# Syllabus

## International Doctoral Degree Program (2016-Fall Term)

Subject name[English]	Advanced Semin Engineering 1]	nar on Mechanical	I Engineering 1[/	Advanced Seminar	on Mecha
Schedule number	D51010010	Subject area	Advanced	Required or	Required
			Mechanical	elective	
		I	Engineering		
Time of starting a course	Year	Day of the week.period		Credit(s)	4
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	1~
Department Offered	Mechanical Engine	eering		Beggining grade	D1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1	kei kyomu Iin−S		B	
Numbering					
Objectives of class	<u>.</u>				
The seminar aims to enhance the	ability of each stu	dent to plan and acc	complish research	in the field of mecha	anical engine
through reviewing reading, and di	soussing technical	naners related to his	<pre>&gt;</pre>	s research topic.	Iniour ongine
Contents of class	Sousonig coorning		3/110/ 000001 01000	5105001011 00010.	
Each student reads English tech	hnical naners relat	ed to his/her doct	or thesis introduc	can the contents of	f the naners
discusses them with other studer	ate and his /her sup	onvieor			
Self Drenaration and Review	Its and morner supe				
<b>-</b> • · · • • • •					
Related subjects					
Inquire this of your supervisor.					
Notes for textbook					
Inquire this of your supervisor.					
Goals to be achieved	dont to discuss hi	- /bar doctor thesis		-d topics related to	his /her rest
field with his/her supervisor and	energialists in his/he	s/ner uuuuu uuuuu ar fiald			
To acquire the ability to write En	alish technical nane				
Fyelvation of achievement	Susu recumoa pape	15.			
The achivement is evaluated has	ad on the results of	f paper introduction	understanding of	namera answers to (	questions ar
the contribution to discussion	su on the results of		Understanding of	papers, answers to t	Juescions, an
Evenination					
Land during even period					
None during examination					
Details of examination					
Other information					
Inquire this of your supervisor.					
Reference URL					
Reference URL Office hours					
Reference URL Office hours Inquire this of your supervisor.					
Reference URL Office hours Inquire this of your supervisor. Relations to attainment objective	s of learning and eq	Jucation			
Reference URL Office hours Inquire this of your supervisor. Relations to attainment objective	s of learning and ec	ducation			
Reference URL Office hours Inquire this of your supervisor. Relations to attainment objective	s of learning and e	ducation			
Reference URL Office hours Inquire this of your supervisor. Relations to attainment objective	is of learning and eq	ducation			
Reference URL Office hours Inquire this of your supervisor. Relations to attainment objective	s of learning and e	ducation			

(D51010020)Advanced Seminar o	n Mechanical Engir	neering 2[Advanced	Seminar on Mec	hanical Engineering 2]	
Subject name[English]	Advanced Semir Engineering 2]	nar on Mechanica	I Engineering 2	2[Advanced Seminar	on Mechanica
Schedule number	D51010020	Subject area	Advanced Mechanical Engineering	Required or elective	Required
Time of starting a course	Year	Day of the week,period	Intensive	Credit(s)	1
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	2~
Department Offered	Mechanical Engin	eering		Beggining grade	D2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1	kei kyomu Iin−S			
Numbering					
Objectives of class					
The seminar aims to enhance the engineering through reviewing, rea Contents of class Each student reads English tech discusses them with other studer Self Preparation and Review	e ability of each st ading, and discussin nnical papers relat nts and his/her sup	tudent to plan and ng technical papers n ed to his/her doct ervisor.	accomplish his/k related to his/he or thesis, introd	ner research in the fie r doctor thesis resear uces the contents of	eld of mechanica ch topic. <sup>:</sup> the papers and
Related subjects					
Inquire this of your supervisor.					
Notes for textbook					
Inquire this of your supervisor.					
Notes for reference					
Goals to be achieved					
To acquire the ability of each st	udent to discuss hi	is/her doctor thesis	research topic	and topics related to	his/her researcl
field with his/her supervisor and	specialists in his/he	er field.			
To acquire the ability to write En	glish technical pape	ers.			
Evaluation of achievement					
The achivement is evaluated base	ed on the results of	f paper introduction	, understanding c	of papers, answers to o	questions, and o
the contribution to discussion.					
Examination					
None during exam period					
Details of examination					
Other information					
Inquire this of your supervisor.					
Office hours					
Inquire this of your supervisor.					
Relations to attainment objective	s of learning and e	ducation			
Key words					

#### (D51010050)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	Seminar on Interd	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]						
Schedule number	D51010050 Subject area		Advanced	Required or	Required			
			Mechanical	elective				
			Engineering					
Time of starting a course	Fall term	Day of the	Mon.3~3	Credit(s)	1			
		week,period						
Faculty	Graduate Program	n for Doctoral Degre	ee	Subject grade	2~			
Department Offered	Mechanical Engin	eering	Beggining	D2				
	grade							
Charge teacher name[Roman	│S1系教務委員, 教務委員会副委員長 1kei kyomu Iin−S, kyoumu iinkai fukuiintyou							
alphabet mark]								
Numbering								

#### **Objectives of class**

New technologies are often developed from the combination of different disciplines. It is clear that successful interdisciplinary efforts require mastery of specific competencies. This course will develop a student's scientific and technical knowledge in which researchers from different disciplines. If such competencies are explicated, it might be possible to enhance researchers' abilities to develop the next generation in interdisciplinary scholarship.

The purpose of this class is to recognize how interdisciplinary-based research provides important knowledge and insight into complex problems and issues and also appreciate the unique advantages of integrative research and learning.

#### **Contents of class**

In this seminar, doctoral course student of 2nd year will make a presentation to other D2 students of different research fields, in order to obtain the research ability to integrate varieties of research fields. See the schedule.

1) Presentations

In this class, each student will make a presentation to other students of different research fields.

So the student who do the presentation will prepare the outline for approximately 2 pages (A4), and make a power-point. \*Supervisor will come and check his student's presentation, if available.

2) Title and abstract of presentation

Not only D2 students, but also other students are welcome to attend the presentation.

So please submit the title and abstract (200 words) 3 weeks before your presentation to Academic Affairs Division. We will post it on the bulletin board inside the campus.

#### 3) Report you will submit

You will be requested to submit a report after each presentation to your supervisor. As an initial training to create a new research project, students will work to make brief summary of a topic from other student's research filed with the goal of creating research project. And students will complete a research proposal that will be integrated from other scientific field and their own research filed.

4) Schedule of your presentationPlease check the schedule given before the semester begins.

5) Absence from the class

Basically, you have to attend every class.

If you need to take absence due to the sickness or conference, please discuss with your supervisor what you should do instead.

#### Self Preparation and Review

#### Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

The purpose of this class is to recognize how interdisciplinary-based research provides important knowledge and insight into appropriate the unique advantares of integrative research and learning
Fullistion of achievement
Your supervisor will check your report, and submit your academic score to the member of Academic Affairs Committee at the
end of semester
Examination
None during exam period
Details of examination
Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

#### (D51010060)Ethics of Researcher[Ethics of Researcher]

Subject name[English]	Ethics of Resear	cherLEthics of Rese	archer						
Schedule number	D51010060	Subject area	Advanced	Required or	Required				
			Mechanical	elective					
			Engineering						
Time of starting a course	Fall1 term	Day of the	Wed.1~1	Credit(s)	1				
		week,period							
Faculty	Graduate Progra	m for Doctoral Degr	ee	Subject grade	1~1				
Department Offered	Mechanical Engir	neering		Beggining	D1				
				grade					
Charge teacher name[Roman	教務委員会副委	§員長,原 邦彦,」	:野 未貴 kyoumu	u iinkai fukuiintyou,	HARA Kunihiko,				
alphabet mark]	UENO Miki								
Numbering									
Objectives of class									
Assist graduate students as they	undertake researd	h activities and pro	note an understan	ding of the inherent	ethical problems:				
lead students to think independent	antly and evercise	normative conscio	isness of research	ang of the innerent	nics education in				
research in accordance with goals	of scientific educ	ation and research	and characteristics	of individual resear	ch specialties				
Contents of class	s of sciencine educ				on specialities.				
1st week: Introduction 1st made	a in a-learning								
and - 6th woold and - 7th									
Zriu – otn week: Znd – /th module	s in e-learning								
- / In week: Discussion with super	VISOr								
ouri week: Examination									
e-learning									
Ist module: Research Misconduct	Manager ( C )	the function of the P							
Zna module: Etnical Issues in the	wanagement of Da	ata in Engineering Re	esearch						
3ra module: Responsible Authorsh									
4th module: Ethical Issues in the	Peer Review and H	ublication of Engine	ering Research						
5th module: Collaborative Research in Engineering Fields									
6th module: Whistleblowing and th	e Obligation to Pr	otect the Public							
7th module: Managing Public Rese	earch Funds								
Self Preparation and Review									
Students will need to refer to the	ir textbook to prep	pare for and review e	ach lesson.						
Related subjects									
Philosophy of Science and Techn	ology, Ethics for E	ngineers							
Notes for textbook									
Notes for reference									
For the Sound Development of Sc	sience ?The Δttitu	de of a Conscientiou	is Scientist						
In the Society for the Promotion	of Science Editing	Committee MARI							
2015 ISBN978-4-621-08938-5									
(PDF: https://www.isps.go.ip/i-k	usei/data/rinrind	t)							
רטר . חננףג./ / www.jsps.go.jp/ j=kousei/ data/ mm/i.pdt/									
Ocale to be achieved									
To prevent misconduct and promote fair research activities, this course provides knowledge and techniques regarding research									
ethics in accordance with charact	eristics of each gi	raduate student s re	search specialties						
[Evaluation method] Final exam(1	00%)								
[Evaluation basis]									
I hose who take and pass the sho	rt test atter each	unit of e-learning co	ntents will be eval	uated with following	basis.				
A: Achieved all goals and obtained	1 80 points or high	er (out of 100) as to	tal score of exams						
B: Achieved most goals and obtai	ned 65 points or h	igher (out of 100) as	total score of exa	ms					
C: Achieved more than half of spe	ecitied goals and o	btained 55 points or	higher (out of 100)	) as total score of ex	ams				
Examination									
Examination(Face to Face)									
Details of examination									

1

Other information

#### **Reference URL**

Office hours

Relations to attainment objectives of learning and education

#### Key words

Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism

#### (D51030020)Advanced Production Processes[Advanced Production Processes]

Subject name[English]	Advanced Production Processes Advanced Production Processes							
Schedule number	D51030020	Subject an	ea	Advanced	Required	Required or Elective		
				Mechanical	elective			
				Engineering				
Time of starting a course	Fall term	Day of	the	Mon.2~2	Credit(s)		2	
		week,perio	d					
Faculty	Graduate Progra	m for Doctora	al Degre	e	Subject gr	ade	1~	
Department Offered	Mechanical Engir	neering			Beggining		D1	
					grade			
Charge teacher name[Roman	森 謙一郎,柴田	1 隆行,安部	洋平日	MORI Ken-Ichiro	, SHIBATA Tak	ayuki,	ABE Yohei	
alphabet mark]								
Numbering								
Objectives of class								
With the recent development of	computers. numer	ical methods	tend to	be used in the	field of manufa	acturin	g processes. The	
finite element method is mainly e	explained in this le	cture. The fi	nite ele	ment method is	widely applied	to eng	ineering problems	
such as solid mechanics, fluid me	chanics, etc. (K. M	ori and Y. Abe	e)		, ,,	0	01	
In addition, the objectives of this	s course is to intr	oduce fundam	nentals	of conventional	micromachining	g techi	nologies and the-	
state-of-art nanomachining tech	nologies, and their	application in	the de	velopment of "N	/licro/Nano Elec	tro M	echanical System	
(MEMS/NEMS)". (T. Shibata)								
Contents of class								
(K. Mori and Y. Abe)								
1st week: Numerical Methods: fin	ite difference meth	nod, finite eler	nent m	ethod and bound	ary element me	thod		
2nd week: Finite difference met	hod for heat con	duction: disc	retizato	n of differentia	l equation gove	erning	heat conduction,	
calculation of temperature distrib	ution							
3rd week: Basic equations in solid	d mechanics: three	-dimensional	stress	and strain, equili	brium equations	, cons	titutive equations	
in elasticity and plasticity, yield c	riteria, incompress	ibility conditio	n, etc.					
4th week: Finite element method	for elastic deforma	ation: triangula	ar elem	ents, distribution	is of displaceme	ent and	l strain	
5th week: Equilibrium equations o	f nodal forces, stif	fness matrix,						
6th week: Treatment of boundary	conditions							
7th week: Plasticity, elastic-plast	ic finite element m	nethod						
8th week: Finite element method	for plastic deformation	ation						
(I. Shibata)								
9th week: Introduction of MEMS/	NEMS							
11th week: Photolithography	4 - I							
1 Ith week: wet etching and dry e								
12th week: Physical vapor deposi	tion (PVD) and che	emical vapor o	iepositi	on (GVD)				
14th week: Surface micromachini	g, and bollding proc	ess achining						
15th week: Microactuators and se	ng anu buik micron	lacining						
16th week: State-of-the-art in m	hicro/nanomarching	, technologies						
Self Preparation and Review			•					
Students are required to prepare	and review each la	esson						
Related subjects	2							
Strength of material. Solid mecha	nics. Numerical me	ethods (K. Mo	ri and \	. Abe)				
Micromachining engineering (T. Shibata)								
Notes for textbook	•							
Handout								
Notes for reference								
(T.Shibata) Useful informatic	on on MFMS	technologie	s car	n be obtaine	d from the	e fol	lowing website	
http://www.memsnet.org/mems/			501					
Reference: (1) M.J. Madou, "Fund	lamentals of Micro	fabrication, 2r	nd ed.".	CRC Press, 200	02. (2) S. Franss	ila, "In	troduction to	
Microfabrication", John Wilev & S	Sons, 2004. (3) M. (	Gad-El-Hak. "	The M	EMS Handbook. 2	2nd ed.", CRC F	r I Llc	, 2006.	
Goals to be achieved	,	,			,		e de la companya de l	
To understand the finite element								
	method (K. Mori a	nd Y. Abe)						
To gain an understanding of the principles of micro/nanomachining technologies and to apply knowledge of the technologies to								
To gain an understanding of the p the design and manufacturing of a	method (K. Mori a principles of micro a micro/nanodevic	nd Y. Abe) ⁄nanomachini e (T. Shibata)	ng tech	nologies and to	apply knowledge	e of th	e technologies to	

