluation of achi</b> 30 % Homework 30 % Homework	of basic structure of molecular intera evement report and/or Quiz report and/or Quiz	and properties of com ction z, 70 % Final examinati z, 70 % Final examinati	iposit materials on or report on or report			
定期試験を実施(注	対面) ta Fasa)					
Details of examina	ition					
Other information	oom # B−505, E−m	ail: aki*at*ens.tut.ac.jŗ ail: aki*at*ens.tut.ac.jŗ	p (Please replace p (Please replace	e ″*at*″ to ″@″ when e ″*at*″ to ″@″ when	e-mailing) e-mailing)	
A. Matsumoto: ro A. Matsumoto: ro Reference URL	oom # B−505, E−m					
A. Matsumoto: ro A. Matsumoto: ro Reference URL Office hours	oom # B−505, E−m					

(M44630100)Special Topics in Applied Organic Chemistry[Special Topics in Applied Organic Chemistry]

Subject nemo[Endich]	Succial Taniaa in	Annlind Ourania Ch	amiatus (Succial Tau)	in Applied Orm	nia Chamiatur/	
	Special Topics In	Applied Organic On	emistry_Special Top	cs in Applied Orga		
Schedule number	WI44030100	Subject area	Advanced	Required or	Elective	
			Environmental	elective		
			and Life			
			Sciences			
Time of starting a course	Spring1 term	Day of the	Tue.5~5	Credit(s)	1	
		week,period				
Faculty	Graduate Progran	n for Master's Degre	e	Subject grade	1~	
Department Offered	Environmental and	d Life Sciences		Beggining	M1, M2	
			grade			
Charge teacher name[Roman	岩佐  精二, 柴富  一孝 IWASA Seiji, SHIBATOMI Kazutaka					
alphabet mark						
Numbering						
Objectives of class						
右機化学の分野で精密有機会成	化学と右機全属化	学の最失端の知識	を翌得する			
To provide you with a working kn	owledge of advance	d synthesis of mole	cular materials			
Contents of class						
	エムータジャニキョ	+ み+、 + 撚ハマ + +			- オル 性肉を挑	
月機化学は、灰素育格と水素の	まかに多彩な元素な	と言む有機分士を扱	れ、様々な分野に加え、 古たまない 服金の	い用されている。この	- じは、 有欲有機	
合成化字と有機金属化字に焦点	を絞り、高度な最前	縁の知識を修得す	る。また融合分野の物	時別講義を行う。		
<b>第1回 動植物記酒有機物質概</b> 量	Ϋ́					
第一回 新福物超称有限物質概						
第2回 を合成時間に至日成	後の理題					
	反の赤皮					
第4回 18 电于则、能位形式、触 第5回 計除	ほりイクル					
弗5凹 試駛 茨2日 针拱后亡多亡田						
第6回 照媒反応の応用						
第7回 医楽品の合成と反応(I)						
第8回 医楽品の合成と反応(II)						
第9回 試験						
This course includes the detail o	of the most recent	progress in modern	synthetic applicatio	n of catalysis, org	anometallics, and	
the total synthesis of natural pro	ducts on the basis	of retrosynthetic ar	alvsis.			
		•	•			
1. Total cumthonic of hispative or	namia annanaumda (1	Iuree)				
1. Total synthesis of bloactive or	ganic compounds. (	iwasa)	(1)			
2. Advanced modern synthetic or	ganic reactions usi	ng transition metals	. (Iwasa)			
3. Basic concept of oxidative add	lition and reductive	elimination in catal	/tic cycles. (Iwasa)			
4. Synthetic applications of asym	metric synthesis ar	id asymmetric catal	ysts. (Iwasa)			
5. Basic concept of Lewis acid ca	atalyst and organoc	atalyst. (Shibatomi)				
6. Advanced Lewis acid catalysis	in organic synthesi	s. (Shibatomi)				
7. Advanced organocatalysis in o	rganic synthesis. (S	hibatomi)				
8. Organofluorine chemistry. (Shi	patomi)					
Self Preparation and Review						
Baland and the						
	w — ⊥ // ×/ /± = ∧					
有磯合成字、有機元素化学、有樹	殿反応化学特論					
Subjects related to Organic Cher	nistry					
Notes for textbook						
参考書						
大学院講義 I, II 有機化学 1999,	野依 編 東京化学	同人				
遷移金属が拓く有機合成 1997、	辻 二郎 著 化学	同人				
Classics in Total Synthesis 1997	K.C. Nicolaou.; E.	J. Sorensen. VCH				
No textbook is required.						
Some of information in WebCT w	ill be help for your u	understanding on th	is course.			

## Notes for reference

## Goals to be achieved

有機化合物の構造と反応性について (1)逆合成解析と全合成を理解する。 (2)18 電子則を正確に理解する。 (3)不斉合成、不斉触媒を理解する。 (4)理解した概念を触媒サイクルに応用できる。 (5)医薬品合成の実際を概観する。

A firm understanding on catalyst, stereochemistry, reaction mechanism, and their application for the synthesis of molecular materials is achieved.

Evaluation of achievement

評価法:定期試験2回・補習・レポート(40%+40%+10%+10%)で評価する。

評価基準:原則的にすべての講義に出席したものにつき、下記のように成績を評価する。

- A:達成目標をすべて達成し、かつ試験・補習・レポートの合計点(100 点満点)が 80 点以上
- B:達成目標を3つ達成し、かつ試験・補習・レポートの合計点(100 点満点)が 65 点以上

C:達成目標を2つ達成し、かつ試験・補習・レポートの合計点(100 点満点)が 55 点以上

The report on papers from scientific journals such as J.A.C.S and Angew. Chem. will be imposed.

A design of novel organic molecular material.

Examination

授業と定期試験(対面)

By Report

## Details of examination

# Other information

岩佐(部屋:B-506, Tel:内線 6817, E-mail: iwasa@ens.tut.ac.jp) http://ens.tut.ac.jp/orgchem/

For more information: Seiji Iwasa: room (B-506), e-mail (iwasa@ens.tut.ac.jp) Kazutaka Shibatomi: room (B-507), e-mail (shiba@ens.tut.ac.jp)

#### Reference URL

http://www.tutms.tut.ac.jp/RESEARCH/iwasa.html

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

http://material.tutms.tut.ac.jp/STAFF/IWASA/index.html.ja、http://ens.tut.ac.jp/orgchem/

http://www.siorgchem.ens.tut.ac.jp/index.html

Office hours

質問、意見等随時受けます。

anytime.

Relations to attainment objectives of learning and education

Key words 不斉触媒、不斉合成、全合成、天然物

molecular catalyst, total synthesis, natural product, asymmetric synthesis, transition metal

# (M44630110)Developmental Neuroscience[Developmental Neuroscience]

Subject name[English]	Developmental Ne	euroscience[Develo	pmental Neuroscienc	e]	
Schedule number	M44630110	Subject area	Advanced	Required or	Elective
		-	Environmental	elective	
			and Life		
			Sciences		
Time of starting a course	Spring2 term	Day of the	Tue.2~2	Credit(s)	1
<b>–</b> 1	0 1 . 5	week,period		<u>.</u>	1
	Graduate Progran	n tor Master's Degr	ee	Subject grade	1~ M1_M2
Department Offered	Environmental and	a Life Sciences		Beggining	MIT, MZ
Charge teacher name[Roman	吉田 祥子,沼野	利佳 YOSHIDA Sa	achiko, NUMANO Rik	a	
alphabet mark]					
Numbering					
Objectives of class					
Objective of class is to develop	a new technology	for detection of	neuronal function in	your brain. We de	al with neuronal
property and development of neu	ronal circuit, and di	scuss applicability	and problem of your i	ideas.	
Objective of class is to develop	a new technology	for detection of	neuronal function in	your brain. We de	al with neuronal
property and development of neu	ronal circuit, and di	scuss applicability	and problem of your i	ideas.	
Contents of class					
S Yoshida,					
(1)Properties of neuronal cells					
(2)Electrical function and ion tran	isport				
(3)Chemical information transport	t				
(4)Development of neuronal circu	it				
(5)Detection of chemical informat	tion				
(6)Detection of electrical informa	tion				
(7)Detection of cortical developm	ient				
R Numano,					
(8)Neural inducer in vertebrates					
(9)Notch and Delta genes					
(10)Polarity and Segmentation					
(11) Hox gene function in the nerv	ous system				
(12)Genesis and Migration					
(13)Cerebral cortex histogenesis (14)Topic1					
(15)Topic? & Discussion					
S Yoshida					
(1)Properties of neuronal cells					
(2)Electrical function and ion tran	isport				
(3)Chemical information transport	t				
(4)Development of neuronal circu	it				
(5)Detection of chemical informat	tion				
(6)Detection of electrical informa	tion				
(7)Detection of cortical developm	lent				
DN					
R Numano,					
(9)Notch and Delta genes					
(10)Polarity and Segmentation					
(11)Hox gene function in the nerv	vous system				
(12)Genesis and Migration					
(13)Cerebral cortex histogenesis					
(14)Topic1					
(15)Topic2 & Discussion					
Self Preparation and Review					
Related subjects					

A firm understanding on fundamental biochemistry and thermodynamics will be necessary.
A firm understanding on fundamental biochemistry and thermodynamics will be necessary.
Notes for textbook
Wed-based lext will be distributed.
From Neuron To Brain 4th Ed, Nicholls et. al. (Sinauer, 2001)
Wed-dased text will be distributed.
Prom Neuron 10 Brain 4th Ed, Nicholis et. al. (Sinauer, 2001)
Goals to be achieved
Evaluation of achievement
Dr. Yoshida
Short reports on Web; 40%, Term report; 60%
Dr. Numano
Term report; 100%
Short reports on Web; 40%, Term report; 60%
Term report; 100%
レボートで実施
By Report
Other information
S Yoshida
Room: B-406, E-mail:syoshida@ens.tut.ac.jp
R Numano
Room: G-407, E-mail:numano@tut.jp
S Yoshida
Room: B-406, E-mail:syoshida@ens.tut.ac.jp
R Numano
Room: G=407, E=mail:numano@cuc.jp
https://madle.ima.tut.ac.in/
https://module.ime.tut.ac.jp/
Office hours
Palations to attainment objectives of learning and education
Key words

# (M44630140)Advanced Electrical and Electronic Technology for Ecological Engineering[Advanced Electrical and Electronic Technology for Ecological Engineering]