Reports of every week : 100% (K. Mori and Y. Abe) Written report : 100% (T. Shibata) Examination その他 By Report Details of examination Other information Ken-ichiro Mori: room D-606, extension number: 6707, e-mail: mori@me.tut.ac.jp Yohei Abe: room D-604, extension number: 6705, e-mail: abe@me.tut.ac.jp Takayuki Shibata: room D-605, extension number: 6693, e-mail: shibata@me.tut.ac.jp **Reference URL**  $http://plast.me.tut.ac.jp/index.eng.html \ (K. \ Mori \ and \ Y. \ Abe)$ http://mems.me.tut.ac.jp/ (T. Shibata) **Office hours** Monday (K. Mori and Y. Abe) Anytime during regular working hours. Contact me by email before coming if possible. (T. Shibata) Relations to attainment objectives of learning and education Key words K. Mori and Y. Abe: forming processes, solid mechanics, finite element method // T.Shibata: micro/nanomachining, MEMS/NEMS

#### name[English] D51030040 Subject area Required or Elective Schedule number Advanced Mechanical elective Engineering Fri.2~2 Time of starting a Fall term Day of the Credit(s) 2 week,period course Faculty Graduate Program for Doctoral Degree Subject 1~ grade Department Offered Mechanical Engineering Beggining D1 grade 三浦 博己. 戸高 義一, 小林 正和 MIURA Hiromi, TODAKA Yoshikazu, KOBAYASHI Masakazu Charge teacher name[Roman alphabet mark] Numbering **Objectives of class** Learn knowledge and application about strength fracture and problems solutions of materials' microstructures on the base of material science necessary for safe and reliable usages of materials. Learn methods for experiments and the evaluation on the base academic understanding. Learn mechanisms of manifestation of functions and properties in relation with processing for the manifestation, because controls of properties and optimization of structural functional materials are now carried out. Contents of class 1st: Introduction (deformation, fracture and micro structural control of materials and the recent related topics) (MIURA) 2nd: Microstructural control and improvement of mechanical property (MIURA) 3rd: Dynamic recrystallization and micro structural control I (MIURA) 4th:Dynamic recrystallization and micro structural control II (MIURA) 5th: Static recrystallization and micro structural control (MIURA) 6th: Evaluation and analysis of material Microstructure 1(Synchortron radiation)(KOBAYASHI) 7th: Evaluation and analysis of material Microstructure 2(Imaging, tomography)(KOBAYASHI) 8th: Evaluation and analysis of material Microstructure 3(Image processing, modeling)(KOBAYASHI) 9th: Evaluation and analysis of material Microstructure 4(Orientation analysis)(KOBAYASHI) 10th: Evaluation and analysis of material Microstructure 5(Texture analysis)(KOBAYASHI) 11th: Microstructure of materials 1 (Structure, Lattice defect) (TODAKA) 12th: Microstructure of materials 2 (Phase diagram, Solidification, Diffusion) (TODAKA) 13th: Microstructure of materials 3 (Deformed structure, Recovery, Recrystallization, Phase transformation) (TODAKA) 14th: Strength of Materials 1 (Strengthening mechanism, Heat treatment Deformation process) (TODAKA) 15th: Strength of Materials 2 (Plastic deformation and microstructure) (TODAKA) 16th:Term-end report Self Preparation and Review Self Preparation and Review are essential. **Related** subjects B3 機械の材料と加工(Materials and Processing in Mechanical Engineering), 材料物理化学 B4 材料信頼性工学,構造材料学(Structural Materials),材料解析 M1 材料保証学, 材料機能制御工学特論(Advanced Materials Function Control Engineering) Notes for textbook The text for lecture is distributed. 978-0-08-Reference 1 Book title Recrystallization and related annealing phenomena ISBN 044164-1 2004 Author F.J.Humphreys and Publisher Elsevier Publish M.Hatherly year Reference2 Book title Materials Science and Engineering: An Introduction, 8th ISBN 978-0470419977 Edition Author William D. Callister, John Wiley and Publish 2009 Publisher David G. Rethwisch Sons year 材料の科学と工学 <1>- <4> ISBN Reference3 Book title 978-4563067120 Author W.D. キャリスター Publisher 培風館 Publish 2002 (著), William D., Jr. year Callister (原著),入 戸野修(翻訳)

#### (D51030040)Advanced Materials Science[Advanced Materials Science]

Subject

Advanced Materials Science[Advanced Materials Science]

Notes for reference
参考書 4
書名「マテリアルエ学シリーズ 2 材料組織学」, 著者名:高木節雄,津崎兼彰, 出版社:朝倉書店,ISBN:978-4254236927,
出版年 : 2000
参考書 5
 - ターマテリアルエ学シリーズ 3 材料強度学」、著者名:加藤雅治、熊井真次、尾中晋、 出版社:朝倉書店、ISBN:978-
4254236934, 出版年:1999
Goals to be achieved
1. Understand mechanisms of deformation, fracture and microstructural control of materials and the related recent topics
2. Understand meanings of microstructural control and improvement of mechanical property
3. Understand mechanisms of dynamic recrystallization and microstructural control for actual applications
4. Understand mechanisms of static recrystallization and microstructural control for actual applications
5. Understand and explain imaging technique by using synchrotron radiation
6. Understand and explain representation of crystallographic orientation
7. Understand and explain relationship between microstructure and properties
8. Propose heat treatment and deformation process for control of microstructure and properties
Evaluation of achievement
Evaluation of results : intermediate reports(50%) and term-end final report(50%)
Criterion: evaluate results for the students presented at all the lectures essentially as below.
A: achieve all objectives and total marks of reports and exam over 80
A achieve an objectives and total marks of reports and evan over 65
Disachieve 5 objectives and total marks of reports and exam over 55
Examination
その他
By Report
Details of examination
Other information
Pafaranaa LIPI
<pre>\miura &gt; nttp://str.me.tut.ac.jp</pre>
<pre>Chobayasmi / intp://strime.ut.acjp</pre>
<pre></pre>
Chine hours
Windra / Prease send e-mail in advance for appointment.
Chobayashi > Prease send e-mail in advance for appointment.
Crodeka Prease send e-mail in advance for appointment.
Key worde
Properties envited structure microstructure therms presses mechanical presses

#### (D51030080)Advanced Environmental Engineering[Advanced Environmental Engineering]

Subject name[English]	Advanced Environmental Environmental Environmental Environmental							
Schedule number	D51030080	Subject area	Advanced	Required or	Flective			
	201000000		Mechanical	elective	LICCLIVE			
			Engineering	01000140				
Time of starting a course	Fall term	Day of the	Thu 1~1	Credit(e)	2			
Time of starting a course		week period		Of Buil(S)	2			
Faculty	Graduate Progra	m for Doctoral Degre	20	Subject grade	1~			
Department Offered	Mechanical Engir	neering		Beggining	D1			
	Meenamoar Engi	looring		grade	51			
Charge teacher name[Roman	飯田 明由 関下	「 信正 柳田 秀記」	IDA Akiyoshi, SEKIS	SHITA Nobumasa	ANADA Hideki			
alphabet mark]			,,,	, ·				
Numbering								
		6 I.			<b>C L C L</b>			
The class aims to acquire advan	ced knowledge ne	cessary for tackling	energy and environ	mental problems ir	n future from the			
standpoint of thermal and fluid en	igineering.							
Contents of class								
The class is given by Prof.Iida (fir	st five weeks), Pro	of.Sekishita (second t	five weeks), and Pro	f.Yanada (last five	weeks).			
1st to 5th weeks:								
In the first five lectures, students	will learn about th	ne technology of wind	d turbines and renew	vable energy.				
Lecture 01: Explain basic problem	is of environmenta	l and renewable ener	σV.					
Lecture 02:Study about fundamer	ntal and problems (	of wind turbines	83.					
Lecture 03:To understand the lim	itation of wind turk	nine we will discuss	about Betz' law					
Lecture 00:10 understand the init	Theory to design a	wind turbines	about Detz law.					
Lecture 05: Introduce the recent	technology of wing	d turbines.						
Lecture 00. Introduce the recent	teermology of wind							
6th to 10th weeks:								
Each student is requested to rea	d English papers ti	hat treat atmospheri	c turbulence, air pol	lution, building wind	d and heat island,			
to introduce the contents of the	papers, and to dis	scuss them with the	other students and	the lecturer. Fund	lamental theories			
and recent trend of heat and mas	s transfer problem	ns and urban air pollu	tion are acquired th	rough this process				
11th to 15th weeks:								
Each student is requested to rea	id a few English pa	apers that treat fluid	filtration technolog	ies utilizing mecha	nical phenomena,			
to introduce the contents of the	papers, and to dis	scuss them with the	other students and	the lecturer. Fund	lamental theories			
and recent trend of fluid filtration	technologies are a	acquired through this	s process.					
Self Preparation and Review								
Please read handouts before the	lecture.							
Please read your notes again for	review of lecture.							
Related subjects								
Hydrodynamics								
Notes for textbook								
Prof.Iida: Printed materials are give	/en.							
Prot.Sekishita: English technical papers are used.								
Prof.Yanada:English technical pa	Prof.Yanada:English technical papers are used.							
Notes for reference								
Goals to be achieved								
To understand the fundamentals	of renewable ener	gy and theory of wind	turbine.					
To understand fundamental theor	ies and technical t	rends of Atmospheri	c Diffusion and Air	Pollution.				
To understand methods and theo	ries of fluid filtratio	on utilizing mechanic	al phenomena.					
Evaluation of achievement		0						
Report 100%								
Examination								

By Report
Details of examination
Other information
Prof.lida:
office:D-410, extension:6680, e-mail:iida@me.tut.ac.jp
Prof.Sekishita :
office:D2-303, extension:6687, e-mail:seki@me.tut.ac.jp
Prof.Yanada:
office:D-309, extension:6668, e-mail:yanada@me.tut.ac.jp
Reference URL
Prof.lida: http://aero.me.tut.ac.jp
Office hours
Prof.Iida: 13:00~15:00 on Monday
Prof.Sekishita and Prof.Yanada: Inquire this of the lecturer by e-mail.
Relations to attainment objectives of learning and education
Key words
Fluid dynamics

(D510	30090)Advanced	Systems and Instrumentation Fi	ngineering[Advanced Sv	vstems and instrumer	tation Engineering]
			IKIIIOOI IIIKLAUVAIICOU Oj	yotoilio alla filou allioi	

Subject name[English]	Advanced S	ystems and	Instru	umentation	n Engin	eering[Advanc	ed Syst	tems and I	nstrume
	Engineering					I			·
Schedule number	D51030090			Subject	: area	Advanced Mechanical Engineering	н е	Required or lective	Electr
Time of starting a course	Fall term			Day o week.pe	of the priod	Tue.2~2	C	redit(s)	2
Faculty	Graduate Pro	gram for Doc	ctoral D	egree		I	S	Subject rade	1~
Department Offered	Mechanical Er	ngineering					B	Beggining rade	D1
Charge teacher name[Roman alphabet mark]	章 忠,内山	直樹, 三宅	哲夫 S	HO Tadas	hi, UCH	IYAMA Naoki, I	MIYAKE	Tetsuo	
Numbering									
Objectives of class									
1)Learns some importar	nt methods in sig	mal processi	nø						
2) Inderstand some met	thods in image b	ased recogni	tion						
3)Provides analytical mu	ethods for nonlir	aseu recogni near systems	and th	eir annlica	tion to	real systems			
Contonto of close		iear systems		en applica		real systems.			
	C.1								
Ith week: Basic theory	y of the wavelet	transforms	<i>c</i>						
2th week: Theory of co	omplex discrete	wavelet tran	istorm						
3th week: Design meth	lods of complex	discrete way	velet tra	ansform					
4th week:Theory of c	omplex wavelet	packet trans	form						
5th week:Design meth	nods of complex	wavelet pac	ket trar	nsform					
Lecturer: Sho									
6th week: Nonlinear leas	st square								
7th week: 2D shape rea	opetruction								
And week. 3D shape reco	onstruction								
8th week: Function fittin	lg								
9th week: Various applic	ation of fitting								
10th week: Pattern class	sification								
Lecturer: Miyake									
11th week: Fundamenta	l properties of n	onlinear syst	tems						
12th week: Analysis of r	nonlinear system	ıs I							
13th week: Analysis of r	nonlinear system	ns II							
14th week: Application (	of nonlinear anal	vsis to real s	systems	. I					
15th week: Application (	of nonlinear anal	vsis to real (	sveteme	2 II					
Lecturer: Lichiyama(The	above subjects	may be cha	nged ac	cording to	n studer	nts' requests ar	nd hackø	rounds)	
		may be ona	ngou uc		5 56466			rounds/	
Self Preparation and Re	oview								
Required to prepare for	and review each	h lecture con	ntents b	ased on h	andouts	s provided.			
Related subjects									
	a wanta anti	neering							
1. Advanced signal mea	surements engin	0							
<ol> <li>Advanced signal mea</li> <li>Advanced image mea</li> </ol>	asurements engi	ineering							
<ol> <li>Advanced signal mea</li> <li>Advanced image mea</li> <li>Advanced systems er</li> </ol>	asurements engi asurements engi	ineering							
<ol> <li>Advanced signal mea</li> <li>Advanced image mea</li> <li>Advanced systems er</li> </ol>	asurements engr asurements engr ngineering	ineering							
1. Advanced signal mea 2. Advanced image mei 3. Advanced systems er <b>Notes for textbook</b>	asurements engingingingering	ineering							
<ol> <li>Advanced signal mea</li> <li>Advanced image me.</li> <li>Advanced systems er</li> <li>Notes for textbook</li> <li>Handouts will be provide</li> </ol>	asurements engingingingering asing the subscript state of the subscr	ineering							
<ol> <li>Advanced signal mea</li> <li>Advanced image mei</li> <li>Advanced systems er</li> <li>Notes for textbook</li> <li>Handouts will be provide</li> </ol>	asurements engi ngineering ed.	ineering							
1. Advanced signal mea 2. Advanced image me 3. Advanced systems er Notes for textbook Handouts will be provide Rader & Gold:chap.5 in	asurements engingineering agineering ad. Theory and appli	ineering	gital sigr	nal proces	sing (Pr	intice-Hall)			
1. Advanced signal mea 2. Advanced image me 3. Advanced systems er <b>Notes for textbook</b> Handouts will be provide Rader & Gold:chap.5 in	asurements engingineering agineering ad. Theory and appli	ineering	gital sigr	nal proces	sing (Pr	intice-Hall)			
Advanced signal mea     Advanced image me     Advanced systems er     Notes for textbook     Handouts will be provide     Rader & Gold:chap.5 in	asurements engingineering ed. Theory and appl	ineering ication of dig	gital sigr	nal proces	sing (Pr	intice-Hall)	for 1	SBN	0.70-

	Manufacturing Applications										
	Author	Yoshiaki Shimizu, Zhong Zhang, Rafael Batres	Publisher	Springer	Publish year	2007					
Reference2	Book title	Nonlinear Contro	l of Engineer	ing Systems: A	ISBN	0-8176-					
		Lyapunov-Based A	Approach			4265-X					
	Author	W. E. Dixon et al.	Publisher	Birkhauser	Publish year	2003					
Reference3	Book title	Nonlinear Systems	, 3rd Ed.		ISBN	0-13- 067389-7					
	Author	H. K. Khalil	Publisher	Prentice Hall	Publish year	2002					
Notes for reference											
Goals to be achieved											
1)Learn the advanced s	ignal processing	g methods and knowle	edge								
2)Understand the theor	v of wavelet tra	nsform.	0								
4)Learn mathematical n	nethods in imag	e processing and patt	ern recognition.								
5)Apply the methods to	pattern classif	cation.	0								
6)Expected to understa	nd analysis of r	onlinear systems									
7)Be able to apply the	analytical metho	ids to real nonlinear s	systems								
			Jocomo								
Evaluation of achievem	ent										
The final mode will be a	on.	weath and amounts of	thus a la stumana (	Each watia ia 100/2 0	()						
The linal grade will be d	letermined by re	eport assignments of	three lecturers (	Each ratio is 100/37	0).						
Basically, students are The credit of this cours Grade levels are C (55%	expected to att se is given if the 6 – less than 65'	end all courses. : score of the above r %), B (65 – less than a	reports is 55% or 80%) and A (80% o	over. or over).							
Examination											
By Report											
Details of examination											
Other information											
Reference URL											
Office hours											
Sho (Accept at any time)											
Miyake(Accept at any time)											
Uchiyama(Contact by e-mail first.)											
Relations to attainment	t objectives of I	earning and education	n								
Key words											
	Key words										
Signal processing, Patt	ern recognition.	Nonlinear systems, S	Systems engineer	ing							

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

Subject name[English]	Seminar on Electrical and Electronic Information Engineering 2[Seminar on Electrical and					
	Electronic Informa	ation Engineering 2]	T	1		
Schedule number	D52010020	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)	4	
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	1~	
Department Offered	Electrical and Elec	ctronic Information	Engineering	Beggining	D1	
				grade		
Charge teacher name[Roman	S2糸教務委員 2	kei kyomu Iin−S				
alphabet mark						
Numbering						
Objectives of class						
The seminar aims to provide a b	road understanding	g of theoretical and	experimental appro	oches related to t	the electrical and	
electronic engineering for the res	earch work of his/h	ner master thesis.				
	and the second second		<b>f</b>		and manufactions	
rife class provides both of fundar	nental knowledge o	n the research work	of master thesis a	the supersides T	be appaured by	
individual supervisors	papers and monogra	apris. Contents of th	le class depend on	the supervisor. 10	be announced by	
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	lual 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 prob	lem and the present	tation skill.		
Evaluation of achievement						
Coursework, presentation and/or	report.					
Examination						
None during exam period						
Other information						
Reference URL						
05						
UTTICE hours						
Relations to attainment objective	s of learning and e	ducation				
Kaumanda						
Ney Words						

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

Subject name[English]	Seminar on Electrical and Electronic Information Engineering 3[Seminar on Electrical and				
	Electronic Informa	ation Engineering 3]			
Schedule number	D52010030	Subject area	Advanced	Required or	Required
			Electrical and	elective	
			Electronic		
			Information		
			Engineering		
Time of starting a course	Year	Day of the	Intensive	Credit(s)	1
Parada a	Our durate Durannes	week,period		Outlant much	0.5.1
Pacenty Department Offerred	Graduate Program	atronic Information	e Engineering	Subject grade	2~
Department Offered	Electrical and Elec	ctronic information	Lingineering	orade	DZ
Charge teacher name[Roman	S2系教務委員 21	kei kvomu Iin-S		Brado	
alphabet mark]		·····			
Numbering	ELC_DOC71015				
Objectives of class					
The seminar aims to provide a b	road understanding	g of theoretical and	experimental appro	oches related to t	the electrical and
electronic information engineering	; for the research w	vork 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	lual supervisors.	
Notes for reference					
Goals to be achieved					
I o acquire fundamental knowledg	e on individual rese	arch fields.			
I o acquire the ability of finding a	problem, the ability	ot solving the prob	iem and the present	tation skill.	
	rapart				
Examination	report.				
None during exam period					
Details of examination					
Other information					
Reference URL					
Office hours					
Palations to attainment abiantic	a of learning and a	ducation			
Notations to attainment objective	s of learning and e	uuuauun			
Key words					

#### (D52010050)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	Seminar on Interd	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D52010050	Subject area	Advanced	Required or	Required	
			Electrical and	elective		
			Electronic			
			Information			
			Engineering			
Time of starting a course	Fall term	Day of the	Mon.3~3	Credit(s)	1	
		week,period				
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	2~	
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	D2	
				grade		
Charge teacher name[Roman	S2系教務委員, 教務委員会副委員長 2kei kyomu Iin-S, kyoumu iinkai fukuiintyou					
alphabet mark]						
Numbering						

#### **Objectives of class**

In this lecture, each student is requested to present its own doctoral research intelligibly for the doctoral students from other departments. By studying various topics in other areas, each student is supposed to acquire the ability to organize various knowledge of different areas to promote its own research and development.

#### Contents of class

Lecture 1: The vice-chair of the committee of educational affairs give the guidance and instructions for the applicants to enforce this lecture. The students arrange the schedule of the lectures by themselves.

#### Lecture 2 -- 16:

10 lectures out of 15: Two or three students present their research themes along with the problems and solutions in their activities. Each students prepares a resume of two A4 pages, presents the contents in 20 minutes using presentation software (e.g. powerpoint), and then discusses with doctoral students from other departments (20 minutes).

5 lectures out of 15: Five professors (one for each department) give the lectures on their research topics. The students discuss the interdisciplinary research based on the professor's talk.

When a student presents their research, its supervisor is requested to attend to the class. Thus, the presentation schedule is examined in the committee of educational affairs.

The student presentations are open to faculty members and students. Each student is requested to submit the title and the abstract of the talk by three weeks before the scheduled date, which are publicized in our campus.

#### Self Preparation and Review

#### Related subjects

Specialized and general subjects in each course.

#### Notes for textbook

#### Notes for reference

#### Goals to be achieved

To acquire the ability to present the research for the doctoral students from other departments.

To acquire the ability to organize various knowledge of different areas to promote its own research and development.

#### Evaluation of achievement

The evaluation is given by the supervisor, totally considering the reports submitted by the student. Each student selects one or more presentations from the other's presentations, and writes a report of 1 page (A4) on the relationship to its own theme with the possible feedback to the own theme.

#### Examination

None during exam period

Details of examination

#### Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

#### (D52010060)Ethics of Researcher[Ethics of Researcher]

Cubicat name[E==tich]	Ethics of Deer						
	Ethics of Researc		arcnerj	De maine 1	De maine 1		
Schedule number	D52010060	Subject area	Advanced	Required or	Required		
			Electrical and	elective			
			Information				
			Engineering				
Time of starting a course	Fall1 term	Day of the	Wed.1~1	Credit(s)	1		
<b></b>		week,period					
Faculty	Graduate Program	n for Doctoral Degre	ee	Subject grade	1~1		
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	DI		
Ohanna taashan nama[Daman	<b></b>	吕티 匠 邦英 ト	- 町 土忠 Javaumau	grade			
Charge teacher name_roman	我伤安貝云副安 LIENO Mili	貝衣, 床 升彦, 1	_ 新 本員 kyoumu	linkai tukulintyou,	HARA KUNINIKO,		
Numbering							
Objectives of class							
Assist graduate students as they	undertake researc	h activities and pror	note an understand	ing of the inherent	ethical problems;		
lead students to think independe	ently and exercise	normative consciou	usness of research	ethics through etl	nics education in		
research in accordance with goals	s of scientific educ	ation and research a	and characteristics of	of individual resear	ch specialties.		
Contents of class							
1st week: Introduction, 1st modul	e in e-learning						
2nd – 6th week: 2nd – 7th module	es in e−learning						
- 7th week: Discussion with supe	rvisor						
8th week: Examination							
e-learning							
1st module: Research Misconduct	t						
2nd module: Ethical Issues in the	Management of Da	ta in Engineering Re	esearch				
3rd module: Responsible Authors	nip	0 0					
4th module: Ethical Issues in the	Peer Review and P	ublication of Engine	ering Research				
5th module: Collaborative Resear	ch in Engineering F	ields	0				
6th module: Whistleblowing and th	e Obligation to Pro	tect the Public					
7th module: Managing Public Rese	earch Funds						
Self Preparation and Review							
Students will need to refer to the	ir textbook to prep	are for and review e	ach lesson.				
Related subjects	· ·						
Philosophy of Science and Techn	ology. Ethics for Er	ngineers					
Notes for textbook		.8					
Notes for reference							
For the Sound Development of Se	cience ?The Attitud	le of a Conscientiou	is Scientist				
Japan Society for the Promotion	of Science Editing	Committee MARII	ZEN PUBLISHING				
2015 ISBN978-4-621-08938-5							
(PDF:https://www.isps.go.ip/i-kg	ousei/data/rinri.ndf	;)					
(		,					
Goals to be achieved							
Goals to be achieved							
I o prevent misconduct and promote fair research activities, this course provides knowledge and techniques regarding research							
Evaluation of achievement	tensules of each gr	audate student s re	searen specialties.				
	0006)						
Evaluation method Final exam(1	0070/						
					h '-		
I nose who take and pass the sho	ort test after each i	unit of e-learning co	ntents will be evaluated	ated with following	Dasis.		
A: Achieved all goals and obtained	a ou points or highe	er (out of IUU) as to	tal score of exams				
B: Achieved most goals and obtai	ned 65 points or hi	gher (out of 100) as	total score of exam	IS			
C: Achieved more than half of spe	ecified goals and ob	tained 55 points or	higher (out of 100) a	as total score of ex	ams		
Examination							
Examination(Face to Face)							

l

Details of examination

#### Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

#### Key words

Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism

#### (D52030020)Advanced Electronic Materials 2[Advanced Electronic Materials 2]

Subject name[English]	Advanced Electronic Materials 2[Advanced Electronic Materials 2]				
Schedule number	D52030020	Subject area	Advanced	Required or	Elective
			Electrical and	elective	
			Electronic		
			Information		
			Engineering		
Time of starting a	Fall term	Day of the	Thu.3~3	Credit(s)	2
course		week,period			
Faculty	Graduate Program for Doctoral De	gree		Subject	1~
				grade	
Department Offered	Electrical and Electronic Information	on Engineering		Beggining	D1
				grade	
Charge teacher	松田 厚範,服部 敏明,石山 武	代,高木 宏幸 MA	ATSUDA Atsunori, H	ATTORI Toshi	aki, ISHIYAMA
name[Roman alphabet	Takeshi, TAKAGI Hiroyuki				
mark]					
Numbering					

#### **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.

#### Contents of class

"Advanced Electronic Materials 2" 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 electrochemical devices. The contents are Functional materials for ionis including all-solid-state-Li-ion battery and advanced intermediate-temperature fuel cell.

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.

#### **Related** subjects

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

#### Notes for textbook

None						
Reference1	Book title	Fuel Cells			ISBN	978-1-
						4614-5784-
						8
	Author	Klaus-Dieter	Publisher	Springer	Publish year	2013
		Kreuer				
Reference2	Book title	Solid State Ionics f	or Batteries		ISBN	978-4-431-
						24974-0
	Author	Tsutomu Minami	Publisher	Springer	Publish year	2005
		et al				
Notes for reference						
None						

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 phenomena.	
Evaluation of achievement	
The final evaluation will be the sum of four categories (25%); functional materials, photonics, electrodics, spin electronics.	
Examination	
None during exam period	
Details of examination	
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	
Reference URL	
http://www.ee.tut.ac.jp/material	
Office hours	
one hour after every classes	
Relations to attainment objectives of learning and education	
Key words	-
functional materials, photonics, spin electronics, ionics, micro-optics, electrodics	

#### (D52030030)Advanced Electrical Systems 1[Advanced Electrical Systems 1]

Subject name[English]	Advanced Electri	cal Systems 1[Adva	nced Electrical Svs	tems 1]	
Schedule number	D52030030	Subject area	Advanced	Required or	Flective
	20200000	Casjoot a ou	Flectrical and	elective	LIGGUIVO
			Electronic		
			Information		
			Engineering		
Time of starting a course	Fall term	Day of the	Mon 2~2	Credit(s)	2
		week period			-
Faculty	Graduate Progra	m for Doctoral Degr	ee.	Subject grade	1~
Department Offered	Electrical and Ele	actronic Information	Engineering	Beggining	D1
			Engineering	grade	D1
Charge teacher name[Roman	油川 浩中 櫻井	唐司 種積 直裕	TAKIKAWA Hirofum	i SAKURATYoji HO	71 IMI Naohiro
alphabet mark]				., ., ., ., ., ., ., ., ., ., ., ., ., .	
Numbering					
Objectives of class					
This lecture is implemented as a	in introduction to e	electrical energy sys	stems and intended	for students and o	other engineering
disciplines. It is being useful as r	eterence and selt-	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					
1. Generation and control of vario	ous plasmas				
2. Characteristics and diagnostics	s of plasma				
3. Applications of functional plasm	na and trends				
Sub Course 2					
1. Li-ion and Post Li-ion Batterie	S				
2. Materials for Advanced Batteri	es				
3. Modern Aspects of Electroche	mical Energy Conve	ersion Devices			
Sub Course 3					
1. Ultrasonic techniques for medi	cal use				
2. Diagnosing techniques for indu	strial use				
3. Assessment for high voltage in	sulation system				
Self Preparation and Review					
Related subjects					
Basic electrical power engineering	g course is prereau	iisite.			
Notes for textbook	B course is bronede				
Materials will be prepared by the	lecturer				
Materials will be prepared by the					
(Reference)					(11.0.1.11)
(1) E. Kuffel, W. Zaengel and J. K	uffel: High Voltage	Engineering (Newne	es), (2) D. Linden: H	andbook of Batterie	es (McGraw-Hill),
(3) J. Larminie and A. Dicks: Fuel	Cell Systems Expl	ained (Wiley)			
Notes for reference					
Goals to be achieved					
duals to be achieved					
Evaluation of achievement					
Marks are based on reports (100%	)				
Examination	/				
By Report					
Details of examination					
Other information					
Office. Tel and F-mail					
Sakurai: C-305_0532-44-6722_0	akurai@ee tut ac in				
Takikawa: C-311 0532-44-6727	takikawa@ee tut a	c in			
Hozumi: E2-304 E2-301 0532-4	1-6934 hozumi@io	ceed tut ac in			
Reference IIDI	т 550 <del>т</del> , поzumielo	oosu.cuc.αυ.jμ			