Subject name[English]	Advanced Ele	Advanced Electrical and Electronic Technology for Ecological Engineering[Advanced Electrical and							
	Electronic Te	chnology for Ecolo	gical Engineering]						
Schedule number	M44630140		Subject area	Advanced Environmental and Life Sciences	Required or elective	Elective			
Time of starting a course	Spring1 term		Day of the week,period	Fri.4~4	Credit(s)	1			
Faculty	Graduate Pro	gram for Master's I	Degree		Subject grade	1~			
Department Offered	Environmenta	al and Life Sciences	S		Beggining grade	M1, M2			
Charge teacher name[Roman alphabet mark]	田中 三郎, 7	田中 三郎, 高島 和則, 有吉 誠一郎 TANAKA Saburo, TAKASHIMA Kazunori, ARIYOSHI Seiichiro							
Numbering									
Objectives of class	·								
This lecture provides a	comprehensive	overview of the ir	mportant technolo	gies for photon detec	tion from the m	illimeter-wave			
through the ultraviolet s	pectral regions								
This lecture provides a	comprehensive	overview of the in	nportant technolo	gies for photon detec	tion from the m	illimeter-wave			
through the ultraviolet s	pectral regions	•							
Contents of class									
Attendance students rea	ad the recomm	endation reference	book 1 in advanc	e and give presentatio	on in a seminar f	orm about any			
of the following topics.									
<ol> <li>Introduction</li> <li>Intrinsic photoconduction</li> <li>Extrinsic photoconduction</li> <li>Extrinsic photoconduction</li> <li>Photodiodes and other</li> <li>Amplifiers and readouted</li> <li>Arrays</li> <li>Photoemissive detection</li> <li>Photography</li> <li>Bolometers and other</li> <li>Visible and infrared of</li> <li>Submillimeter- and readouted</li> <li>Submillimeters and readouted</li> <li>Submillimeters and readouted</li> </ol>	tors ctors r junction-base ts ors thermal detec coherent receiv nillimeter-wave ad the recomm	ed detectors tors vers heterodyne receiv endation reference	rers book 1 in advanc	e and give presentatic	on in a seminar f	orm about any			
Attendance students read the recommendation reference book 1 in advance and give presentation in a seminar form about any of the following topics.  1. Introduction 2. Intrinsic photoconductors 3. Extrinsic photoconductors 4. Photodiodes and other junction-based detectors 5. Amplifiers and readouts 6. Arrays 7. Photoemissive detectors 8. Photography 9. Bolometers and other thermal detectors 10. Visible and infrared coherent receivers 11. Submillimeter- and millimeter-wave heterodyne receivers Self Preparation and Review Related subjects Notes for textbook References are distributed as needed.									
Deferences are discribut		Dotootice of Link	<b>\</b> +		ICDN	0 521 01626			
ICOLORICO I	DOOK TITIE	Detection of Ligh	IL		ISDIA	0 021 01030			

						Х			
	Author	George Rieke	Publisher	Cambridge	Publish year	2003			
				University Press					
Notes for reference									
Goals to be achieved									
	_								
Evaluation of achievem	ent								
[Evaluation basis]									
Students who attend a	all classes basi	cally will be evaluate	ed as follows:		+ - f 100 + - +				
A: Achieved 80 % of go	bais and obtain	ed total points of pr	esentation and re	eports, 80 or higher (ou	it of 100 points)				
B: Achieved 65 % of go	bais and obtain	ed total points of pr	esentation and re	eports, 65 or higher (ou	it of 100 points)				
C: Achieved 55 % of go	bais and obtain	ed total points of pr	resentation and re	eports, 55 or nigher (ot	it of 100 points,				
[Evaluation basis]									
Students who attend a	all classes basi	cally will be evaluate	ed as follows:		+ - f 100 + - +				
A: Achieved 80 % of go	bais and obtain	ed total points of pr	esentation and re	eports, 80 or higher (ou	it of 100 points)				
B: Achieved 65 % of go	bais and obtain	ed total points of pr	esentation and re	eports, 65 or higher (ou	it of 100 points)				
C: Achieved 55 % of go	bals and obtain	ed total points of pr	esentation and re	eports, 55 or higher (ou	it of 100 points				
By Report									
Details of examination									
Other information									
Seiichiro Ariyoshi, Offic	e: G−404 (phor	ne 6908), E-mail: ariy	/oshi@ens.tut.ac.j	р					
Sabro Tanaka. Office: G	i-605 (phone 6	916). E-mail: tanaka:	s@ens.tut.ac.ip						
Kazunori Takashima. Of	fice: G-310 (pł	none 6921). E-mail: t	akashima@ens.tu	t.ac.ip					
Seiichiro Arivoshi. Offic	e: G-404 (phor	ne 6908). E-mail: ariv	/oshi@ens.tut.ac.i	D					
			, j	•					
Sabro Tanaka, Office: G	-605 (phone 6	916) E-mail: tanaka	s@ens tut ac in						
Kazupori Takashima Of	fice: G=310 (pt	one 6921) E-mail: t	akashima@ens.tu	t ac in					
Reference LIRI			anashina@ons.ta	c.ao.jp					
http://ens.tut.ac.in/squ	id/								
http://ens.tut.ac.jp/squ	id/								
Office hours	10/								
Relations to attainment	objectives of	learning and educati	ion						
Key words									
Nay words									

# (M44630180)Advanced Reaction Engineering[Advanced Reaction Engineering]

Subject name[English]	Advanced Reaction Engineering[Advanced Reaction Engineering]					
Schedule number	M44630180	Subject are	a	Advanced	Required or	Elective
				Environmental	elective	
				and Life		
				Sciences		
Time of starting a course	Spring1 term	Day of week,period	the 1	Tue.2~2	Credit(s)	1
Faculty	Graduate Program	m for Master's	Degr	ee	Subject grade	1~
Department Offered	Environmental an	d Life Scienc	es		Beggining	M1, M2
Charge teacher name[Roman	小口 達夫 OGUC	CHI Tatsuo			Brado	
Objectives of class						
This course will provide student	ts with the opport	unity to unde	erstand	the basic reaction	kinetics and dyna	mics. Especially,
experimental and theoretical trea	atment of reaction	rate constan	ts will	be given. Some read	ction mechanisms	in combustion or
atmosphere will be also discussed	d.					
This course will provide student	ts with the opport	unity to unde	erstand	the basic reaction	kinetics and dyna	mics. Especially,
experimental and theoretical trea	atment of reaction	rate constan	ts will	be given. Some read	ction mechanisms	in combustion or
Contents of alace	u.					
1 Introduction						
<ol> <li>Introduction.</li> <li>Chemical reaction and rate the</li> </ol>						
3 Reaction mechanism	eory.					
4 Thermodynamics of reaction						
5 Reaction rate theory (1)						
6 Reaction rate theory (2)						
7 Summary						
7. Guinnary						
1 Indus duration						
1. Introduction.						
3 Reaction mechanism	eory.					
4 Thermodynamics of reaction						
5 Reaction rate theory (1)						
6 Reaction rate theory (2)						
7. Summary						
Self Preparation and Review						
Delete disable sta						
Related subjects						
Notes for textbook						
(Reference book)				1:11		
Paul L. Houston, Chemical Kinet	tics and Reaction D	ynamics , Mo	Grawl	יווו.		
(A study–aid book)	″					
Steingfeld, Francisco, and Hase, '	Chemical Kinetics	and Dynamic	s″, Pre	entice-hall, 1989.		
(Reference book)						
Paul L. Houston, "Chemical Kinet	tics and Reaction D	)ynamics″, Mo	Grawł	Hill.		
(A study-aid book)						
Steingfeld, Francisco, and Hase, '	Chemical Kinetics	and Dynamic	s″, Pre	entice-hall, 1989.		
Notes for reference						
Goals to be achieved						
Understanding reaction rate theo	ry, reaction mecha	nisms.				
Understanding reaction rate theo	ry, reaction mecha	nisms.				

## Evaluation of achievement

Grades for the course will be based on the reports. Grades for the course will be based on the reports.

**Examination** レポートで実施

By Report

Details of examination

#### Other information

Tatsuo Oguchi, Phone:6930 **Reference URL** 

## Office hours

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

# Relations to attainment objectives of learning and education

Physical chemistry and thermodynamics.

Physical chemistry and thermodynamics.

# Key words

Reaction, Rate Theory, Transition State Theory, Lindemann Mechanism. Reaction, Rate Theory, Transition State Theory, Lindemann Mechanism.

# (M44630190)Advanced Sustainable Coordinator[Advanced Sustainable Coordinator]

Subject name[English]	Advanced Sustair	able Coordinat	tor[A	- dvanced Sustainable	Coordinator]		
	MAAG20100	Subject eres			Bequired	Elective	
	10144030180	Subject area	I		Required OF	Elective	
				Environmental	elective		
				and Life			
				Sciences			
Time of starting a course	Spring2 term	Day of	the	Fri.4~4	Credit(s)	1	
		week,period	_				
Faculty	Graduate Progran	n for Master's I	Degre	e	Subject grade	1~	
Department Offered	Environmental and	d Life Sciences	5		Beggining	M1, M2	
					grade		
Charge teacher name[Roman	後藤 尚弘,東海	林 孝幸 GOTC	DH Na	aohiro, TOKAIRIN Ta	ikayuki		
alphabet mark]							
Numbering							
Objectives of class	I						
Goto							
To optibilize a "Suptainable Soc	vietu" ie one of me	viar fields for a	ouoto	inchla dovolonment	Countormooouro	for it should be	
To establish a Sustainable Soc		yor neids for s	susta	diasistisses The shis			
comprehensive and they comprise	e not only engineer	ing but also sev	verai	disciplines. The obje	cuves of this clas	is are	
I to comprehend notion of Sust	ainable Society						
2 to learn human dimensional dis	ciplines for Sustail	nable Society					
3 to know planning method to es	tablish "Sustainable	e Society" thou	igh e	kamples			
Tokairin							
The objectives of this class are							
1 to know air pollution situation							
2 to understand the evaluation m	ethod of pollutant o	concentration					
3 to understand the characterist	ics of planetary bou	indarv laver					
Goto		in a construction of the second se					
To establish a "Sustainable Soc	ciety" is one of ma	aior fields for s	susta	inable development	Countermeasure	s for it should be	
comprehensive and they comprise	e not only engineer	ing but also sev	voral	disciplines. The obje	ctives of this class	s are	
1 to comprehend notion of "Quet	e not only engineer	ing but also set	verai	uiscipiiries. The obje			
2 to comprehend notion of Sust	ainable Society	able Seciety"					
2 to learn numan dimensional dis	ciplines for Sustall	nable Society					
3 to know planning method to es	tablish Sustainable	Society thou	igh ei	kamples			
Tokairin							
The objectives of this class are							
1 to know air pollution situation							
2 to understand the evaluation m	ethod of pollutant o	concentration					
3 to understand the characterist	ics of planetary bou	indary layer					
Contents of class							
Goto							
1 Concept of Sustainable develo	oment						
2 Material (Substance) flow analy	sis and Life Cycle.	Assessment					
3 Japanese environmental law ar	d institution	133633110110					
Iokairin							
1 Atmospheric environment and	air pollution						
2 Atmospheric diffusion modeling	2 Atmospheric diffusion modeling						
3 Meteorology of planetary bound	Meteorology of planetary boundary layer						
Goto							
1 Concept of Sustainable develo	oment						
2 Material (Substance) flow analy	sis and Life Cycle	Assessment					
3 Japanese environmental law ar	nd institution						
Tokairin							
1 Atmospheric environment and	air pollution						

2 Atmospheric diffusion modeling3 Meteorology of planetary boundary layer

## Self Preparation and Review

## Related subjects

# Notes for textbook

I will distribute copies of document.