Office hours

Relations to attainment objectives of learning and education

Key words

#### (D52030060)Advanced Microelectronics 2[Advanced Microelectronics 2]

Subject name[English]	Advanced Microe	lectronics 2[Advanc	ed Microelectronics	s 2]	
Schedule number	D52030060	Subject area	Advanced	Required or	Elective
			Electrical and	elective	
			Electronic		
			Information		
			Engineering		
Time of starting a course	Fall term	Day of the week period	Tue.2~2	Credit(s)	2
Faculty	Graduate Program	n for Doctoral Degre	ee.	Subject grade	1~
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	D1
				grade	
Charge teacher name[Roman alphabet mark]	若原 昭浩,岡田	浩, 河野 剛士 WA	KAHARA Akihiro, O	KADA Hiroshi, KAV	VANO Takeshi
Numbering					
Objectives of class	<b>b</b>				
To understand semiconductor phy	vsics structure de	sign, and processing	of advanced semic	onductor devices	
Contents of class	,,		,		
This subject consists of two part	rs. The first half he	gins by introducing	majority- and mino	ritv-carrier behavi	or in fundamental
pn-junction and MOS structures	Injected minority	carrier dynamics i	n semiconductors i	is also included O	in the latter half
student choose one from followin	a three topics				
student choose one nom followin	g three topics.				
1. Fabrication and characterizatio	n technology for Na	anosturecture devic	es (Prot. Okada)		
2. Band engineering and quantum	effect devices (Pro	of. Wakahara)			
3. MEMS/NEMS technology(Prof.	Kawano)				
Adding to lectures by professors	s, in this subject, a	a case study is als	o conducted. Name	ely, students are re	equired to give a
presentation on researches on th	e given topics, and	on design of device	s that satisfies requ	uired specifications	
Self Preparation and Review					
Related subjects					
Notes for textbook					
SMSze Physics of Semiconduct	or Devices (Wiley)				
Related references, data, printed	matters will be give	en in the class.			
Notes for reference					
Goals to be achieved					
You will be able to:					
1. Deeply understand fundament	tal phenomena in	semiconductors, ar	nd explain operation	n principle of basi	c semiconductor
devices to master course student	IS.				
2. Design a essential part of semi	conductor devcie t	hat satisfies the giv	en specification.		
3. Investigate on given topics, and	give a lecture on t	this.			
Evaluation of achievement					
Achievenemt of lectures of the ca	ase study, and writi	ing research reports	5.		
Examination					
By Report					
Details of examination					
Other information					
Before choosing a sub-course of	ontact to following	professors			
Akibira Wakabara 0-609					
Hirophi Okodo C-202P ake de	alaijee.iui.ac.jρ				
Takeshi Kawano: C-602 kawano	atlee tut ac in				
Taneshi nawanu, utuus kawahul	ariee.tut.ac.ip				

Reference URL

http://www.int.ee.tut.ac.jp http://www.eiiris.tut.ac.jp

Office hours

As needed. It is preferable to make an appointment in advance.

Relations to attainment objectives of learning and education

Key words

#### (D52030080)Advanced Information and Communication Systems 2[Advanced Information and Communication Systems 2]

Subject name[English]	Advanced Inform	mation and Com	munication Systen	ns 2[Advanced	Information and
	Communication S	Systems 2]	1	I	
Schedule number	D52030080	Subject area	Advanced	Required or	Elective
			Electrical and	elective	
			Electronic		
			Information		
Time of starting a source	Fall term	Day of the	Engineering Mon 3~3	Cradit(a)	2
Time of starting a course		week period	WON.5** 5	Oreal(s)	2
Faculty	Graduate Program	n for Doctoral Degr	e	Subject grade	1~
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	D1
-				grade	
Charge teacher name[Roman	市川 周一,田村	昌也 ICHIKAWA S	huichi, TAMURA Ma	saya	
alphabet mark]					
Numbering					
Objectives of class					
This lecture introduces some adv	vanced topics on (1	) computer system	engineering and (2)	analog filters. The	e details are given
below.					
Contents of class					
The topics of item (1) include the	following items:				
1. Parallel and High-performance	computing,				
2. Parallel and High-performance	computer architect	ture,			
3. Custom computing circuit, spec	sial-purpose compu	iting system.			
The topics of item (2) include the	following items:				
1. Analog filter consisting of pass	ive components				
2. Design of microwave filter used	l in wireless commu	unications			
3. Fusion of microwave filter and	one's expertise				
Self Preparation and Review					
Related subjects					
The students who register for th	is lecture must hav	ve studied the Adva	nced Electronic Inf	ormation System 1	1 and 2 (Ichikawa,
Tamura) in master course program	n, or its equivalent.			-	
All courses taken at other univers	sities must be appr	oved by the lecture	rs before registering	for this course.	
Notes for textbook					
Course materials and references	are shown by lectu	rers.			
Notes for reference					
Goals to be achieved					
The students are required to ob	tain the advanced	knowledge on the	above-mentioned it	ems for their rese	earch activities in
doctoral program.					
Evaluation of achievement					
There will be assignments for the	topics shown abov	ve; course grades wi	ll be the average of	these assignments	3.
Attendance to all lectures is com	pulsory; the absenc	ce without permission	on will result in a sub	ostantial penalty.	
Examination					
By Report					
Details of examination					
Other information					
Ichikawa, Room C−404. ichikawa@	tut.jp				
Tamura, Room C-405, tamura@ee	e.tut.ac.jp				
Reference URL	5				
Ichikawa http://meta.ccs.ee.tut.a	c.jp/~ichikawa/inde	x-e.html			
Tamura http://www.comm.ee.tut.	ac.jp/em/index_en.ł	ntml			
	. –				
Office hours					

Please make an appointment via e-mail.

Relations to attainment objectives of learning and education

Key words

(1) computer system, high performance computing (2) analog filter, microwave

#### (D52030090)Methodology of R & D[Methodology of R & D]

Subject name[English]	Methodology of R & D[Methodology of R & D]						
Schedule number	D52030090	Subject area	Advanced	Required or	Elective		
			Electrical and	elective			
			Electronic				
			Information				
			Engineering				
Time of starting a course	Fall term	Day of the	Tue.3~3	Credit(s)	2		
		week,period					
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	1~		
Department Offered	Electrical and Ele	ctronic Information	Engineering	Beggining	D1		
-				grade			
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 bas	sic understanding o	of R&D methodology	related to the ele	ectrical and electro	onic information		
engineering for the research work	of his/her doctor	thesis	,				
Contents of class							
The class provides some fundam	ental tips to condu	ict R&D work effect	ively. Contents of t	he class depend o	n the supervisor.		
To be announced by individual su	pervisors		···· <b>,</b> ································	··· ···· ···			
Self Preparation and Review							
·							
Palatad subjects							
Notes Contraction							
Notes for textbook							
Reference and material will be available	ailable from the sup	bervisor.					
Notes for reference							
Goals to be achieved							
To acquire the ability of identif	ying and formulating	ng research probler	n, planning and imp	lementing specific	research tasks,		
troubleshooting and communication	ng outcomes.						
Evaluation of achievement							
Coursework and presentation are	evaluated generall	у.					
Examination							
None during exam period							
Details of examination							
Other information							
Reference URL							
Office hours							
Polations to attainment objective	o of loorning and a	ducation					
Relations to attainment objective	s or learning and e	ducation					
Kev words							

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

			omman				
Subject name[English]	Seminar on Computer Science and Engineering 1[Seminar on Computer Science and						
	Engineering 1]						
Schedule number	D53010010	Subject a	rea	Advanced	Required or	Required	
		-		Computer	elective		
				Science and			
				Engineering			
				Engineering	<b>a 1</b> 1/2		
lime of starting a course	Year	Day of	the	Intensive	Gredit(s)	4	
		week,peri	od				
Faculty	Graduate Progra	m for Docto	ral Degr	ee	Subject grade	1~	
Department Offered	Computer Science	ce and Engin	eering		Beggining	D1	
					grade		
Charge teacher name[Roman	S3系教務委員-	-23kei kyon	u Iin-Sź	2			
alphabet mark]							
Numbering							
Objectives of class							
The course is intended for stud	dents to study ba	sic material	s in dep	oth, related to his/	her research subj	ects in computer	
science and engineering.							
It is also aimed for students to	acquire various ski	lls. required	in gene	ral research work.	such as those for	oral presentation.	
and technical discussion and writ	ing	,				,	
Contents of class							
While specific contents depend	on the research a	reas studen	ts are i	nvolved in, it is usu	ally the case for	students to read	
relevant textbooks/research pap	ers and report on t	hem, as wel	as to p	resent and discuss (	on the research wo	ork of their own.	
Self Preparation and Review							
Consult with your advisor							
Poloted subjects							
Consult with your advisor.							
Natao far tauth cale							
Notes for textbook							
Consult with your advisor.							
Notes for reference							
Goals to be achieved							
To acquire abilities for technical	readings in English	logical think	ing/eyn	lanation and clear r	resentation		
Evaluation of achievement	readings in English,	logiour chini	ang/ cxp	ianation, and oldar p			
Will be evaluated by taking into	accout various fac	tors overall	such a	s technical explana	tion, question answ	vering, discussion	
involvements and so on.							
Examination							
None during exam period							
Details of examination							
Other information							
Reference URL							
Office hours							
Office nours							
Relations to attainment objective	es of learning and e	ducation					
1							
						L L	
Key words							

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

Subject nameLengani Schedule number DS3010020 Subject are Computer Science and Engineering Usernian on Computer Science and Engineering 2 DS3010020 Subject are Computer Science and Computer Science and Engineering Computer Science and Computer Science and Computer Science and Engineering Computer Science and Engineering D2 Computer Science and Engineering D2 Science and Computer Science and Engineering D2 Science and Computer Science and Engineering CD3 Science and Computer Science and CD3 Science and Science And Science Science and CD3 Science and Science And Science Science And Science Science And Science Science And Science A			· · · ·					
Engineering 2/J         Subject area is advanced in the source of t	Subject name[English]	Seminar on Computer Science and Engineering 2[Seminar on Computer Science and						
Schedule number         D53010020         Subject area         Advanced Science         Required of science         Required elictive         Credit(a)         1           Time of starting a course         Year         Day of the weak.pariod         Intensive         Credit(a)         1           Feculty         Graduate Program for Doctoral Degree         Subject grade         2~           Department Offered         Computer Science and Engineering         Degaring         D2           Objectives of class         S3乘秋溪漫員=23kei kyomu lin=52         June of standing of students to study basic materials in depth, related to his/her research subjects in computer science and engineering.         Dis/her research subjects in computer science and engineering.           It is also almost of class         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.         Starting variables of the research work, such as those for oral presentation, and technical discussion and writing.           Contract of class         While specific contents to acquire various skills, required in general research work, such as those for students to acquire various skills, required and discuss on the research work of their own.           Soft Forsparation and Review         Consult with your advisor.           Consult with your advisor.         Soft forstock           Notes for textbook         Consult with your advisor.           So		Engineering 2			1			
Image: Section of Se	Schedule number	D53010020	Subject a	area	Advanced	Required or	Required	
Imme of starting a course         Year         Dev of the lengineering         Intensive         Credit(a)         1           Faculty         Graduate Program for Doctoral Degree         Subject grade         2~           Department Offored         Computer Science and Engineering         Baggining         D2           Charge teacher name[Roman alphabet mat]         S3条数器要員-23kei kyomu lin-S2         Baggining         D2           Objectives of clase         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.         It is also aline for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Contant of class         While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own.           Soft textbook         Consult with your advisor.           Notes for textbook         Consult with your advisor.           Notes for reference         Gasts to be achieved           Consult with your advisor.         It engineering.           Notes for textbook         Consult with your advisor.           Consult with your advisor.         It engineering.           Note for textbook         Consult with your advis					Computer	elective		
Time of starting a course         Year         Day of the subject of a linensive         Credit(s)         1           Faculty         Graduate Program for Doctoral Degree         Subject grade         2~           Department Offered         Computer Science and Engineering         Beginning         D2           Charge teacher name[Roman sphabet mark]         S3乘放游漫員ー23kei kyomu lin-S2         Beginning         D2           Objective of class         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and angineering.         It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Contents of class         S3乘放泳漫員         S3乘放泳         S3 model           Sold technical discussion and writing.         S3乘放泳         S3 model         S3 model           Contents of olas         S3 model         S3 model         S3 model         S3 model           Sold technical discussion and writing.         S3 model         S3 model         S3 model         S3 model           Contents of olas         S3 model         S3 model         S3 model         S3 model         S3 model           Contents of olas         S3 model         S3 model         S3 model         S3 model         S3 model         S3 model <th></th> <th></th> <th></th> <th></th> <th>Science and</th> <th></th> <th></th>					Science and			
Time of starting a course         Year         Day of the weak parked is the set of the					Engineering			
Notes for textbook         Subject grade         Subject grade           Faculty         Graduate Program for Doctoral Degree         Subject grade         2~           Department Offered         Computer Science and Engineering         Begining         D2           Oharge teacher name[Tommal alphabet mark]         SI系教務委員 – 23kei kyonu lin-S2         Image: Similar Science and Engineering         D2           Objectives of class         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.         It is also almed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Contents of class         Sifter Search and science and Enginity in the social course is intended for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Soft Forspatic Contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own.           Soft Forspatic         Soft forspatic Contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own.           Soft Forspatic Consult with your advisor.         Consult with your advisor.	Time of starting a course	Year	Dav o	f the	Intensive	Credit(s)	1	
Faculty         Graduate Program for Doctoral Degree         Subject grade         2~           Department Offered         Computer Science and Engineering         Degring         D2           Charge teacher name[Roman sphate mak]         S3乘数務委員 - 23kei kyomu lin-S2         Department offered         D2           Objectives of class         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.         It is also almed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Contents of class         While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbook/research papers and report on them, as well as to present and discuss on the research work of their own.           Self Preparation and Review         Consult with your advisor.           Related subjects         Consult with your advisor.           Notes for reference         Goals to be schleved           To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.           Evaluation of solvement         Evaluation of schlewent as on.           Woll be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvement as oon.           Dotail of samination         Detale of samination           <			week per	iod			-	
Department Offered         Computer Science and Engineering         Department         Depa	Faculty	Graduate Prograu	m for Docto	ral Degr		Subject grade	2~	
Department entered         Decay and part of the statement	Department Offered	Computer Science	e and Engir	neering		Beggining	D2	
Oterge teacher name[Roman]         S3系教務委員一23kei kyomu lin-S2           alphabet mark]         Numbering           Objectives of class         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.           It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Contents of class           While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own.           Safe Treparation and Roview         Consult with your advisor.           Related subjects         Consult with your advisor.           Notes for reference         Consult with your advisor.           Value by taking into accout various factors overall, such as technical explanation, question answering, discussion involvement and so on.           Examination         Note of examination           Other information         Consult with your advisor.           Consult with general personal personal and education         Consult with your advisor.	Dopartmont onorou	Compacer Colene	Computer Science and Engineering Deggining D2					
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Bipting         Image           Objectives of class         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.         It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Contents of class         It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.           Contents of class         It is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own.           Self Preparation and Review         Consult with your advisor.           Related subjects         Consult with your advisor.           Notes for reference         Consult with your advisor.           Notes for reference         Consult with your advisor.           Vill be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and as on.           Evaluation of achievement         It is an all be content subjectives of learning and education           Other information         Content to for examination           Other information         Reference URL           Office hours         Relations to attainment objectives of learning and education	onarge ceacher name_roman	30米秋彻女員		nu in 52	-			
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Objectives of class         The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.         It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.         Contents of class         While specific contents depend on the research areas students are involved in, it is usually the case for students to read relevant textbooks/research papers and report on them, as well as to present and discuss on the research work of their own.         Self Preparation and Roview         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 thinking/explanation, and clear presentation.         Evaluation of achievement         Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	Numbering							
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Self Proparation and Review         Consult with your advisor.         Related adulated         Notes for textbook         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 thinking/explanation, and clear presentation.         Evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	relevant textbooks/research pape	ers and report on t	hem, as we	ll as to p	resent and discuss (	on the research wo	ork of their own.	
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 thinking/explanation, and clear presentation. Evaluation of achievement Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on. Examination Other information Reference URL Office hours Relations to attainment objectives of learning and education Key words	Self Preparation and Review							
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 thinking/explanation, and clear presentation.         Evaluation of achievement         Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	Consult with your advisor.							
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Goals to be achieved         To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.         Evaluation of achievement         Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	Notes for reference							
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To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.         Evaluation of achievement         Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education	Goals to be achieved							
To acquire abilities for realings in English, ognar tillinking explanation, and clear presentation.         Evaluation of achievement         Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	To acquire abilities for technical	readings in English	logical thin	king/evn	lanation and clear r	resentation		
Evaluation of achievement         Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	Evoluation of achievement	eaungs in English,	logical triin	King/ exp	ianation, and clear p	desentation.		
Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion involvements and so on.         Examination         None during exam period         Details of examination         Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words								
Involvements and so on.  Examination None during exam period Details of examination Other information Reference URL Office hours Relations to attainment objectives of learning and education Key words	Will be evaluated by taking into accout various factors overall, such as technical explanation, question answering, discussion							
Examination   None during exam period   Details of examination   Other information   Reference URL   Office hours   Relations to attainment objectives of learning and education   Key words	involvements and so on.							
None during exam period   Details of examination   Other information   Reference URL   Office hours   Relations to attainment objectives of learning and education   Key words	Examination							
Details of examination Other information Reference URL Office hours Relations to attainment objectives of learning and education Key words	None during exam period							
Other information         Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	Details of examination							
Other information Reference URL Office hours Relations to attainment objectives of learning and education Key words								
Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words	Other information							
Reference URL         Office hours         Relations to attainment objectives of learning and education         Key words								
Reference URL Office hours Relations to attainment objectives of learning and education Key words								
Office hours Relations to attainment objectives of learning and education Key words	Reference URL							
Office hours Relations to attainment objectives of learning and education Key words								
Relations to attainment objectives of learning and education Key words	Office hours							
Relations to attainment objectives of learning and education Key words								
Key words	Peletions to attainment objectives of learning and education							
Key words	ווטומוטיוס גע מנגמוווווסווג טעוסטעיסס טו וסמווווון מווע סעעטמעטו							
Key words								
Key words								
Key words	1							
Key words	1							
Key words								
	Key words							
	1							

#### (D53010050)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	t name[English] Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]						
Schedule number	D53010050	Subject area	Advanced	Required or	Required		
			Computer	elective			
			Science and				
			Engineering				
Time of starting a course	Fall term	Day of the week,period	Mon.3~3	Credit(s)	1		
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	2~		
Department Offered	Computer Science	e and Engineering		Beggining	D2		
				grade			
Charge teacher name[Roman	S3系教務委員, 教	<b>教務委員会副委員</b> 長	€3kei kyomu Iin−S,	kyoumu iinkai fuku	iintyou		
alphabet mark]							
Numbering							
Objectives of class							
Contents of class							
Self Preparation and Review							
Related subjects							
Notes for textbook							
Notes for reference							
Goals to be achieved							
Evaluation of achievement							
Examination							
Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objective	es of learning and e	ducation					
Key words							

#### (D53010060)Ethics of Researcher[Ethics of Researcher]

Subject name[English]	Ethics of Researc	her[Ethics of	Resea	archer]			
Schedule number	D53010060 Subject area Advanced		Advanced	Required or	Required		
		_		Computer	elective		
				Science and			
				Engineering			
Time of starting a course	Fall1 term	Day of week,period	the	Wed.1~1	Credit(s)	1	
Faculty	Graduate Progran	Graduate Program for Doctoral Degree			Subject grade	1~1	
Department Offered	Computer Science	e and Enginee	ring		Beggining grade	D1	
Charge teacher name[Roman							
alphabet mark]							
Numbering							
Objectives of class							
Assist graduate students as they	undertake researd	h activities an	d proi	note an understand	ing of the inherent	ethical problems:	
lead students to think independe	ently and exercise	normative co	nscio	isness of research	ethics through et	hics education in	
research in accordance with goals	s of scientific educa	ation and rese	arch a	nd characteristics	of individual resear	ch specialties.	
Contents of class							
1st week: Introduction, 1st modul	e in e-learning						
2nd – 6th week: 2nd – 7th module	s in e-learning						
- 7th week: Discussion with super	rvisor						
8th week: Examination							
e-learning							
1st module: Research Misconduct	:						
2nd module: Ethical Issues in the	Management of Da	ta in Engineer	ing Re	search			
3rd module: Responsible Authorsh	nip						
4th module: Ethical Issues in the	Peer Review and P	ublication of E	ngine	ering Research			
5th module: Collaborative Researc	ch in Engineering Fi	ields					
6th module: Whistleblowing and th	e Obligation to Pro	tect the Publi	с				
/th module: Managing Public Rese	earch Funds						
Sen Preparation and Review		<b>f</b>		la la			
Students will need to refer to the	ir textbook to prepa	are for and re	view e	ach lesson.			
Dhilesenby of Science and Techn	alam, Ethiaa far En	rinoara					
Notes for textbook	ology, Luncs for Li	Igineers					
Notas for reference							
For the Sound Development of So	cience ?The Attitud	le of a Consci	entiou	s Scientist			
Japan Society for the Promotion of Science Editing Committee MARIJZEN PURI ISHING							
2015 ISBN978-4-621-08938-5							
(PDF:https://www.jsps.go.jp/j-kousei/data/rinri.pdf)							
Goals to be achieved							
To prevent misconduct and promote fair research activities, this course provides knowledge and techniques regarding research							
ethics in accordance with characteristics of each graduate student's research specialties.							
Evaluation of achievement							
[Evaluation method] Final exam(100%)							
[Evaluation basis]							
Those who take and pass the short test after each unit of e-learning contents will be evaluated with following basis.							
A: Achieved all goals and obtained 80 points or higher (out of 100) as total score of exams							
B: Achieved most goals and obtained 65 points or higher (out of 100) as total score of exams							
C: Achieved more than half of specified goals and obtained 55 points or higher (out of 100) as total score of exams							
Examination							
Examination(Face to Face)							
Details of examination							
# Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

### Key words

Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism

## (D53030060)Brain and Neural System Engineering[Brain and Neural System Engineering]

Subject	Brain and Neural System Enginee	Brain and Neural System Engineering[Brain and Neural System Engineering]							
name[Fnglish]									
	D 5000000			<b></b>					
Schedule number	D53030060	Subject area	Advanced	Required or	Elective				
			Computer	elective					
			Science and						
			<b>F</b> : .						
			Engineering						
Time of starting a	Fall term	Day of the	Mon.4~4	Credit(s)	2				
course		week,period							
Faculty	Graduate Program for Doctoral D	egree		Subject	1~				
				grade					
Department Offered	Computer Science and Engineerin	Ig		Beggining	D1				
				grade					
Charge teacher	中内 茂樹,北崎 充晃 NAKAUCI	HI Shigeki, KITAZ	AKI Michiteru	-	I				
neme[Pomen		<b>U</b> .							
alphabet mark]									
Numbering									
Numbering									

#### **Objectives of class**

To understand brain and neural system functioning underlying the excellence of human information processing such as perception, learning, and memory. To learn methods of measurement based on engineering approaches and data analysis. To understand what is "human" based on deep insights gained from the study.

#### Contents of class

The current findings on the excellence of human information processing in perception, learning, and memory are explained and methodologies are introduced to investigate the brain using a new approach combining physiology and engineering to realize technological applications. The lectures include various demonstrations and discussions about the latest findings on neural activities and perceptual phenomena.

- Lecture Schedule
- 1. Introduction
- 1, 2. Physiological basics of vision
- 3. 4. Visual illusions
- 5, 6. Color perception
- 7. Depth perception
- 8, 9. Motion perception
- 10, 11. Attention and Consciousness
- 12. Computational vision
- 13. Color-imaging technology
- 14. Color Universal Design
- 15. Development

### Self Preparation and Review

Read the documents provided before each lecture. Review the lectures in consultation with the references and other resources such as the Internet.

## Related subjects

### Notes for textbook

Documents (slides) will be provided via web before commencement of the lectures.

Reference1	Book title	Cognitive Neurosci	ence; Fourth Inte	ernational Student	ISBN	978-
		edition			0393922288	
	Author	Michael S.	Publisher	W. W. Norton &	Publish	2008
		Gazzaniga		Company	year	
Reference2	Book title	イラストレクチャー言	忍知神経科学		ISBN	978-
					4274208225	
	Author	村上郁也 編著	Publisher	Publish	2010	
				year		

Notes for reference

#### Goals to be achieved

To be able to explain the differences between traditional information processing and human information processing To be able to discuss research concepts based on cognitive neurosciences, which will replace current technologies To be able to discuss human-machine symbiosis

### Evaluation of achievement

Grades will be based on theme reports from each lecture (60%) and the final report (40%)

A: 80 points or higher (out of 100)

B: 65 points or higher (out of 100)

C: 55 points or higher (out of 100)

## Examination

By Report

### Details of examination

## Other information

Please contact Prof. Nakauchi (C-510, nakauchi@tut.jp) before attending the regular lectures. **Reference URL** 

## Office hours

Contact by e-mail

### Relations to attainment objectives of learning and education

## Key words

cognitive neurosciences, color, perception

# (D53030080)Pattern Information Processing[Pattern Information Processing]

Subject name[English]	Pattern Information Processing[Pa	ttern Information	Processing]		
Schedule number	D53030080	Subject area	Advanced	Required or	Elective
		_	Computer	elective	
			Science and		
			Engineering		
Time of starting a	Fall term	Day of the	Tue.2~2	Credit(s)	2
course		week,period			
Faculty	Graduate Program for Doctoral De	gree		Subject	1~
		0		grade	
Department Offered	Computer Science and Engineering	r		Beggining	D1
		•		grade	
Charge teacher	全選 诘 芭谷 保之 KANA7AWA	Yasushi SUGAYA	Yasuvuki	Brado	
name[Pomen_alphabet			a lasuyuki		
mametroman alphabet					
markj Norskovine					
Numbering					
Objectives of class					
This course involves fun	Idamentals and advanced issues on in	mage processing	and computer vision	I.	
				-	
<b>T</b> I:					
I his course involves fun	adamentals and advanced issues on it	mage processing	and computer vision	I.	
Contents of class					
[Kanazawa]					
1: Introduction					
2. Projective Geometry					
2: Enipolar Geometry					
4: 2-D Reconstruction f					
	rom two views				
5: Affine Projection					
6: Uncalibrated Stereo					
7: Structure from Motion	า				
8: Experiments					
[Sugava]					
9: Mathematical Introduc	stion				
10: Limits of Eurotions					
11: Ontimization of Euro	ationa				
10. Least Causes	tions				
12. Least Squares					
13: Advance of Least So	juares				
14: Non-linear Optimizat	tion				
15: Maximum Likelihood					
[Kanazawa]					
1: Introduction					
2: Projective Geometry					
3: Epipolar Geometry					
4: 3-D Reconstruction f	rom Two Views				
5: Affine Projection					
6: Uncalibrated Stereo					
7: Structure from Motion	-				
9. Every evimente	1				
o: Experiments					
[Sugaya]					
9: Mathematical Introduc	stion				
10: Limits of Functions					
11: Optimization of Fund	tions				
12: Least Squares					
13: Advance of Least Sc	Juares				
14: Non-linear Ontimizat	tion				
15: Movimum Literille	.1011				
15: Maximum Likelinood					