## Tokairin

Goto

 $\ensuremath{I}$  will distribute copies of document.

# Goto

I will distribute copies of document.

Tokairin I will distribute copies of document.

# Notes for reference

#### Goals to be achieved

Goto to understant how to establish sustainable society

#### Tokairin

to understand basics on atmospheric environment and its evaluation method.

# Goto

to understant how to establish sustainable society

Tokairin

to understand basics on atmospheric environment and its evaluation method.

## Evaluation of achievement

Every week and Term end report (100%)

Every week and Term end report (100%)

## Examination

レポートで実施 By Repor<u>t</u>

# Details of examination

#### Other information

Naohiro Goto (G603) goto@ens.tut.ac.jp Takayuki Tokairin (G405) tokairin@ens.tut.ac.jp

Naohiro Goto (G603) goto@ens.tut.ac.jp Takayuki Tokairin (G405) tokairin@ens.tut.ac.jp

## **Reference URL**

**Office hours** 

Any time by E-mail Any time by E-mail

Relations to attainment objectives of learning and education

Key words

Sustainablity, MFA, LCA, Air pollution, planetary boundary layer, Atmospheric diffusion Sustainablity, MFA, LCA, Air pollution, planetary boundary layer, Atmospheric diffusion

# (M44630200)Advanced Supercritical Fluid Engineering[Advanced Supercritical Fluid Engineering]

Subject name[English]	Advanced Supercritical Fluid Engineering[Advanced Supercritical Fluid Engineering]					ieering]		
Schedule number	M44630200	Subject	area	Advanced	Required or	Elective		
				Environmental	elective			
				and Life				
				Sciences				
Time of starting a course	Spring2 term	Day c	of the	Fri.2~2	Credit(s)	1		
		week,pe	riod					
Faculty	Graduate Progran	n for Mast	er's Degre	ee	Subject grade	1~		
Department Offered	Environmental and	d Life Scie	ences		Beggining	M1, M2		
Oberen teacher neme[Demen	十明 松立 DAINA		L:		grade			
sinhahet mark]	NI THE DAIN		KI					
Numbering								
Deced on Supervisition Fluid I	Indianauting and E		tal Cham	iaal Engineering a	unation, shilonashi			
Based on Supercritical Fluid I	ingineering and Ei	nvironment	tan Unem	a mainly wasta man	ractical philosophy	, creativity and		
Environmental issue is widely dis	cussed to obtain th	e knowled	re and or	e mainly waste man		or society		
Based on Supercritical Fluid F	Eusseu to obtain th Engineering and Fi	nvironment	tal Chem	ical Engineering n	ractical philosophy	creativity and		
leadership of engineer are impro	ved during this cou	rse. The	topics ar	e mainly waste man	agement and utilization	ation of biomass.		
Environmental issue is widely dis	cussed to obtain th	e knowled	ge and or	ganizing skill of com	prehensive process	or society.		
Contents of class			5		•			
1st Summary								
2nd History								
3rd Physical property 1								
4th Physical property 2								
5th Instrumentation and process	engineering							
6th Application of Supercritical V	later Technologies	1						
7th Application of Supercritical V	later Technologies	2						
8th Application of Supercritical V	later Technologies	3						
9th Application of Supercritical V	later Technologies	4						
10th Application of Supercritical	Water Lechnologies	35 						
12th Application of Supercritical	Carbon dioxide Tec	hnologies	1 2					
13th Application of Supercritical	Carbon dioxide Teo	hnologies	2					
14th Application of Supercritical	Carbon dioxide Tec	hnologies	4					
15th Examination		annoiogies	-					
1st Summary								
2nd History								
3rd Physical property 1								
4th Physical property 2								
5th Instrumentation and process	and process engineering							
6th Application of Supercritical V	later Technologies	1						
7th Application of Supercritical V	later Technologies	2						
8th Application of Supercritical V	later Technologies	3						
9th Application of Supercritical V	later lechnologies	4						
10th Application of Supercritical	Water Technologies	6 D Invalanian	1					
12th Application of Supercritical	Carbon dioxide Teo	hnologies	1 2					
13th Application of Supercritical	Carbon dioxide Tec	hnologies	3					
14th Application of Supercritical	Carbon dioxide Tec	Carbon dioxide Technologies 3						
15th Examination		0						
Self Preparation and Review								
	Obernation (Arter-	ما آسما+ '						
Advanced Analytical Separation	Chemistry, Advance	a Industria	al Ecology					
Notes for textback	onemistry, Advance	a Industria	al ECOlogy	1				
1 Analytical Superaritical Fluid C	bromatography and	Extraction	n					
edited by MIL Lee and K F Mai	kides 1990							

Chromatography Conference, Inc.
2. Hyphenated Techniques in Supercritical Fluid Chromatography and Extraction
edited by K. Jinno, 1992
Elsevier
1. Analytical Supercritical Fluid Chromatography and Extraction
edited by M. L. Lee and K. E. Markides, 1990
Chromatography Conference, Inc.
2. Hyphenated Techniques in Supercritical Fluid Chromatography and Extraction
edited by K. Jinno, 1992
Elsevier
Notes for reference
Goals to be achieved
1. To understand Supercritical Fluid Technology
2. To improve engineering skill
3. To obtain the knowledge about Environmental problem especially for waste management
1. To understand Supercritical Fluid Technology
2. To improve engineering skill
3. To obtain the knowledge about Environmental problem especially for waste management
Evaluation of achievement
Based on Presentation and Interview during class
More than
80% ; A
65% ; B
55% ; C
Based on Presentation and Interview during class
More than
80% ; A
65%; B
55%; C
レホートで実施
By Report
Other information
Office : Builing G. Floor 6th, Room 602
Tel:0532-44-6905
Email:daimon@ens.tut.ac.jp
Office Builing G. Floor 6th Boom 602
Tel:0532-44-6905
Email:daimon@ens.tut.ac.ip
Reference URL
http://water.eco.tut.ac.ip/class.html (English version under construction)
http://water.eco.tut.ac.ip/class.html (English version under construction)
Office hours
After the class or anytime when you make an appointment through Email
After the class or anytime when you make an appointment through Email
Relations to attainment objectives of learning and education
(D)
(D)
Key words
Supercritical Fluids, Resource Recovery, Material and Energy Balance, Process Engineering
Supercritical Fluids, Resource Recovery, Material and Energy Balance, Process Engineering

# (M44630220)Advanced Life Science and Biotechnology II[Advanced Life Science and Biotechnology II]

Subject name[English]	Advanced Life Science and Biotechnology II[Advanced Life Science and Biotechnology II]					
Schedule number	M44630220	Subject	area	Advanced	Required or	Flective
	MITTOODEED	Cabjoot	aioa	Environmental	elective	LICOLIVO
				and Life	0000000	
				Sciences		
Time of starting a course	Spring term	Day o	f the	Intensive	Credit(s)	2
	oping com	week ne	riod	Inconsive	Ci Cult(3)	2
Faculty	Graduate Progra	m for Mast	er's Degr	ee	Subject grade	1~
Department Offered	Environmental a	nd Life Scie	nces		Beggining	ч М1 М2
Dopardnone Onorod			1005		grade	1411, 1412
Charge teacher name[Poman	S4	1 kei kvomu	lin-S		grauo	
elnhahet mark]	0	thei kyönnu				
Numbering						
Objectives of class						
This course will provide the stud	lents with the opp	ortunity to	study or	n the selected subje	ct in the realm of t	further advanced
life science and biotechnology ba	ised on the knowle	dge of the o	course of	FAdvanced Life Scie	nce and Biotechno	ogy I.
Contents of class						
The classes will be given by his/	her supervisor. Th	e type and o	contents	of this course deper	nd on his/her super	visor.
Self Preparation and Review						
Related subjects						
Advanced Life Science and Biote	chnology I					
Notes for textbook	critiology I					
NOLOS TOT LOXIDOOK						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
The evoluation is based on the e		vecentetien		- min ation		
The evaluation is based on the s	cores of reports, p	resentation	s, and ex	amination.		
その他						
None during exam period						
Details of examination						
Other information						
Supervisor						
Reference URL						
Office hours						
Students are encouraged visiting	by appointment.					
Relations to attainment objective	es of learning and	education				
		outouton				
Key words						
Molecular hiology and microhiolog	my renomina hista	chnolom a	nd higens	ineering		
worecular biology and microbiolog	sy, genomics, plote	connoiogy ar	in pipelis	lineering		

# (M44630240)Advanced Environmental Technology II[Advanced Environmental Technology II]

Subject name[English]	Advanced Environmental Technology II[Advanced Environmental Technology II]						
Schedule number	M44630240	Subject area	Advanced	Required or	Elective		
			Environmental	elective			
			and Life				
			Sciences				
Time of starting a course	Spring term	Day of the week,period	Intensive	Credit(s)	2		
Faculty	Graduate Progra	am for Master's Degr	ee	Subject grade	1~		
Department Offered	Environmental a	nd Life Sciences		Beggining	M1, M2		
Charge teacher name[Roman	S4系教務委員	4kei kvomu Iin-S		Binne			
alphabet mark]							
Numbering							
Objectives of class							
This source will provide the stur	lants with the on	portupity to study o	the calented cubie	ot in the realm of	further advanced		
environmental technology based	on the knowledge	of the course of Adv	anced Environmenta	I Technology I	luruner auvanceu		
Contents of class				in reenhology I.			
The classes will be given by his/l	her supervisor Th	e type and contents	of this course deper	nd on his/her super	visor		
Self Preparation and Review					1301.		
Related subjects							
Advanced Environmental Techno	lom/ I						
Notes for textbook	logy I						
Notoo for reference							
O ale ta ha askissad							
Goals to be achieved							
Evaluation of achievement							
The evaluation is based on the se	cores of reports, j	presentations, and ex	amination.				
Examination							
その他							
None during exam period							
Details of examination							
Other information							
Supervisor							
Reference URL							
Office hours							
Students are encouraged visiting	by appointment.						
Relations to attainment objective	es of learning and	education					
Key words							