Self Preparation and Review								
Related subjects								
Geometry, Linear Algeb	ora. Statistics.							
Geometry, Linear Algeb	ora. Statistics.							
Notes for textbook	,							
Handouts will be prepar	red							
Handouts will be prepar	red							
Reference1	Book title	Multiple View Geom	etry in Compute	er Vision	ISBN			
	Dook dat							
	Author	R.I. Hartley and A. Zisserman	Publisher	Cambridge University Press	Publish year	2000		
Reference2	Book title	Computer Vision	- A Modern Appr	roach	ISBN			
	Author	D.A. Forsyth and J. Ponce	Publisher	Prentice Hall	Publish year	2003		
Notes for reference								
Goals to be achieved								
Understanding of the fu	Indamentals and	d advanced issues on	image processin	ng and computer vision	n including:			
– camera model,								
– epipolar geometry,								
- 3-D reconstruction fr	rom images,							
<ul> <li>optimization</li> </ul>								
Understanding of the fu	Indamentals and	d advanced issues on	image processin	ng and computer vision	n including:			
– camera model,								
– epipolar geometry,								
- 3-D reconstruction fr	rom images,							
- optimization								
Evaluation of achievem	ent							
Grade will be determine	ed by all submit	ted reports:						
A: score >= 80								
B: score ≻= 65								
C: score >= 55								
Grade will be determine	ed by all submit	ted reports:						
A: score >= 80								
B: score ≻= 65								
C: score >= 55								
Examination								
レポートで実施								
By Report								
Details of examination								
Other information								
Room F-404, Ext. 6888	, Email: kanazav	va@cs.tut.ac.jp (Yasus	hi Kanazawa)					
Room C-507, Ext. 6760	), Email: sugaya	@iim.cs.tut.ac.jp (Yasu	yuki Sugaya)					
Room F-404, Ext. 6888	, Email: kanazav	va@cs.tut.ac.jp (Yasus	hi Kanazawa)					
Room C-507, Ext. 6760	), Email: sugaya@	@iim.cs.tut.ac.jp (Yasu	yuki Sugaya)					
Reference URI								
http://www.img.cs.tut.a	in/							
http://www.img.co.tut.a	n in /							
http://www.img.cs.tut.ac	c in/							
http://www.iim.cs.tut.a	n in/							
Office houre	אני~							
Relations to attainment	t objectives of	learning and educatior	1					

# Key words

image processing, computer vision image processing, computer vision

# (D53030120)Theoretical Computer Science, Advanced[Theoretical Computer Science, Advanced]

Subject name[English]	Theoretical Computer Science, Advanced Theoretical Computer Science, Advanced						
Schedule number	D53030120	Subject area	Advanced	Required or	Elective		
		-	Computer	elective			
			Science and				
			Engineering				
Time of starting a course	Fall term	Day of the	Mon.3~3	Credit(s)	2		
		week,period					
Faculty	Graduate Program	n for Doctoral Degr	ee	Subject grade	1~		
Department Offered	Computer Scienc	e and Engineering		Beggining	D1		
				grade			
Charge teacher name[Roman	増山 繁 MASUY	AMA Shigeru					
alphabet mark]							
Numbering							
Objectives of class							
To learn knowledge and skill on a	dvanced computer	science and engine	ering.				
Contents of class	· · · · ·						
Lectures are given 15 times.							
Each time a student is requested	to give a presentat	ion on selected top	ics in Advanced co	mputer science and	engineering.		
Self Preparation and Review							
Related subjects							
· · · · · · · · · · · · · · · · · · ·							
Notes for textbook							
No text is used							
Notes for reference							
Goola to be aphiaved							
Acquire knowledge on advanced	omputer science a	nd angineering					
Evaluation of achievement	somputer science a						
Precentation:50%							
assignment (report): 50%							
Examination							
By Report							
Details of examination							
Other information							
E503 masuvama@tut in							
Reference URL							
Office hours							
Disess make an appointment in a	duonaa huu a-maail						
Please make an appointment in a	dvance by e-mail.	ducation					
Key words							
computer science							

(D53030130)Robotics Intelligence 1[Robotics Intelligence 1]										
Subject	Subject         Robotics Intelligence 1[Robotics Intelligence 1]									
name[English]										
Schedule number	D53030130		Subject area	Advanced Computer	Required or elective	Elective				
				Science and Engineering						
Time of starting a course	Fall1 term		Day of the week,period	Tue.3~3	Credit(s)	1				
Faculty	Graduate Pr	ogram for Doctoral [	Degree		Subject grade	1~				
Department Offered	Computer S	cience and Engineeri	ng		Beggining grade	D1				
Charge teacher	三浦 純 MIL	JRA Jun			<b>9</b>	I				
name[Roman										
alphabet mark]										
Numbering										
Objectives of class										
Fundamental and adva	nced issues ir	n intelligent robotics	s will be discuss	ed. Topics included	are probabilist	ic sensor fusion				
techniques (e.g., Kalmar	n filter and par	ticle filter) and its ap	plication to mobil	e robot localization	and mapping.					
Contents of class										
Week 1: Introduction to	scene recogni	ition and sensor fusio	on.							
Week 2: Probability basi	ic and Bayes f	ilter.								
Week 3: Kalman filter an	id its extensio	ns.								
Week 5: Mobile robot lo	calization									
Week 6: Mobile robot m	apping.									
Week 7: SLAM (Simulta	neous Localiza	ation and Mapping).								
Week 8: Presentations	of students' re	ports and conclusion	IS.							
Self Preparation and Re	eview									
Related subjects										
Fundamental knowledge	of linear algeb	ora and probability th	neory is useful.							
Notes for textbook										
Handouts will be prepar	ed. The main r	eference is shown b	elow.							
		1								
Reference1	Book title	Probabilistic Robo	otics		ISBN	978- 0262201629				
	Author	S. Thrun, W.	Publisher	The MIT Press	Publish year	2005				
Notes for reference		Durgaru, D. FOX	<u>I</u>	1		1				
Goole to be achieved										
Understanding of the fu	ndomentals of	concor fucion strate	gies and algorithr	me						
Evaluation of achievem	ant			113.						
Grade will be determine	d by the prese	entation and the repo	ort.							
Examination										
By Report										
Details of examination										
Other information										
Room C-604, Ext. 6773	, Email: jun.miu	ıra@tut.jp (Jun Miura)	)							
Reference URL										
http://www.aisl.cs.tut.a	c.jp/classes/ro	obotics-and-informat	tics/							
ID and password will be given at the class.										

Office hours Make an appointment beforehand by email. Relations to attainment objectives of learning and education

Key words Robotics

# (D53030160)Web Data Engineering, Advanced 2[Web Data Engineering, Advanced 2]

Subject name[English]	Web Data Engineering Advanced 2[Web Data Engineering Advanced 2]						
Schedule number	D53030160	Subject	t ares	a	Advanced	Required or	Elective
	Decerter	Cabjee	c ai oc		Computer	elective	Lioodivo
					Science and	000000	
					Engineering		
Time of starting a source	Fall1 torm	Dev	of	the	Mon 2~2	Credit(a)	1
Time of starting a course		veek p	oriod	ule	WIOII.Z 2	Oredit(s)	1
Feaulty	Graduate Program	for Doc	toral	Degro		Subject made	1~
Paculty Department Offered	Computer Science	a and En	rinoo	Degre		Subject grade	D1
Department Onered	Computer Science		gineer	ring		Dogginnig	ы
Charge teacher name[Bargen	━」」 敏 kuptvn	MA Shire				grade	
	未山 系 NUNITAI	WA Shige	ru				
Numbering							
Objectives of class							
本講義では、大規模または多次を	このデータを効率的	かつ効果	果的に	こ表示	する可視化の設計	手法を講述し、対象	ミデータの性質や
特徴を分析しながら可視化機構を	自らデザインしてフ	゚ログラム	化す	る制作	乍実習によって、実践	桟的な応用開発力る	を習得する。
This class teaches design metho	dology of developin	g data ex	xplora	ation	tools by efficiently a	and effectively visu	ualizing huge size
or dimension of dataset. Practical	skill of developing	visualizat	tion to	ools is	s learned by the pra	ctice of actual pro	gramming.
					· · · · · · · · · · · · · · · · · · ·		<u>.</u>
Contents of elect							
Contents of class							
弗   週日: 情報 □ 税化の 得人と 做	安說明						
第2週目: 可視化 API とクラフ描画	■演習 ━━━━= を、						
第3週目:相関の可視化(多変量	<b>テータ</b> )						
第4週目:構造の可視化(階層・木	、構造)						
第5週目:関係の可視化(グラフ・)	ネットワーク)						
第6週目:テキストと変動の可視化	と対話的操作						
第7+0.5 週目 : 課題制作							
Week 1. Introduction and overview	v of information visi	ualization	n				
Week 2 API for drawing diagram							
Week 2. Correlation visualization	of multivariate data						
Week J. Dolotion visualization with	hiororobical and n	otwork re		ontoti	<b>o</b> n		
Week 4. Relation visualization with	reach and natwork)	etwork re	epres	entat	on		
Week 5. Visualization of relation (	fauration and time.	verietier	_				
Week 0. Visualization of textual in							
Week 7+0.5. Exercise of developin	ig a visualization to	01					
Self Preparation and Review	*****						
予習・復習のために、それまでに調	講義した内容と翌週	の講義	内容を	Web	でのe-ラーニングシ	ィステム(Moodle)で	公開する。
All digital textbook are freely supp	olied on e-learning :	system d	evelo	ped o	n moodle.		
Related subjects							
数値解析、多変量解析、データマ	イニング・可視化特	論I					
Numerical analysis, Multivariate a	nalysis, Advanced D	Data Minir	ng an	d Visı	ualization 1		
Notes for textbook							
e-ラーニングシステム(Moodle)に	公開する電子テキ	ストを使月	用する	5.			
Digital textbook is supplied on an	E-learning system	of moodle	e.				
Notes for reference							
Goals to be achieved							
 大担模 多次元のデータを効率的	かつ効果的に可想	まれすスキ	デザイ	いま	法を理解  与えこう	hたデータの性質ス	を老歯して最適た
ハパス、シヘルのノーノを効率の	1.2 フルネリーリカ 古能を翌得する	010 7 00 1	, , , ,				- う慮して取迴る
The goal of this class is to toool	したってい日日すでの design methodolog	ov of the	view	alizati	on system for offici	iently and effective	aly visualiza bure
size of multi-dimensional dataset			, visui	anzati	Sh System for enild		any visualize fluge
Evaluation of achievement							
	たトバキルケ部略へ	<u> ተ</u> ጠል።	± 100	トイ	ᄧᇰᆂᆂ		
	ゆみい利作課題 60	見の官部	1 100	「 尻 じ - ァ ゙ 生 !	体出りる。 作曲時の人士上(11	)の 上:ま 上 \ <i>上</i> 0 0 ト	
	ッ,かつ中间レホー	-17, 田席	, 00 J	、い利	TF誄題の音計県(IU	ル 泉海泉/か 80 泉	
	, かつ中间レホート 」 かった問い 1°	、 山 席,	もよ(	ひ利们	= 味趣の合計点(100	/ 品) () いち 点)	<u>人</u> 人
	ル かつ中間レボート ちょびかん 一部 日本	ヽ, 出席,	および	い制作	= 誅趙の台計点(100 城上士ス	) 京満京) か 55 点」	えこ
中间レホート 20 点, 出席 20 点, 3	わよい利作課題 60	京の合計	T 100	見で	怵尻りる。		

A:達成目標をすべて達成しており,かつ中間レポート,出席,および制作課題の合計点(100 点満点)が 80 点以上 B:達成目標を 80%達成しており,かつ中間レポート,出席,および制作課題の合計点(100 点満点)が 65 点以上 C:達成目標を 60%達成しており,かつ中間レポート,出席,および制作課題の合計点(100 点満点)が 55 点以上 Examination

その他

Other

## Details of examination

制作課題の発表会を試験期間中に実施する.

Presentation of final exercise is carried out within the period of a regular exam.

Other information

## **Reference URL**

Office hours

随時だが、電子メールで予約をとること。 Anytime, but requires reservation by E-mail.

Relations to attainment objectives of learning and education

Key words 情報検索、情報可視化、ビジュアル情報処理 Information visualization, Visual data mining, Visual information processing (D53030190)Advanced Complex Systems and Intelligent Informatics 1[Advanced Complex Systems and Intelligent Informatics 1]

Subject name[English]	Advanced Complex Systems and Intelligent Informatics 1[Advanced Complex Systems and							
	Intelligent Informa	atics 1]		1				
Schedule number	D53030190	Subject area	Advanced	Required or	Elective			
			Computer	elective				
			Science and					
			Engineering					
Time of starting a course	Fall1 term	Day of the week.period	Wed.3~3	Credit(s)	1			
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	1~			
Department Offered	Computer Scienc	e and Engineering		Beggining	D1			
- · · · · · · · · · · · · · · · · · · ·	·	0 0		grade				
Charge teacher name[Roman	村越 一支 MURA	KOSHI Kazushi						
alphabet mark]								
Numbering								
Objectives of class								
This source provides appartunitie	a ta laarn tha fallo	wingo:						
* Medaling and analysis on compl		wings.						
* Modeling and analysis on complete	ex systems and lea	rning systems,						
* System theoretic analysis on co	mplex systems and	d learning systems,						
* Computer simulations and implic	cations, and							
* Implementation of complex syst	ems and learning s	ystems.						
Recent topics on complex system	is and learning syst	ems will be also dis	cussed in the cours	e.				
Contents of class								
A Introduction on complex there	ical avatama							
A. Introduction on complex dynam	lical systems							
B. Dynamical systems								
C. Complex networks and interact	tions							
D. neural networks								
E. Information Processing by com	plex systems							
F. Learning algorithms								
G. Biological systems and informa	tion processing							
Self Preparation and Review								
Related subjects								
You must take the credits of "Co	mplex Systems and	Intelligent Informat	ics" in master cour	se in advance.				
Notes for textbook		0						
No textbook								
Notes for reference								
Goals to be achieved								
<b>_</b>								
Evaluation of achievement								
Class performance (50%) and tern	n-end report (50%)							
Examination								
その他								
By Report								
Details of examination								
Other information								
E-mail: mura[at]tut.jp (replace [at Room F-507, Ext. 6899	] with @)							
Reference URL								
Office hours								
After this class								
Relations to attainment objective	s of learning and e	ducation						