# (M44630260)Advanced Environmental and Ecological Systems II[Advanced Environmental and Ecological Systems II]

Subject name[English]	Advanced Envir	ronmental and Ecolog	ical Systems IILAdva	anced Environment	al and Ecological
	Systems II		1		
Schedule number	M44630260	Subject area	Advanced	Required or	Elective
			Environmental	elective	
			and Life		
			Sciences		
Time of starting a source	Spring torm	Day of the	Intensive	Credit(a)	2
Time of starting a course	Spring term	Day of the	Incensive	Oreal(s)	2
		week,period			
Faculty	Graduate Progr	am for Master's Degre	ee	Subject grade	1~
Department Offered	Environmental a	and Life Sciences		Beggining	M1, M2
				grade	
Charge teacher name[Roman	S4系教務委員	4kei kyomu Iin-S			
alphabet mark]					
Numbering					
Numboring					
Objectives of class					
This course will provide the stud	lents with the op	portunity to study on	the selected subje	ct in the realm of t	further advanced
environmental and ecological sv	, stems based on	the knowledge of t	he course of Advar	nced Environmenta	I and Ecological
Systems I.		0			0
Contents of class					
The electron will be shown by 12 /			af this as we also	a an bia /b	vienn
The classes will be given by his/i	ner supervisor. Ir	he type and contents	of this course depen	id on his/her super	visor.
Self Preparation and Review					
Related subjects					
Advanced Environmental and East	Jariaal Systema I	r			
Advanced Environmental and Ecc	logical Systems I				
Notes for textbook					
Notes for reference					
Goals to be achieved					
Evaluation of achievement					
The evaluation is based on the se	ores of reports	presentations and ex	amination		
	cores of reports,	presentations, and ex-			
その他					
None during exam period					
Details of examination					
Other Information					
Supervisor					
Reference URL					
Office hours					
Studente ere ere ere del 11	hu ann airtean 1				
Students are encouraged visiting by appointment.					
Relations to attainment objective	es of learning and	education			
Kaumanda					
Key words					

# (M44630280)X-ray Spectroscopy for Catalytic Engineering[X-ray Spectroscopy for Catalytic Engineering]

Subject name[English]	X-ray Spectroscopy for Catalytic Engineering X-ray Spectroscopy for Catalytic Engineering							
Schedule number	M44630280	Subject	area	Advanced	Required or	Flective		
	1111000200	Cabjeet	aiva	Environmental	elective	LICOLIVE		
					01000140			
				and Life				
The station of a second	Caralia and the same	Davis	<b>6</b> 11.	Tur 2 - 2	0	1		
l ime of starting a course	Spring2 term	Day c	οτ τηθ 	Tue.3~3	Great(s)	1		
	0 I I D	week,pe	bon					
Faculty	Graduate Progra	m for Mast	er's Deg	ree	Subject grade	1~		
Department Offered	Environmental a	nd Life Scie	nces		Beggining	M1, M2		
					grade			
Charge teacher name_Roman	水鳴 生智 MIZU	JSHIMA Tak	anori					
alphabet mark								
Numbering								
Objectives of class								
To gain knowledge of X-ray spec	stroscopic technia	ues includir	ng X-ray	diffraction X-ray ab	sorption fine strue	$(X \Delta FS)$ and		
fluorescent X-ray spectroscopy	a analytical tools	for colid on	talvete					
To goin knowledge of V-ray spectroscopy a	as analytical tools	ior soliu ca	Lalysis.	diffuention V-way of				
To gain knowledge of A-ray spec	croscopic techniq		ig ∧−ray	diffraction, A-ray ad	sorption line struc	sture (AAFS), and		
Tiuorescent A-ray spectroscopy a	as analytical tools	tor solid ca	talysts.					
(1) Fundamentals of X-ray and it	s spectroscopy							
(2) Principle, measurement, and a	pplication of X-ra	y diffractior	ı					
(3) Experimental practice of X-ra	y diffraction							
(4) Principle, measurement, and a	nalysis of XAFS							
(5) Application of XAFS to cataly	st characterizatio	n						
(6) Advanced XAFS techniques a	nd their applicatio	ns						
(7) Principle, measurement, and a	pplication of fluor	escent X-ra	iy specti	oscopy				
(1) Eurodemontals of X-ray and it	c chectrosconv							
(1) Turuamentals of X ray and (2)	s spectroscopy							
(2) Frinciple, measurement, and a		y diffraction	1					
(3) Experimental practice of X-ra	y diffraction							
(4) Principle, measurement, and a	inalysis of XAFS							
(5) Application of XAFS to cataly	st characterization	n						
(6) Advanced XAFS techniques a	nd their applicatio	ns						
(1) Principle, measurement, and a	pplication of fluor	escent X-ra	iy specti	roscopy				
Self Preparation and Review								
Related subjects								
It is advisable to have basic know	ledge of physical	and inorgan	ic chemi	stry.				
It is advisable to have basic know	ledge of physical	and inorgan	ic chemi	stry.				
Notes for textbook								
No textbook is required. A printe	d synopsis of the	class will be	given.					
			0					
(Peference)								
(Reference)				fare and " Would Calant	: <b>c</b> :_			
1.Iwasawa et al., X-ray absorption	on tine structure t	or catalysts	and sur	taces , world Scient	ITIC			
No textbook is required. A printer	d synopsis of the	class will be	given.					
(Reference)								
Y.Iwasawa et al., "X-ray absorpti	on fine structure f	or catalysts	and sur	faces", World Scient	ific			
Notes for reference								
Goals to be achieved								
(1) Inderstanding of basics of X-	ray spectroscopy							
(2) Understanding of V-rev difference	tion YAES and f	luorooont	Y-row	antrocony on analyt	ical toolo for calle	aatalveta		
(2) Understanding of A-ray diffra	SUOTI, AAFS, and f	uorescent	∧-ray sp	ectroscopy as analyt	ical loois for solid	Galalysis.		
(1) Understanding of basics of X-	ray spectroscopy							
(2) Understanding of X-ray diffra	ction, XAFS, and f	luorescent	X−ray sp	ectroscopy as analyt	ical tools for solid	catalysts.		

Evaluation of achievement	
Reports 100%	
Reports 100%	
Examination	
レポートで実施	
By Report	
Details of examination	
Other information	
Takanori Mizushima, room : B-303, e-mail: mizushima@ens.tut.ac.jp	
Takanori Mizushima, room : B-303, e-mail: mizushima@ens.tut.ac.jp	
Reference URL	
Office hours	
Anytime	
Anytime	
Relations to attainment objectives of learning and education	
Key words	
X-ray spectroscopy, X-ray diffraction, XAFS, Fluorescent X-ray spectroscopy, Solid catalysts	
X-ray spectroscopy, X-ray diffraction, XAFS, Fluorescent X-ray spectroscopy, Solid catalysts	

#### (M44630290)Advanced Biomaterials Engineering[Advanced Biomaterials Engineering]

Subject name[English]	Advanced Biomaterials Engineering[Advanced Biomaterials Engineering]						
Schedule number	M44630290	Subject area	Advanced Environmental and Life Sciences	Required or elective	Elective		
Time of starting a course	Spring2 term	Day of the week,period	Thu.3~3	Credit(s)	1		
Faculty	Graduate Program for Master's I	Subject grade	1~				
Department Offered	Environmental and Life Sciences	Beggining grade	M1, M2				
Charge teacher name[Roman alphabet mark]	辻 秀人, 手老 龍吾 TSUJI Hid	eto, TERO Ryugo					
Numbering							

#### **Objectives of class**

Biomaterials have been developed and studied in terms of various applications including biomedical, pharmaceutical and environmental applications. This course covers the fundamentals and applications of biomaterials and related experimental techniques.

Biomaterials have been developed and studied in terms of various applications including biomedical, pharmaceutical and environmental applications. This course covers the fundamentals and applications of biomaterials and related experimental techniques.

#### **Contents of class**

This course deals with all aspects of biobased and biodegradable polymers for biomedical, pharmaceutical, and environmental applications, and of devices and techniques for sensing biomolecules. The detailed course schedule is shown below. The detailed course schedule is shown below.

#### Biobased and biodegradable polymers (Hideto Tsuji):

(1) introduction, synthesis, and structures, (2) molding, crystallization, and physical properties, (3) hydrolytic degradation and biodegradation, and (4) applications.

Biodevice and biosensing (Ryugo Tero):

(5) introduction of biomaterials and biodevices, (6) detection of cell membrane functions, (7) surface patterning and microarray, and (8) imaging techniques for biomolecules.

This course deals with all aspects of biobased and biodegradable polymers for biomedical, pharmaceutical, and environmental applications, and of devices and techniques for sensing biomolecules. The detailed course schedule is shown below. The detailed course schedule is shown below.

Biobased and biodegradable polymers (Hideto Tsuji):

(1) introduction, synthesis, and structures, (2) molding, crystallization, and physical properties, (3) hydrolytic degradation and biodegradation, and (4) applications.

Biodevice and biosensing (Ryugo Tero):

(5) introduction of biomaterials and biodevices, (6) detection of cell membrane functions, (7) surface patterning and microarray, and (8) imaging techniques for biomolecules.

#### Self Preparation and Review

If possible, read the reference book chapters which are shown below and you can find them in the university library (Hideto Tsuji).

Read the appropriate chapter(s) of the reference book (#3) shown below. You can access it in the university network. (Ryugo Tero)

If possible, read the reference book chapters which are shown below and you can find them in the university library (Hideto Tsuii).

Read the appropriate chapter(s) of the reference book (#3) shown below. You can access it in the university network. (Ryugo Tero)

#### **Related subjects**

## Notes for textbook

Printed materials will be distributed (Hideto Tsuji).

Printed materials will be distributed as necessary (Ryugo Tero). Printed materials will be distributed (Hideto Tsuji).

Printed materials will be distributed as necessary (Ryugo Tero).								
Reference1	Book title	Degradation of F	Poly (Lactide)-B	ased Biodegradable	ISBN	1604565020		
		Materials						
	Author	Hideto Tsuji	Publisher	Nova Science	Publish	2008		
Deferment	De als site	Obantan 01 '	//////////////////////////////////////		year	0470000007		
Keterence2	Book title	Chapter 21 in Structures, Prope	n Poly(lactic rties, Processing	acid): Synthesis, and Applications"	ISBN	04/029366/		
	Author Hideto Tsuji Publisher Wiley Publish							
Reference3	Book title	Nanoscience: Nan	obiotechnology a	nd Nanobiology	ISBN	978-3-540-		
				-		88633-4		
	Author	Patrick	Publisher	Springer	Publish	2009		
		Boisseau &			year			
		Marcel Lahmani						
Notes for reference								
Reference book 3 (Ryu	go Tero):							
http://link.springer.com	1/book/10.1007	7%2F978-3-642-280	)30–6					
Reference book 3 (Ryu	go Tero):							
http://link.springer.com	n/book/10.1007	/%2F978-3-642-280	)30–6					
Goals to be achieved								
To understand the fund	amentals and	applications of bioba	ased and biodegra	adable polymers (Hide	to Tsuji).			
I o understand the fund	amentals and	applications of biode	evice, biosensing	and related methods	(Hyugo Tero).			
To understand the fund	amentals and	applications of bioba	ased and biodegra	idable polymers (Hide	to Isuji). (D			
To understand the fund	amentals and	applications of biode	evice, biosensing	and related methods	(Ryugo lero).			
Evaluation of achievem	ent							
Presentation (100%) reg	garding the biol	based and biodegrad	lable polymers (F	ideto Isuji)				
Reporting assignment (100%) which will be given in each class (Ryugo Tero) Presentation (100%) regarding the biobased and biodegradable polymers (Hideto Tsuji)								
Reporting assignment (	100%) which wi	ll be given in each c	lass (Ryugo Tero	)				
Examination								
レポートで実施								
By Report								
Details of examination								
Presentation (Hideto Tsuji)								
Reporting assignment (	Ryugo Tero)							
Presentation (Hideto T	suji) D T \							
Reporting assignment (	Ryugo Tero)							
Room (G-606), e-mail (	tsuji@ens.tut.a	c.jp), phone: 6922 (F	Hideto Isuji)					
Room (B-405), e-mail (	tero@tut.jp), pr /+::@	none: 0/91 (Ryugo 1						
Room (G=000), $e$ -mail (	(isuji@ens.iui.a /toro@tutin) nl	c.jp), priorie: 0922 (r						
Room (B=405), e=mail (	.tero@tut.jp), pr	none: 0791 (Ryugo 1	ero)					
Office hours								
		ouii)						
Immediately after the class (Hideto I suji)								
Alter the class, or as needed in my office (kyugo Tero)								
After the class or as needed in my office (Ryugo Tero)								
Relations to attainment objectives of learning and education								
Key words								

I

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

Subject name[English]	Seminar on A	rohitacture and Civ	il Engineering IS	minar on Archit	oture and Civil		
	Seminar on Architecture and Own Engineering (Seminar on Architecture and Own						
Oshadala assubas		Out to at any a	A	De audue de la cu	De milio d		
Schedule number	MI45610010	Subject area	Advanced	Required or	Required		
			Architecture	elective			
			and Civil				
	ļ		Engineering				
Time of starting a course	Year	Day of the	Intensive	Credit(s)	3		
		week,period					
Faculty	Graduate Progra	am for Master's Degre	ee	Subject grade	1~		
Department Offered	Architecture and	d Civil Engineering		Beggining	M1, M2		
				grade			
Charge teacher name[Roman	S5系教務委員,	5系各教員 5kei kyo	mu Iin-S, 5kei kakuk	youin	l		
alphabet mark]							
Numbering							
Objectives of class							
All the students are required to	attend all the ser	minars, which is arrar	nged by the laborate	ory supervisor for	the special study		
subjects related to the current re	search activity of	f the laboratory. The	scheduled program	of the seminars is a	announced by the		
supervisor at the guidance of the	seminar.						
Contents of class							
Self Preparation and Review							
Related subjects							
-							
Notes for textbook							
Notes for reference							
Ocole to be exhirted							
Goals to be achieved							
Evaluation of achievement							
Report							
Examination							
その他							
ת עווש Pu Descut							
Details of exemination							
Details of examination							
Other information							
Deference LIDI							
Office hours							
Relations to attainment objectives of learning and education							
ולטומנוטווא נט מננמוווווסווג טטוסגנועסא טו וסמרווווע מווע סעענימעטוו							
Key words							

M45610020)Seminar on	Architecture and	Civil Engineering	III Seminar on	Architecture and	Civil Engineering II
			mreeting en		

Subject name[English]	Seminar on Architecture and Civil Engineering II[Seminar on Architecture and Engineering II]				
Schedule number	M45610020	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Require
Time of starting a course	Year	Day of the week.period	Intensive	Credit(s)	3
Faculty	Graduate Progr	ram for Master's Degr	ee	Subject grade	2~
Department Offered	Architecture ar	nd Civil Engineering		Beggining grade	M2
Charge teacher name[Roman alphabet mark]	S5系教務委員	, 5系各教員 5kei kyo	omu Iin−S, 5kei kakuk	youin	
Numbering					
Objectives of class					
All the students are required to	attend all the se	aminars which is arra	nged by the laborat	ory supervisor for	the specie
subjects related to the current re	esearch activity of	of the laboratory. The	scheduled program	of the seminars is	announcer
supervisor at the guidance of the	seminar	of the laboratory. The	Scheduled program		announced
Contents of class	seminar.				
Self Preparation and Review					
Related subjects					
Notes for textbook					
Notes for reference					
Goals to be achieved					
Evaluation of achievement					
Report					
Examination					
その他					
By Report					
Details of examination					
Other information					
Reference URL					
Office hours					
	<u> </u>	d education			
Relations to attainment objective	es of learning and				
Relations to attainment objective	es of learning and				
Relations to attainment objective	es of learning and				

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

Subject name[English]	Thesis Research	on Architecture and	Civil Engineering[T	hesis Research on	Architecture and			
	Civil Engineering							
Sebadula number			Advanacd	Doguino d	Doguirod			
Schedule number	10145610030	Subject area	Advanced	Required or	Required			
			Architecture	elective				
			and Civil					
			Engineering					
Time of starting a course	2Years	Day of the	Intensive	Credit(s)	6			
		week,period						
Faculty	Graduate Progra	m for Master's Degre	ee	Subject grade	1~2			
Department Offered	Architecture and	d Civil Engineering		Beggining	M1, M2			
				grade				
Charge teacher name[Roman	S5系教務委員,	5系各教員 5kei kyo	mu Iin−S, 5kei kakuk	youin				
alphabet mark]								
Numbering								
Research on architecture and civ	vil engineering							
Contents of class								
It depends on the laboratory. All	students must pr	esent their thesis at	the end of the cou	rse and take a fina	al examination on			
the thesis, as a requirement for	the graduation of t	he master course. T	he study for the the	sis is planned and	conducted under			
the guidance of the supervisor			··· ···, ··· ··· ···					
the galaanee of the capervicer.								
Self Preparation and Review								
Related subjects								
It depends on the laboratory								
Notes for textbook								
Notes for reference								
Goals to be achieved								
Evolution of achievement								
Evaluation is based on report.								
Examination								
その他	その他							
By Report								
Details of examination								
Other information								
Reference URL								
Office hours								
Relations to attainment objectives of learning and education								
ולסומניטווא גע מנגמוווווסווג טעוסטעיסא טו וסמרווווא מוזע פמעכמעטח								
1								
Key words								
### (M45610030)Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]

Subject name[English]	Thesis Research	h on Architecture and	Civil Engineering	hesis Research on	Architecture and	
	Civil Engineering			nesis nesearch on	Architecture and	
Schedule number	M45610030	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Required	
Time of starting a course	2Years	Day of the week.period	Intensive	Credit(s)	6	
Faculty	Graduate Progra	am for Master's Degre	e	Subject grade	1~	
Department Offered	Architecture an	d Civil Engineering		Beggining grade	M1, M2	
Charge teacher name[Roman alphabet mark]	S5系教務委員, 5系各教員 5kei kyomu Iin-S, 5kei kakukyouin					
Numbering						
Objectives of class						
This thesis research on architect	ure and civil engi	neering is designated	to deepen the know	wledge and enhanc	e the skills of the	
students in their research fields t	brough the self-o	riented endeavour wi	th the instruction of	his/her superviso		
Contents of class		mented endeavour wi			1(5).	
The subjects and the contents of	of the thesis your	depending on the la	horatory All studer	te must present t	heir thesis at the	
end of the course and take a fir	al examination or	the thesis as a rea	uirement for the gr	aduation of the m	aster course The	
study for the thesis is planned ar	d conducted und	er the guidance of the	supervisor(s)			
Self Preparation and Review						
Related subjects						
TBD by the laboratory						
Notes for textbook						
TBD by the laboratory						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
This credit is assigned for all the	process for the p	reparation and prese	ntation of the thesis	i.		
Examination						
その他						
By Report						
Details of examination						
Other information	Other information					
Refer to administration office.						
Reference URL						
Refer to the URL of each laborat	ory					
Office hours						
Reter to administration office.						
Relations to attainment objective	s or learning and	education				
Key words						

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

Subject name[English]	Thesis Researc	h on Architecture and	I Civil Engineering[T	hesis Research or	Architecture and
	Civil Engineerin	g			
Schedule number	M4561003T	Subject area	Advanced	Required or	Required
			Architecture	elective	
			and Civil		
			Engineering		
Time of starting a course	Year	Day of the week.period	Intensive	Credit(s)	6
Faculty	Graduate Progr	am for Master's Degre	e	Subject grade	2~
Department Offered	Architecture an	d Civil Engineering		Beggining	 M2
				grade	
Charge teacher name[Roman	S5系教務委員	5kei kvomu Iin-S			
alphabet mark]					
Numbering					
Objectives of class					
This thesis research on architec	ture and civil eng	ineering is designated	to deepen the know	wledge and enhand	e the skills of the
students in their research fields	through the self-o	priented endeavour wi	th the instruction of	f his/her supervise	or(s).
Contents of class				_, eaper not	
The subjects and the contents of	of the thesis van	depending on the la	boratory. All studen	its must present t	heir thesis at the
end of the course and take a fir	al examination o	n the thesis as a req	uirement for the gr	aduation of the m	aster course. The
study for the thesis is planned ar	nd conducted und	er the guidance of the	supervisor(s)		
Self Preparation and Review					
Related subjects					
Notes for textbook					
Notes for reference					
Goals to be achieved					
Evaluation of achievement					
This credit is assigned for all the	process for the p	preparation and prese	ntation of the thesis	5.	
Examination					
その他					
By Report					
Details of examination					
Other information					
Refer to administration office.					
Reference URL					
Refer to the URL of each laborat	ory				
Office hours					
Refer to administration office.					
Relations to attainment objective	es of learning and	education			
Key words					

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

Subject name[English]	Seminar on A	rchitecture and C	ivil Engineering[Ser	ninar on Archite	cture and Civil	
	Engineering]					
Schedule number	M45610040	Subject area	Advanced	Required or	Required	
			Architecture	elective		
			and Civil			
			Engineering			
Time of starting a course	Year	Day of the	Intensive	Credit(s)	6	
		week,period				
Faculty	Graduate Progra	am for Master's Degr	ee	Subject grade	2~	
Department Offered	Architecture and	d Civil Engineering		Beggining	M2	
	05万批改千号		<b>T O EI : I I I</b>	grade		
Charge teacher name_Roman	55糸教務安員,	5糸谷教員 5kei kyo	mu lin-S, 5kei kakuk	youin		
alphabet mark						
Numbering						
Objectives of class						
All the students are required to	attend all the ser	minars, which is arra	nged by the laborate	ory supervisor for	the special study	
subjects related to the current re	esearch activity of	the laboratory. The	scheduled program	of the seminars is a	announced by the	
supervisor at the guidance of the	seminar.					
Contents of class						
In each seminar, students purs	sue several resea	arch topics and/or	undertake projects	collectively and	solely under the	
instruction of the faculty member	rs of the departme	ent and/or those of o	other departments.			
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Ocele to be achieved						
Goals to be achieved						
Evaluation of achievement						
Report						
Examination						
その他						
By Report						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	s of learning and	education				
		Julian				
Kev words						

# (M45630030)Seismic Evaluation of Existing Buildings[Seismic Evaluation of Existing Buildings]

Subject name[English]	Seismic Evaluation of Existing Buildings[Seismic Evaluation of Existing Buildings]							
Schedule number	M45630030	Subject area Advanced Required or				<b>r</b> Elective		
				Architecture	elective			
				and Civil				
				Engineering				
Time of starting a course	Spring term	Day of	the	Tue.3~3	Credit(s)	2		
		week,period						
Faculty	Graduate Progran	n for Master's	Degr	e	Subject grade	1~		
Department Offered	Architecture and	Civil Engineer	ing		Beggining	M1, M2		
Ohanna haadhan mara (Damar		grade						
Charge teacher name_roman	作开 首成 MAIS	公开						
Numbering								
Objectives of class								
This course is intended to introd	luce the Japanese	seismic eval	uation	method for existin	g buildings, in part	cicular, reinforced		
concrete buildings. The concept	and procedures of	this method	are o	outlined in this cour	se, to gain advand	ced knowledge to		
This source is intended to intro	uce the lananece	saismia aval	uation	method for existin	a huildings in part	ioular reinforced		
concrete buildings The concept	and procedures of	this method	are o	utlined in this cour	se to gain advand	ced knowledge to		
evaluate seismic performance of	existing buildings		uro c					
Contents of class								
1: Introduction								
2: Procedure of Seismic Evaluatio	n							
3: Seismic Index of Structure: IS								
4: Irregularity and Time Indexes: S	SD and T							
5: First Level Screening Procedur	e							
6: Second Level Screening Proce	dure -Basic Seismic Index of Structure: E0-							
7: Second Level Screening Proce	dure –Strength Inde	ex: C−						
8: Second Level Screening Proce	dure -Ductility Inde	ex: F-						
9: Judgment on Seismic Safety								
10: Recent Earthquake Disasters								
11: Introduction of Seismic Retrol	nt 							
12: Observation of Retrofitted Bu	ildings							
14: Explanation on Assignments	ung							
1. Introduction								
2: Procedure of Seismic Evaluation	n							
3: Seismic Index of Structure: IS								
4: Irregularity and Time Indexes: S	SD and T							
5: First Level Screening Procedur	e							
6: Second Level Screening Proce	dure -Basic Seismi	c Index of Str	uctur	e: E0-				
7: Second Level Screening Proce	dure –Strength Inde	ex: C−						
8: Second Level Screening Proce	8: Second Level Screening Procedure -Ductility Index: F-							
9: Judgment on Seismic Safety								
10: Recent Earthquake Disasters								
11: Introduction of Seismic Retrol	it.							
12: Observation of Retrofitted Bu	Ildings							
14: Explanation on Assignments	ung							
Self Preparation and Review								
Related subjects								
Notes for textbook								
Standard for Seismic Evaluation of	of Existing Reinforc	ed Concrete E	Buildin	gs, 2001				
Standard for Seismic Evaluation of	of Existing Reinforc	ed Concrete E	Buildin	gs, 2001				
Notes for reference								

Goals to be achieved
To understand nonlinear structural mechanics through learning the Japanese seismic evaluation method for existing buildings.
To understand nonlinear structural mechanics through learning the Japanese seismic evaluation method for existing buildings.
Evaluation of achievement
Report
– A 80 to 100
– B 65 to 79
– C 55 to 64
Report
– A 80 to 100
– B 65 to 79
- C 55 to 64
Examination
レポートで実施
By Report
Details of examination
Other information
Room : D-807
E-mail:matsui@ace.tut.ac.jp
Room : D-807
E-mail:matsui@ace.tut.ac.jp
Reference URL
http://rc.ace.tut.ac.jp/matsui/index.html
http://rc.ace.tut.ac.jp/matsui/index.html
Office hours
Wednesday 14:00-17:00
Wednesday 14:00-17:00
Relations to attainment objectives of learning and education
Key words

L

#### (M45630060)Building Science: Indoor Air Quality and Ventilation[Building Science: Indoor Air Quality and Ventilation]

Subject name[English]	Building Science: Ventilation]	Indoor Air Quality	and Ventilation[Build	ding Science: Indoc	or Air Quality and
Schedule number	M45630060	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Elective
Time of starting a course	Spring term	Day of the week period	Wed.2~2	Credit(s)	2
Faculty	Graduate Progran	n for Master's Degr	ee	Subject grade	1~
Department Offered	Architecture and	Civil Engineering	Beggining grade	M1, M2	
Charge teacher name[Roman alphabet mark]	松本 博 MATSUI	MOTO Hiroshi			·
Numbering					

### **Objectives of class**

This course aims at providing the practical strategies to realize a good air environment, mainly indoor air quality and ventilation in buildings. The goal is to help professionals update their knowledge related to new techniques and methods on indoor climate and its control.

This course aims at providing the practical strategies to realize a good air environment, mainly indoor air quality and ventilation in buildings. The goal is to help professionals update their knowledge related to new techniques and methods on indoor climate and its control.

#### **Contents of class**

The course is offered as an introduction to a professional-level understanding of indoor air quality control and ventilation method for realizing a good air environment in buildings. The course consists of the following topics:

1. General Introduction to indoor air environment

- 2. Building related illness and indoor air quality
- 3. Physical/chemical characteristics of air quality
- 4. Measurement techniques of air pollutants
- 5. Modeling of material emission and sorption
- 6. Prediction method for indoor air quality (IAQ) in rooms
- 7. CFD analysis of air movement
- 8. Performance evaluation of ventilation systems
- 9. Ventilation system design for pollutant control
- 10. Guidelines, codes and standard
- 11. Research and Development on IAQ (1)
- 12. Research and Development on IAQ (2)
- 13. Research and Development on IAQ (3)
- 14. Discussion on IAQ related issues

15. Supplementary lecture

The course is offered as an introduction to a professional-level understanding of indoor air quality control and ventilation method for realizing a good air environment in buildings. The course consists of the following topics:

- 1. General Introduction to indoor air environment
- 2. Building related illness and indoor air quality
- 3. Physical/chemical characteristics of air quality
- 4. Measurement techniques of air pollutants
- 5. Modeling of material emission and sorption
- 6. Prediction method for indoor air guality (IAQ) in rooms
- 7. CFD analysis of air movement
- 8. Performance evaluation of ventilation systems
- 9. Ventilation system design for pollutant control
- 10. Guidelines, codes and standard
- 11. Research and Development on IAQ (1)
- 12. Research and Development on IAQ (2)
- 13. Research and Development on IAQ (3)
- 14. Discussion on IAQ related issues
- 15. Supplementary lecture

Self Preparation and Review

#### Related subjects

#### Notes for textbook

The related handouts will be distributed. The related handouts will be distributed.

# Notes for reference

#### Goals to be achieved

Achievement level of this course is to understand the background of sick building syndrome and the practical strategies to realize a good air environment by controlling indoor air quality and ventilation in buildings, and also propose the healthy and sustainable buildings.

Achievement level of this course is to understand the background of sick building syndrome and the practical strategies to realize a good air environment by controlling indoor air quality and ventilation in buildings, and also propose the healthy and sustainable buildings.

#### Evaluation of achievement

Reports related to this subject are reviewed to evaluate the achievement level.

Reports related to this subject are reviewed to evaluate the achievement level.

# Examination

レポートで実施

# By Report

# Details of examination

#### Other information

Room: D-710, Phone: ext. 6838, E-mail: matsu@ace.tut.ac.jp Room: D-710, Phone:6838, Email: matsu@ace.tut.ac.jp

#### **Reference URL**

http://einstein.ace.tut.ac.jp/

# http://einstein.ace.tut.ac.jp/

Office hours

Thursday 13:00-14:30 Thursday 13:00-14:30

Relations to attainment objectives of learning and education

#### Key words

Indoor Air Quality, Healthy Building, Sick Building Syndrome, Ventilation Indoor Air Quality, Healthy Building, Sick Building Syndrome, Ventilation

(M45630120)Human Settlement: Its History and Theory Human Settlement: Its History and Theory	(M45630120)Human	Settlement: Its Histo	rv and Theory[Human	Settlement: Its Histon	and Theory
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Subject name[English]	Human Settlement: Its History and	d Theo	ry[Hı	uman S	Settlement: Its Histor	ry and Theory]	
Schedule number	M45630120	Subj	ect a	area	Advanced	Required or	Elective
					Architecture and	elective	
					Civil Engineering		
Time of starting a	Spring term	Day	of	the	Thu.3~3	Credit(s)	2
course		weel	k,peri	iod			
Faculty	Graduate Program for Master's De	egree				Subject	1~
						grade	
Department Offered	Architecture and Civil Engineering	5				Beggining	M1, M2
Charma taaahar	息田 苗雄 IZUMIDA Hideo	自由 茶株 IZUMIDA LIST.					
name[Roman alphabet							
mark							
Numbering							
Objectives of class							
After understanding son	ne basic knowledge on Classic and	lanana	ca tr	adition	al architecture		
and city the modern de	evelopment of Japanese architectu	re and	city	ie tau	ight from various no	ints of view: fo	reign influence
and introduction of wes	stern technology architectural educ	ne anu	neo-	-classi	c style modern mov	vement Ginza F	Reconstruction
and Parliament Building	projects building enactments respo	bacion,	neu	ural dia	c style, modern mov	rement, dinza i	(econstruction
After understanding son	ne basic knowledge on Classic and	lanane	se tr	adition	al architecture		
and city the modern de	evelopment of Japanese architectu	re and	city	is tau	ight from various no	ints of view: fo	reign influence
and introduction of wes	stern technology architectural educ	ne and	neo-	-classi	c style modern mov	vement Ginza F	Reconstruction
and Parliament Building	projects building enactments respo	onse to	neo	ural dis	asters etc		
Contents of class			mace				
1 Introduction							
Class Schedule Ancient	t architecture in Asia						
2 Sacred Architecture							
Tomb Shrine India Mes	; econotamia Em/nt						
3 Religious Architecture							
Temple in Buddhism Ch	≂ nurch in Christianity. Mosque in Islam. Miew in Chinese belief						
4 Classic Architecture	iuron in Onriscianicy, mosque in Islam, miew in Oniriese Dellet						
Greece Roman Classic	al=revival						
5 Farly Dwellings in Jan	an						
Pit House and Raised Fl	loor House						
6. Farly City Planning an	nd Nobles' Residence						
Grid-Patterned. Shinder	n Style						
7. Buddhist Architecture	e in Japan						
Horvuii temple, dice and	beam bracket, roof tile, timber cons	structio	on				
8. Shoin and Sukiya Sty	les						
Essential elements for S	Shingen stlye, Tea House						
9. Carpenters and tools							
Development of tools							
10. Early Modernization	Movement and Foreign Settlements	;					
Dutch in Dejima, Fortific	cation, Iron Manufacturing, Yokohama	a, Naga	asaki				
11. Meiji Modernization							
Foundation of Kobu-sho	o, Public Works, Railway Construction	n, Fore	eign E	Ingine	ers		
12. Imperial College of E	Engineering						
Organization, Teaching	Staff, Building, Josiah Conder						
13. 1st Generation of Ja	apanese Architects in late-19th cent	tury ar	chite	cture			
Tatsuno, Sone, etc. Neo	-Classic, Gothic Revival, Arts and C	Crafts					
14. 2nd Generation of J	apanese Architect in early 20th cent	tury ar	chite	cture			
Ito, Furukawa, Takeda, e	etc. Domestic Revival, Art Nouveau,	Seces	sion				
15. 3rd Generation of Ja	apanese Architecture in Modernism						
Horiguchi, Yashi, Ishimol	to, Maekawa, etc, F.L. Wright, Le Coi	rbusier	, Mie	S			
1 Introduction							
Class Schedule Ancient	t architecture in Asia						
2 Sacred Architecture							
Tomb Shrine India Med	sonotamia Egynt						

3. Religious Architecture Temple in Buddhism, Ch 4. Classic Architecture Greece, Roman, Classic, 5. Early Dwellings in Jap Pit House and Raised Fl 6. Early City Planning ar Grid-Patterned, Shinder 7. Buddhist Architecture Horyuji temple, dice and 8. Shoin and Sukiya Styl Essential elements for S 9. Carpenters and tools Development of tools 10. Early Modernization Dutch in Dejima, Fortific 11. Meiji Modernization Foundation of Kobu-sho 12. Imperial College of E Organization, Teaching S 13. 1st Generation of Ja Tatsuno, Sone, etc. Neo 14. 2nd Generation of Ja Horiguchi, Yashi, Ishimot Self Preparation and Re Related subjects 日本建築史(History of W 建築修復保存論(Conse	al=revival an oor House d Nobles' Resi o Style a in Japan beam bracket, es shingen stlye, T Movement and ation, Iron Mar , Public Works, ingineering Staff, Building, panese Archite -Classic, Goth apanese Archite tc. Domestic F apanese Archite to, Maekawa, et view	anity, Mosque in Islan dence roof tile, timber cons ea House Foreign Settlements infacturing, Yokohama Railway Constructio Josiah Conder ects in late–19th cen ic Revival, Arts and C ect in early 20th cen Revival, Art Nouveau, ecture in Modernism tc, F.L. Wright, Le Col tecture) ure: Modern) storation of Heritage	n, Miew in Chineso struction a, Nagasaki n, Foreign Engined tury architecture Crafts tury architecture Secession rbusier, Mies Architecture)	e belief		
世界建築史(History of W 建築修復保存論(Conse	Vorld Architect	ure: Modern) storation of Heritage	Architecture)			
Textbook1	Book title	Japanese Building I	Practice		ISBN	
	Author	Kenneth Frampton and Kunio Kudo	Publisher		Publish year	1991
Notes for textbook						
Notes for reference						
Goals to be achieved         1. understanding of essentials for construction of dwellings/architecture         2. understanding of process of development of architecture styles         3. understanding of various styles of Japanese architecture         4. understanding of modernization process of Japanese architecture         1. understanding of essentials for construction of dwellings/architecture         2. understanding of process of development of architecture         2. understanding of process of development of architecture         2. understanding of process of development of architecture styles         3. understanding of various styles of Japanese architecture         4. understanding of various styles of Japanese architecture         5. understanding of various styles of Japanese architecture         6. understanding of modernization process of Japanese architecture         7. understanding of modernization process of Japanese architecture         8. understanding of modernization process of Japanese architecture         9. understanding of modernization process of Japanese architecture         9. understanding of achievement						
1. Participation to class 2. Final Report (50%) 1. Participation to class 2. Final Report (50%) <b>Examination</b> レポートで実施 By Report	discussion and	short report (50%)   short report (50%)				

### Details of examination

## Other information

### **Reference URL**

https://sites.google.com/site/archisslh/home https://www.facebook.com/savelocalheritage https://sites.google.com/site/archisslh/home https://www.facebook.com/savelocalheritage

Office hours

Wednesday 13:00<sup>~</sup>17:00 Wednesday 13:00<sup>~</sup>17:00

Relations to attainment objectives of learning and education

### Key words

architectural history, Japanese architecture architectural history, Japanese architecture

#### (M45630140)Advanced District Planning[Advanced District Planning]

Subject name[English]	Advanced District Planning[Advanced District Planning]						
Schedule number	M45630140	45630140 Subject area Advanced		Required or	Elective		
				Architecture	elective		
				and Civil			
				Engineering			
Time of starting a course	Spring term	Day of	the	Tue.1~1	Credit(s)	2	
		week,period					
Faculty	Graduate Program	n for Master's	Subject grade	1~			
Department Offered	Architecture and Civil Engineering				Beggining	M1, M2	
		grade					
Charge teacher name Roman	浅野 純一郎 AS/	浅野 純一郎 ASANO Junichiro					
alphabet mark							
Numbering							
Objectives of class							
1) To gain the practical knowledg	e of urban and distr	rict planning.					
2) To learn the advanced method	advanced methods of district planning and design.						

- 3) To learn the theory and the system of Japanese land use control system and land readjustment projects.
- 1) To gain the practical knowledge of urban and district planning.
- 2) To learn the advanced methods of district planning and design.
- 3) To learn the theory and the system of Japanese land use control system and land readjustment projects.

#### **Contents of class**

- The major topics that will be addressed in this class are the followings.
- 1. Overview of the theory and concrete policy and methods about modern urban planning system in Japanese
- 2. Overview of Japanese land use control system, especially area division system and development permission.
- 3. Overview of Japanese land readjustment projects.
- 4. Practice by application of the design methods about land readjustment project and district planning.
- Reporting textbook "Urban Planning System in Japan 2nd Edition" and doing workshop about land readjustment project and district planning.

The major topics that will be addressed in this class are the followings.

- 1. Overview of the theory and concrete policy and methods about modern urban planning system in Japanese
- 2. Overview of Japanese land use control system, especially area division system and development permission.
- 3. Overview of Japanese land readjustment projects.
- 4. Practice by application of the design methods about land readjustment project and district planning.

Reporting textbook "Urban Planning System in Japan 2nd Edition" and doing workshop about land readjustment project and district planning.

### Self Preparation and Review

#### **Related subjects**

- The following knowledge is desirable,
- 1) The basic knowledge on modern urban planning
- 2) The knowledge on urban planning system in your country

The following knowledge is desirable,

- 1) The basic knowledge on modern urban planning
- 2) The knowledge on urban planning system in your country

#### Notes for textbook

- •Urban Planning System in Japan 2nd Edition
- •Urban Land Use Planning System in Japan 2dn Edition
- Both have been published by Japan International Cooperation Agency

Urban Planning System in Japan 2nd Edition
Urban Land Use Planning System in Japan 2dn Edition

Both have been published by Japan International Cooperation Agency

#### Notes for reference

### Goals to be achieved

#### **Evaluation of achievement**

Submitting reports about textbook and another theme. Written report: 100% but this report will be checked several classes through discussion with students.

Submitting reports about textbook and another theme. Written report: 100% but this report will be checked several classes through discussion with students.

Examination

レポートで実施

By Report

#### Details of examination

#### Other information

#### Reference URL

https://webct.edu.tut.ac.jp:443/webct/public/home.pl or https://moodle.imc.tut.ac.jp/ More information and pdf.files of textbook will be offered from Webct.

https://webct.edu.tut.ac.jp:443/webct/public/home.pl or https://moodle.imc.tut.ac.jp/ More information and pdf.files of textbook will be offered from Webct.

#### Office hours

Relations to attainment objectives of learning and education

#### Key words

District planning, Land use control system, Land readjustment project District planning, Land use control system, Land readjustment project

# (M45630180)Advanced Computational Economics[Advanced Computational Economics]

Subject name[English]	Advanced Computational Economics[Advanced Computational Economics]							
Schedule number	M45630180	Subject are	a	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	1		<u></u>	1		
Faculty	Graduate Progra	m for Masters	Degr	e	Subject grade	~ M1_M2		
Department Offered	Architecture and	GIVII Engineei	ring		Beggining	MT, MZ		
Charge teacher name[Roman	渋澤 博幸 SHIB	LISAWA Hirov	uki		grade			
alphabet mark]		(/ギー時干 ShidusAwa niroyuki						
Numbering								
Objectives of class								
In this course, students learn the	economic modelin	g techniques :	and th	e simulation method	ology			
In this course, students learn the	economic modelin	g techniques a	and th	e simulation method	ology.			
Contents of class		8						
1–2: Input–Output Model								
3-4: Simple 2 Sectors General Fo	guilibrium Model							
5-6: Inter-Sectoral General Fouil	ibrium Model							
7–8: Simulation and Numerical Ex	ample							
9–11: Open Model with Exports a	nd Imports							
12–13: General Equilibrium Model	with Public Sector	r						
14–15: Simulation and Numerical	Example	xample						
1-2: Input-Output Model								
3-4: Simple 2 Sectors General Ed	uilibrium Model							
5–6: Inter-Sectoral General Equil	orium Model							
7–8: Simulation and Numerical Ex	ample							
9-11: Open Model with Exports a	nd Imports							
12-13: General Equilibrium Model	with Public Sector	r						
14-15: Simulation and Numerical	Example							
Self Preparation and Review								
Required Assignments								
Students are required to learn to	pics and exercises	before and af	ter ea	ch class.				
Required Assignments								
Students are required to learn to	pics and exercises	before and af	ter ea	ch class.				
Related subjects								
Industrial Policies, Econometrics								
Industrial Policies, Econometrics								
Notes for textbook								
Papers will be distributed.								
Papers will be distributed.	Papers will be distributed.							
Notes for reference								
Goale to be achieved								
Acquiring the theory of the gape	ral equilibrium mod	اما						
Constructing a general equilibrati	on model using an	numerical data	-					
Evaluating impacts of an econom	uon model using an numerical data. mic polity using the general equilibrium model							
Acquiring the theory of the gene	ne poncy asing the general equilibrium model. eral equilibrium model							
Constructing a general equilibrati	nar equilibrium model. ion model using an numerical data							
Evaluating impacts of an econom	ic polity using the	general equilib	 rium n	nodel.				
	,,	,						
Evaluation of achievement								
Reports must be submitted. Repo	ort 100%.							
A: 80 Points or higher, B: 65 poin	ts or higher, C:55 p	oints or highe	r, D: L	ess than 55 points				
Reports must be submitted. Repo	ort 100%.							
A: 80 Points or higher, B: 65 poin	s 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
Reference URL
www.pm.ace.tut.ac.jp
www.pm.ace.tut.ac.jp
Office hours
Wednesday 9:00-10:00
Wednesday 9:00-10:00
Relations to attainment objectives of learning and education
Key words
Computational Economics, Simulation
Computational Economics. Simulation

### (M45630200)Advanced Structural System Planning and Design II[Advanced Structural System Planning and Design II]

Outloot many [Fourth 1]						
Subject name[English]	Advanced Structural System Planning and Design II[Advanced Structural System Planning					
	and Design II		1	1		
Schedule number	M45630200	Subject area	Advanced	Required or	Elective	
			Architecture	elective		
			and Civil			
			Engineering			
Time of starting a source	Saulia a tauna	Davi of the	Intensive	Ore dit(a)	0	
Time of starting a course	Spring term	Day of the	Intensive	Great(s)	2	
		week,period				
Faculty	Graduate Progra	am for Master's Degre	ee	Subject grade	1~	
Department Offered	Architecture and	d Civil Engineering		Beggining	M1, M2	
				grade		
Charge teacher name[Roman	S5系教務委員	S5系教務委員 5kei kyomu Iin−S				
alphabet mark]						
Numbering						
Objectives of class						
It depends on the laboratory. T	he resistered stu	idents are required	to attend all the s	eminars, which is	arranged by the	
laboratory supervisor for the spe	cial study subject	ts related to the cur	rent research activi	ty of the laborato	rv. The scheduled	
program of the seminars is appo	inced by the supe	rvisor at the guidance	of the seminar			
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Frankin stirm						
Examination						
その他						
By Report						
Details of examination						
Reference URL						
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Relations to attainment objectives of learning and education						
ולטומניטיוס גע מנגמוווווסווג טעוסטעיסס טו וסמווווון מווע סעעטמעטו						
1						
Key words						

# (M45630220)Advanced Environmental System Planning and Design II[Advanced Environmental System Planning and Design II]

Subject name[English]	Advanced Environmental System Planning and Design II[Advanced Environmental System					
	Planning and Design II]					
Schedule number	M45630220	Subject area	Advanced	Required or	Elective	
			Architecture	elective		
			and Civil			
Time of starting a summer	Cauda a tauna	Dave of the	Engineering	Our dit(a)	0	
lime of starting a course	Spring term	Day of the	Intensive	Gredit(s)	Z	
Feaulty.	Graduata Progra	m for Master's Degr		Subject grade	1~	
Department Offered	Architecture and	Civil Engineering	66	Beggining	M1 M2	
	Architecture and			grade	1011, 1012	
Charge teacher name[Roman	S5系教務委員 :	5kei kvomu lin-S		8.000		
alphabet mark]						
Numbering						
Objectives of class						
Upjectives of class	he uppletered at	dente que vervined	مطغالم اسمعتهم مع	aminana which is	annenged by the	
laboratory supervisor for the and	ne resisterea stu	increased to the arm	to attenu all the s	ty of the loborator	arranged by the	
program of the cominars is appe	nced by the super	s related to the CUP	e of the seminar	Ly of the laborator	y. The scheduled	
Contents of class	anceu by the super	visor at the guiuanc	e or the semiliar.			
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for the design						
Notes for textbook						
Notes for reference						
Ocele to be exhimined						
Goals to be achieved						
Evaluation of achievement						
Examination						
その他						
By Report						
Details of examination						
Other information						
Reference URI						
Office hours						
Office nours						
Relations to attainment objectives of learning and education						
1						
Ney words						

### (M45630240)Advanced Regional System Planning and Design II[Advanced Regional System Planning and Design II]

Subject name[English]	Advanced Regio	nal System Planning	and Design II[Adva	nced Regional Sys	tem Planning and	
	Design II]					
Sobedule number	M45630240	Subject area	Advanced	Pequired or	Elective	
	10143030240	Subject area	Auvanceu		LIECTIVE	
			Architecture	elective		
			and Civil			
			Engineering			
	0.1.1			<b>a w</b> ()		
lime of starting a course	Spring term	Day of the	Intensive	Credit(s)	2	
		week,period				
Faculty	Graduate Progra	am for Master's Degre	96	Subject grade	1~	
Descents offered				De aninin a	M1 M0	
Department Offered	Architecture and	u Givii Engineering		Deggining		
				grade		
Charge teacher name Roman	S5系教務委員	S5系教務委員 5kei kyomu Jin-S				
alphabet mark]		•				
Numbering						
Objectives of class						
Objectives of class						
It depends on the laboratory. T	he resistered stu	udents are required	to attend all the s	eminars, which is	arranged by the	
laboratory supervisor for the spe	ecial study subject	ts related to the cur	rent research activi	tv of the laborator	v. The scheduled	
program of the cominars is appoi	unced by the sune	nuicor at the muidance	of the cominar		,	
program of the seminars is annot	inced by the super	rvisor at the guidance	e of the seminar.			
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Examination						
その他						
Ву Керогс						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objectives of learning and education						
1						
Key words						

# (M45630310)Water Environment Engineering I[Water Environment Engineering I]

Subject name[English]	Water Environment Engineering I[Water Environment Engineering I]						
Schedule number	M45630310 Subject area Advanced		Advanced	Required or	Elective		
				Architecture	elective		
				and Civil			
				Engineering			
Time of starting a course	Spring term	Day of	the	Tue.5~5	Credit(s)	2	
		week,period	1				
Faculty	Graduate Program	n for Master's	Degr	ee	Subject grade	1~	
Department Offered	Architecture and	Civil Engineer	ring		Beggining	M1, M2	
					grade		
Charge teacher name[Roman	│	KOTA Kuriko					
alphabet mark							
Numbering							
Objectives of class							
To know and understand the wate	er pollutants in wat	er environmei	nt.				
To know and understand Environ	mental Quality Stan	idards for Wat	ter Po	llutants in Japan.			
To know and understand the wate	er pollutants in wat	er environmer	nt.				
To know and understand Environ	mental Quality Stan	idards for Wat	ter Po	llutants in Japan.			
Contents of class							
History of Water Pollution in Japa	an						
I) Minamata disease							
2) Chronic cadmium poisoning							
Environmental Quality Standards	for Water Pollutant	S					
1)Environmental Quality Standard	is for Human Healtr	n and Monitor	ed Sul	ostances and Guidel	ine values		
2)Environmental Quality Standard	is for Conservation	of the Living	Enviro	onment			
Water pollutants in water environ	ment						
1)Nutrients							
2)Chemicals in water environmen	t						
History of Water Pollution in Japan							
1) Minamata disease							
2) Chronic cadmium poisoning							
1)Environmental Quality Standards	Environmental Quality Standards for Water Pollutants						
2)Environmental Quality Standard	is for Concernation	of the Living	Envira	onment	ine values		
2/Environmental Quality Standard		of the Living		Jimene			
Water cellutente in water en úren							
water poliutants in water environment							
2)Chemicals in water environment							
Self Prenaration and Review							
יישו א ויסאמומעטו מוע הסיוסאי							
Deleted autiente							
Notes for touthook							
Notes for textbook							
No textbook is required for this class.							
No textbook is required for this class.							
Coole to be solvinged							
Goals to be achieved							
To understand the water pollution and environmental quality standard.							
Founderstand the water politician and environmental quality standard.							
Reports							
Renorts							
Fxamination							
レポートで実施							
By Report							
Details of examination							

### Other information

D-810 Tel:6851 e-mail:yokota@ace.tut.ac.jp D-810 Tel:6851 e-mail:yokota@ace.tut.ac.jp

Reference URL

# Office hours

Wednesday 12:00- 13:00 Wednesday 12:00- 13:00

Relations to attainment objectives of learning and education

Key words