Key words

(D53030200)Advanced Complex Systems and Intelligent Informatics 2[Advanced Complex Systems and Intelligent Informatics 2]

Subject name[English]	Advanced Complex Systems and Intelligent Informatics 2[Advanced Complex Systems and							
	Intelligent Informa	tics 2]	1	1				
Schedule number	D53030200	Subject area	Advanced	Required or	Elective			
			Computer	elective				
			Science and					
			Engineering					
Time of starting a course	Fall2 term	Day of the	Thu.2~2	Credit(s)	1			
		week,period		-				
Faculty	Graduate Progran	n for Doctoral Degre	e	Subject grade	1~			
Department Offered	Computer Scienc	e and Engineering		Beggining	D1			
		A \ / 11-		grade				
Charge teacher name[Roman	石田 好輝 ISHID	A Yoshiteru						
alphabet mark]								
Humbering								
Objectives of class								
This course provides opportunitie	es to learn the follow	vings:						
* Modeling and analysis on compl	ex systems and lea	rning systems,						
* System theoretic analysis on co	omplex systems and	l learning systems ,						
* Computer simulations and impli	cations, and							
* Implementation of complex syst	ems and learning s	ystems.						
Recent topics on complex system	ns and learning syst	ems will be also dis	cussed in the cours	e.				
Contents of class								
1. Introduction on complex dynam	nical systems							
2. Dynamical systems								
3. Complex networks and interact	tions							
4. Cellular automata and neural ne	etworks							
5. Information Processing by com	plex systems							
6. Emergence of cooperation in a	utonomous agents							
7. Learning algorithms for agents								
8. Evolutionary algorithms for age	nts							
9. Biological systems and informa	tion processing							
Self Preparation and Review								
<b></b>								
Related subjects								
Notes for textbook								
No textbook. References other th	an below will be su	ggested at the first	class.					
Ishida, Y.: Immunity-Based System	ms, Springer (2004)							
Ishida, Y : Self-Repair Networks,	Springer (2015);							
Barabasi, A.L.: Linked, Perseus, (2	2002);							
Strogatz, S. H. Sync, Hyperion (2	:003);							
Goals to be sobjeved								
Evaluation of achievement								
Class performance (50%) and term	-end report (50%)							
	n enu report (30%)							
By Report								
Details of examination								
Other information								
Room F-504. Ext. 6895								
Reference URL								

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

Relations to attainment objectives of learning and education

(B)理論的・応用的知識の獲得と発展的活用能力 重要な学術・技術分野の理論・応用知識を自発的に獲得し、発展的に活用できる能力 (C)広範囲の知識を有機的に連携させた研究開発能力 広範囲の知識の連携による研究開発に対する方法論を体得し、研究開発の計画立案と、それを実践できる能力 (D)国内外において活躍できる表現力・コミュニケーションカ 論文、口頭及び情報メディアを通じて、自分の論点や考えなどを国の内外において効果的に表現し、コミュニケーションする能力

Key words

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

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

Subject name[English]	Seminar on Environmental & Life Sciences 1[Seminar on Environmental & Life Sciences						ife Sciences 1]
Schedule number	D54010010	Subje	ct are	a	Advanced	Required or	Required
				Applied	elective		
					Chemistry and		
			_		Life Science	• • • • • •	
Time of starting a course	Year	Day week,	of period	the	Intensive	Credit(s)	4
Faculty	Graduate Progran	n for Do	octoral	Degre	e	Subject grade	1~
Department Offered	Environmental and	d Life S	cience	es		Beggining grade	D1
Charge teacher name[Roman	S4系教務委員 4	keikyon	nu Iin-	-S		•	
alphabet mark]							
Numbering							
Objectives of class	1						
This course will provide the stude	ents with opportuni	ties to s	studv	on his	/her research subie	ects on advanced e	environmental and
life sciences by reading scientific	papers under the g	guidance	e of his	s/her	supervisor. The aim	of the lessen for	the students is to
learn the latest knowledge and p	resentation skills r	equired	for hi	s/her	research in the se	minar as well as t	o deepen his/her
understanding of advanced enviro	onmental and life sc	iences.					
Contents of class							
The students will be required to	read scientific pape	ers writt	ten by	other	<sup>r</sup> language than Jap	anese, especially I	English, which are
suggested by his/her supervisor,	and to report and d	liscuss o	deeply	on his	s/her research subj	ect in the seminar.	
Self Preparation and Review							
Related subjects							
Seminar on Environmental & Life	Sciences 2						
All other relevant subjects in Adv	anced Environment	al and L	_ife Sc	iences	6		
Notes for textbook							
Supervisor will recommend textbo	ooks, papers, and re	search	mater	ials to	students.		
Notes for reference							
Goals to be achieved							
To acquire advanced knowledge o	on environmental an	ld life so	cience	s			
To understand the contents of so	cientific papers in a	given fi	eld of	enviro	nmental and life sci	ences	
To be able to make oral and post	er presentations rel	evant to	o pape	ers he∕	/she has read.		
Evaluation of achievement							
The evaluation is based on the	scores of reading t	extbook	ks and	scien	tific papers, discus	sions, reports and	presentations of
his/her research in the seminar. I	His/her supervisor (	evaluate	es the	score	S.		
Examination							
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.	4					
Relations to attainment objective	s of learning and e	ucatior	ר				
Key words							
Environmental science and technological	ology, life science r	naterial	s scie	nce an	id engineering appli	ed chemistry	
		idi	5 5010	al		ea ononnoù y	

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

Subject name[English]	Seminar on Environmental & Life Sciences 2[Seminar on Environmental & Life Sciences 2]						
Schedule number	D54010020 Subject area		Advanced	Required or	Required		
		_		Applied	elective		
				Chemistry and			
				Life Science			
Time of starting a course	Year	Day o	f the	Intensive	Credit(s)	1	
		week,per	iod				
Faculty	Graduate Progran	n for Docto	oral Degr	ee	Subject grade	2~	
Department Offered	Environmental and	d Life Scie	nces		Beggining	D2	
					grade		
Charge teacher name[Roman	S4糸教務委員 4	kei kyomu	lin-S				
alphabet mark							
Numbering							
Objectives of class							
This course will provide the stude	ents with opportuni	ties to stu	dy on his	/her research subje	ects on advanced	environmental and	
life sciences by reading scientific	papers under the g	guidance of	his/her	supervisor. The aim	of the lessen for	the students is to	
expand the knowledge and preser	ntation skills acquire	ed in Semir	nar on En	vironmental and Life	e Science 1.		
Contents of class							
The students will be required to	read scientific pape	ers written	by othe	r language than Jap	anese, especially	English, which are	
suggested by his/her supervisor,	and to report and d	liscuss dee	ply on hi	s/her research subj	ect in the seminar	<u>.</u>	
Self Preparation and Review							
Related subjects							
Seminar on Environmental & Life	Sciences 1						
All other relevant subjects in Adv	anced Environment	al and Life	Science	s			
Notes for textbook							
Supervisor will recommend textbo	ooks, papers, and re	search ma	terials to	students.			
Notes for reference							
Goals to be achieved							
To acquire advanced knowledge of	n environmental an	d life scier	ices				
To understand the contents of so	ientific papers in a	given field	of enviro	onmental and life sc	iences		
To be able to make oral and post	er presentations rel	evant to p	apers he	/she has read	lendes		
Evaluation of achievement							
The evoluation is based on the	action of reading t	ovthooko	and agin	tifia nonora diaqua	aiona ranarta an	d procontations of	
his her recearch in the cominar	lic/ber supervisor		he coore	iunic papers, discus	sions, reports and	presentations of	
Fremination	ns/ner supervisor	evaluates i	ne score	5.			
None during exam period							
Details of examination							
Other information							
Superviser(a)							
Beference LIDI							
http://ans.tut.as.in/an/							
Students are encouraged visiting	hy appointment						
Relations to attainment objective	s of learning and e	ducation					
Key words							
Environmental science and technology	ology, life science. r	naterials s	cience a	nd engineering. appli	ed chemistrv		
	3,		41	J	,		

### (D54010050)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	Seminar on Interc	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]							
Schedule number	D54010050	Subject area	Advanced	Required or	Required				
			Applied	elective					
			Chemistry and						
			Life Science						
Time of starting a course	Fall term	Day of the	Mon.3~3	Credit(s)	1				
		week,period							
Faculty	Graduate Program	n for Doctoral Degre	e	Subject grade	2~				
Department Offered	Environmental an	d Life Sciences		Beggining	D2				
				grade					
Charge teacher name[Roman	S4系教務委員, 教	S4系教務委員, 教務委員会副委員長 4kei kyomu Iin-S, kyoumu iinkai fukuiintyou							
alphabet mark]									
Numbering									
Objectives of class									
New technologies are often deve	loped from the com	bination of different	t disciplines. It is c	lear that successfu	ul interdisciplinary				
efforts require mastery of specif	ic competencies. T	his course will deve	elop a student's s	cientific and techr	nical knowledge in				
which researchers from different	disciplines. If such	competencies are e	xplicated, it might	be possible to enh	ance researchers'				
abilities to develop the next gene	ration in interdiscip	linary scholarship.							
The purpose of this class is to r	ecognize how inter	disciplinary-based r	esearch provides ir	mportant knowledg	e and insight into				
complex problems and issues and	also appreciate the	e unique advantages	of integrative rese	arch and learning.					
Contents of class									
In this seminar, doctoral course s	tudent of 2nd year	will make a present	ation to other D2 s	students of differe	nt research fields,				
in order to obtain the research at	oility to integrate va	rieties of research f	ields. See the sche	dule.					
1) Presentations									
In this class, each student will ma	ke a presentation t	o other students of	different research	fields.					
So the student who do the prese	ntation will prepare	the outline for appr	oximately 2 pages (	A4), and make a p	ower-point.				
*Supervisor will come and check	his student's prese	ntation, if available.							

2) Title and abstract of presentation

Not only D2 students, but also other students are welcome to attend the presentation.

So please submit the title and abstract (200 words) 3 weeks before your presentation to Academic Affairs Division. We will post it on the bulletin board inside the campus.

3) Report you will submit

You will be requested to submit a report after each presentation to your supervisor. As an initial training to create a new research project, students will work to make brief summary of a topic from other student's research filed with the goal of creating research project. And students will complete a research proposal that will be integrated from other scientific field and their own research filed.

4) Schedule of your presentation Please check the schedule given before the semester begins.

5) Absence from the class

Basically, you have to attend every class.

If you need to take absence due to the sickness or conference, please discuss with your supervisor what you should do instead.

Self Preparation and Review	
Related subjects	
Nishan Ramata and	
NOTES TOP TEXTDOOK	
Notes for reference	
Goals to be achieved	

The purpose of this class is to recognize how interdisciplinary-based research provides important knowledge and insight into complex problems and issues and also appreciate the unique advantages of integrative research and learning
Evaluation of achievement
Your supervisor will check your report, and submit your academic score to the member of Academic Affairs Committee at the
end of semester.
Examination
None during exam period
Details of examination
Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

# (D54010060)Ethics of Researcher[Ethics of Researcher]

Subject name[English]	Ethics of Researcher[Ethics of Researcher]							
Schedule number	D54010060	Subjec	ct area	1	Advanced	Required	or	Required
		_			Applied	elective		
					Chemistry and			
					Life Science			
Time of starting a course	Fall1 term	Day	of	the	Wed.1~1	Credit(s)		1
		week,	period	_				
Faculty	Graduate Program	n for Do	ctoral	Degre	e	Subject gra	de	1~1
Department Offered	Environmental and Life Sciences Beggining Di						וט	
Charge teacher name[Roman	教務委員会副委	教務委員会副委員長. 原 邦彦. 上野 未貴 kvoumu jinkai fukujintvou. HARA Kunihiko.						HARA Kunihiko
alphabet mark]		牧扬安莫云副安莫及, 床 升彦, 工护 不莫 kyounnu ninkai hukunintyou, nArka Kunininko, UFNO Miki					n a o c ritaninito,	
Numbering								
Objectives of class								
Assist graduate students as they	undertake receard	h activiti	iac and	d pror	note an understand	ing of the inh	oront	athical problems:
lead students to think independent	ently and exercise	normativ	ve cor	a pror ascior	isness of research	ethics through	oh et	hics education in
research in accordance with goals	s of scientific educa	ation and	d resea	arch a	nd characteristics	of individual r	esear	ch specialties.
Contents of class								
1st week: Introduction, 1st module	e in e-learning							
2nd – 6th week: 2nd – 7th module	s in e−learning							
- 7th week: Discussion with super	rvisor							
8th week: Examination								
e-learning								
1st module: Research Misconduct								
2nd module: Ethical Issues in the	Management of Data in Engineering Research							
3rd module: Responsible Authorsh	np Daar Daadamaa di Da				uiuu Deeeeul			
4th module: Ethical Issues in the l	Peer Review and Publication of Engineering Research							
6th module: Whistleblowing and th	A Obligation to Pro	tect the	Publi	~				
7th module: Managing Public Rese	arch Funds		Fubil					
Self Preparation and Review								
Students will need to refer to the	ir textbook to prepa	are for a	nd rev	view e	ach lesson.			
Related subjects								
Philosophy of Science and Techn	ology, Ethics for En	igineers						
Notes for textbook								
Notes for reference								
For the Sound Development of So	cience ?The Attitud	le of a C	onscie	entiou	s Scientist			
Japan Society for the Promotion	of Science Editing	Committ	ee, N	IARU	ZEN PUBLISHING			
2015 ISBN978-4-621-08938-5								
(PDF:https://www.jsps.go.jp/j-ko	busei/data/rinri.pdf	)						
Goals to be achieved								
I o prevent misconduct and prom	ote fair research ac	ctivities,	this c	ourse	provides knowledge	e and techniq	ues re	egarding research
ethics in accordance with charact	eristics of each gra	aduate s	tudent	s re	search specialties.			
Evaluation of achievement	0006)							
[Evaluation hasis]	0070)							
Those who take and pass the sho	rt test after each u	init of e-	-learni	ng co	ntents will be evalu	ated with follo	owing	basis.
A: Achieved all goals and obtained	80 points or highe	r (out of	f 100)	as to	tal score of exams			
B: Achieved most goals and obtain	ned 65 points or hig	gher (out	t of 10	0) as	total score of exam	ıs		
C: Achieved more than half of spe	ecified goals and ob	tained 5	5 poin	ts or	higher (out of 100)	as total score	ofe	xams
Examination								
Examination(Face to Face)								
Details of examination								

# Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

### Key words

Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism

## (D54030020)Advanced Environmental Technology 2[Advanced Environmental Technology 2]

Subject name[English]	Advanced Enviror	mental Technology	2[Advanced Enviro	- nmental Technolog	v <b>2</b> ]			
Schedule number	D54030020	Subject area	Advanced	Required or	Elective			
			Applied	elective				
			Chemistry and					
			Life Science					
Time of starting a course	Fall term	Day of the week.period	Mon.2~2	Credit(s)	2			
Faculty	Graduate Program	n for Doctoral Degr	ee	Subject grade	1~			
Department Offered	Environmental an	d Life Sciences		Beggining	D1			
Charge teacher name[Roman alphabet mark]	松本 明彦, 小口 Takanori	<b>grade</b>   松本 明彦, 小口 達夫, 水嶋 生智 MATSUMOTO Akihiko, OGUCHI Tatsuo, MIZUSHIMA Takanori						
Numbering								
Objectives of class								
This course aims to fundamenta	al understanding of	state-of-art techn	ologies for environn	nental protection a	nd restoration on			
the basis of physical and inorganic	c chemistry		U	·				
Contents of class	-							
The following articles will be com	mentated in the cou	urse.						
5								
1. Physical chemistry and inorgan	ic chemistry for ur	iderstanding of stat	e-of-art technologi	es used in environ	nental protection			
and/or restoration		ider startding of star						
(1) Physical chemistry and colloid	& interface scienc	e [A. Matsumoto]						
(2) Inorganic chemistry and cataly	sis chemistry [T. N	lizushima]						
(3) Reaction mechanism of combu	ustion in internal-co	ombustion engines [	T. Oguchi]					
		0	0 2					
2. The features of the techniques	used in environme	ntal protection and	rectoration					
(1) Advertise and separation techniques	bology [A Mateur	ntal protection and	restoration					
(1) Adsorption and separation tec	hinology [A. Matsun	liocol						
(3) Compustion control of fuels [7]	[ Oguchi]							
2 Practical example of the techni								
5. Practical example of the technic	ques							
Self Preparation and Review								
B.L.L.L.L.								
Related subjects								
Basic understanding on physical of	chemistry and inorg	anic chemitry is es	sential.					
Reference handouts will be provid	led in the class.							
Notes for reference								
Goals to be achieved								
Evaluation of achievement								
30 % Homework report and 70 % F	inal report							
Examination	Examination							
By Report								
Details of examination								
Other information								
Akihiko Matsumoto: room # B-50	5. E-mail: aki-at-en	is.tut.ac.jp (replace	″-at-″ by ″@″ whe	n sending e-mail)				
Takanori Mizushima: room # B-30	3. E-mail: mizushim	a-at-ens tut ac in (	replace "-at-" hv "	@‴ when sending e	-mail)			
Tatsuo Oguchi: room # G-406 E-	mail: oguchi-at-tut	in(replace "-at-" h	y "@" when sendin	g e−mail)				
		optioplace at a		man/				
Studente who intend to take the	alaaa ara aaliad ±-	oontoot with the in-	tructor before "	tration				
Students who intend to take the o	ciass are asked to (	contact with the ins	structor perore regis	ou alion.				

1

Reference URL

Office hours

Booking required in advance.

Relations to attainment objectives of learning and education

Key words

## (D54030050)Advanced Biotechnology 2[Advanced Biotechnology 2]

Subject name[English]	Advanced Bioteck	phology 2 Adv		Biotechnology 2]			
	D54030050	Subject are			Pequired or	Flective	
	004000000	Subject ale	a	Applied	elective	LICOLIVO	
				Chemistry and	01000140		
				Life Science			
Time of starting a course	Fall term	Day of	the	Fri 5~5	Credit(s)	2	
		week.period	1	111.0 0	010010(0)	-	
Faculty	Graduate Progran	n for Doctoral	Degre	ee	Subject grade	1~	
Department Offered	Environmental and	d Life Science	es		Beggining	D1	
-					grade		
Charge teacher name[Roman	吉田 絵里,吉田	5田 絵里, 吉田 祥子, 梅影 創, 沼野 利佳 YOSHIDA Eri, YOSHIDA Sachiko, UMEP					
alphabet mark]	So, NUMANO Rik	o, NUMANO Rika					
Numbering							
Objectives of class							
To acquire knowledge of advance	d biotechnology inc	luding biology	, bioch	emistry, physiology	and engineering.		
Contents of class	0,	0 0,		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	5 5		
1. Neural physiology and sensing	(Yoshida, S)						
1–1 Function and diversity of phy	siological substance	es					
1-2 Information transmission betw	ween neurons						
1–3 Brain function and neuronal o	rcuits						
1-4 Imaging engineering for neuro	onal functions						
2.Molecular biology (Numano, R)							
2-1 History of molecular biology							
2–2 Technique of molecular biol	ogy						
2-3 Topic of molecular biology1	(Genome)						
2-4 Topic of molecular biology2	(Circadian Rhythm	s)					
3. RNA engineering (Umekage, S)							
3-1 functional RNA (tentative)							
3–2 antisense RNA, ribozyme, siR	NA (tentative)						
3-3 aptamer (tentative)							
3-4 CRISPR-Cas system (tentati	ve)						
4. Bio-related polymer chemistry	and engineering (Yo	oshida, E)					
4–1 Bio-related nanomaterials							
4-2 Design of bio-related polyme	rs with precisely co	ntrolled struc	ture				
4–3 Molecular self–assembly							
4-4 Supramolecular chemistry an	d engineering						
Self Preparation and Review							
<b></b>							
Advensed Determined							
Advanced Polymer Engineering							
NOLES TOP LEXEDOOK							
Notes for a formation							
Notes for reference							
Goals to be achieved						16	
I o understand cutting-edge biot	echnology based o	n cell biology	, phys	iology, KNA engine	erıng, molecular se	eit-assembly, and	
bio-related nanonaterilas.							
	<b>t</b> o						
	13						
Details of examination							
Other information							

Sachiko Yoshida: ex.6802, syoshida@ens.tut.ac.jp, B-406 So Umekage: ex.5832, umekage@ens.tut.ac.jp, G1-201 Rika Numano: ex.6902, numano@ tut. jp, G-407 Eri Yoshida: ex.6814, eyoshida@ens.tut.ac.jp, B-503 **Reference URL** 

# Office hours

Anytime

Relations to attainment objectives of learning and education

Key words

Nanostructure, Molecular self-assembly, Supramolecules, Neuronal circuit, cell differentiation

#### (D54030070)Advanced Molecular Function Chemistry 2[Advanced Molecular Function Chemistry 2]

Subject name[English]	Advanced Molecular Function Chemistry 2[Advanced Molecular Function Chemistry 2]					
Schedule number	D54030070	Subject area	Advanced Applied Chemistry and Life Science	Required or elective	Elective	
Time of starting a course	Fall term	Day of the week,period	Fri.4~4	Credit(s)	2	
Faculty	Graduate Program for Doctoral D	Subject grade	1~			
Department Offered	Environmental and Life Sciences		Beggining grade	D1		
Charge teacher name[Roman alphabet mark]	辻 秀人, 齊戸 美弘, 手老 龍吾 TSUJI Hideto, SAITO Yoshihiro, TERO Ryugo					
Numbering						

#### **Objectives of class**

Since Environmental and Life Science are based on various scientific fields related each other, it is important to acquire broader knowledge and understanding of them. In this class, four topics closely relevant to Environmental and Life Science are open. Objectives of this class is to obtain the in-depth understanding of selected one of these topics.

### **Contents of class**

[1] Biobased and biodegradable polymers are developed and studied in terms of various applications including biomedical, pharmaceutical and environmental applications. This course covers the fundamentals and applications of biobased and biodegradable polymers. Submission of a report regarding the current researches on biobased and biodegradable polymers is required. (by H. Tsuji)

[2] Miniaturization and automation of the whole separation instruments have been one of the most important projects in separation science, because of the increasing requirements for recent separation systems, such as selective/specific detection with high sensitivities, high throughput processing, as well as an environmentally-friendly feature of the systems. On the basis of the above concept, miniaturized sample preparation and separation techniques will be discussed along with the effective coupling of these techniques. Submission of a comprehensive report regarding these topics is required. (by Y. Saito)

[3] Molecular interaction and assembly are key factors for the understanding of the function of biomolecules. This class covers the fundamental and advanced topics of assembly and functions of biomolecules, e.g. proteins, lipids and nucleotides, and related experimental techniques. Submission of a report regarding a chapter of the reference book and a related current research is required. (by R. Tero).

# Self Preparation and Review

Related subjects						
Nataa fay taythaal						
Notes for textbook						
Related materials will be p	provided.					
Reference1	Book title	Poly(lactic acid): S	Synthesis, Struct	ures, Properties,	ISBN	0470293667
		Processing, and Ap	plications			
	Author	Rafael A. Auras,	Publisher	Wiley	Publish year	2010
		Loong-Tak Lim,				
		Susan E. M.				
		Selke. Hideto				
		Tsuji				
Reference2	Book title	Nanoscience: Nano	biotechnology an	d Nanobiology	ISBN	978-3-540-
						88633-4
	Author	Patrick Boisseau	Publisher	Springer	Publish year	2009
		& Marcel				
		Lahmani				
Notes for reference						
#2 can be accessed in the	e universitv n	etwork.				
http://link.springer.com/b	nok/101007	%2F978-3-540-8863	3–4			

# (R. Tero)

# Goals to be achieved

To obtain the in-depth understanding of topic relevant to Enviromental and Life Science.

## Evaluation of achievement

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

**Examination** By Report

# Details of examination

#### Other information

H.Tsuji: room (G-606), e-mail (tsuji@ens.tut.ac.jp), phone: 6922 Y.Saito: room (B-404), e-mail (saito@ens.tut.ac.jp), phone: 6803 R.Tero: room (B-405), e-mail (tero@tut.jp), phone: 6791

### **Reference URL**

## Office hours

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

Key words

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

					<b>1</b>
Subject name[English]	Seminar on A	rchitecture and Giv	I Engineering ILS	eminar on Archite	ecture and Civil
Cabadala availa a	Engineering I	Outlinet and	Adversed	De sudine de la su	De milior d
Schedule number	D55010010	Subject area	Advanced	Required or	Required
			Architecture	elective	
			and Civil		
		<b>_</b>	Engineering	<b>a u</b> ()	
Time of starting a course	Year	Day of the	Intensive	Credit(s)	4
<b>-</b> .		week,period			
Faculty	Graduate Progra	am for Doctoral Degr	ee	Subject grade	1~
Department Offered	Architecture an	Architecture and Civil Engineering			D1
Charge teacher name[Roman	S5系教務委員	5kei kyomu Iin−S			
alphabet mark]					
Numbering					
Objectives of class					
All the students are required to	attend all the se	minars, which is array	nged by the laborate	orv supervisor for	the special study
subjects related to the current re	esearch activity of	f the laboratory. The	scheduled program	of the seminars is	announced by the
supervisor at the guidance of the	seminar	r the laboratory. The			
Contento of class	seminar.				
Contents of class					
Self Preparation and Review					
Polated aubicets					
Noiatod subjects					
Notes for textbook					
Notes for reference					
Goals to be achieved					
Evaluation of achievement					
Report					
Examination					
By Report					
Details of examination					
Other information					
Reference URL					
Office hours					
Relations to attainment objective	s of learning and	education			
Key words					

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

Subject name[English]	Seminar on Architecture and Civil Engineering 2[Seminar on Architecture and Civil						
	Engineering 2]	Engineering 2]					
Schedule number	D55010020	Subject area	Advanced	Required or	Required		
		-	Architecture	elective	·		
			and Civil				
			Engineering				
Time of starting a course	Veer	Day of the	Intensive	Ore dit(a)	1		
Time of starting a course	Tear	Day of the	Intensive	Great(s)	1		
		week,period		<u>.</u>	•		
Faculty	Graduate Progra	m for Doctoral Degr	ee	Subject grade	2~		
Department Offered	Architecture and	d Civil Engineering		Beggining	D2		
				grade			
Charge teacher name[Roman	S5系教務委員5	5kei kyomu Iin−S					
alphabet mark]							
Numbering							
Objectives of class							
	attand all the ear	sinawa udalah ia awa	and by the lebenst		the energial study		
All the students are required to	attend all the sem	ninars, which is arrai	nged by the laborati	bry 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							
Self Preparation and Review							
Related subjects							
Notes for textbook							
Notes for reference							
Goals to be achieved							
Eveluation of achievement							
Report							
Examination							
By Report							
Details of examination							
Other information							
Reference URL							
Office hours							
Relations to attainment objective	s of learning and e	education					
Key words							

#### (D55010050)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	Seminar on Interc	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D55010050	Subject area	Advanced <b>Required or</b> Requ			
			Architecture	elective		
			and Civil			
			Engineering			
Time of starting a course	Fall term	Day of the	Mon.3~3	Credit(s)	1	
		week,period				
Faculty	Graduate Progran	Graduate Program for Doctoral Degree Subject grade 2				
Department Offered	Architecture and	Civil Engineering		Beggining	D2	
				grade		
Charge teacher name[Roman	S5系教務委員, 教	<b>教務委員会副委員</b> 長	€ 5kei kyomu Iin-S,	kyoumu iinkai fuku	iintyou	
alphabet mark]						
Numbering						
Objectives of class						
New technologies are often developed from the combination of different disciplines. It is clear that successful interdisciplinary						
efforts require mastery of speci	re mastery of specific competencies. This course will develop a student's scientific and technical knowledge in					
which researchers from different	nich researchers from different disciplines. If such competencies are explicated, it might be possible to enhance researchers'					
abilities to develop the next generation in interdisciplinary scholarship.						
The purpose of this class is to r	purpose of this class is to recognize how interdisciplinary-based research provides important knowledge and insight into					

The purpose of this class is to recognize how interdisciplinary-based research provides important knowledge and insight into complex problems and issues and also appreciate the unique advantages of integrative research and learning.

#### Contents of class

In this seminar, doctoral course student of 2nd year will make a presentation to other D2 students of different research fields, in order to obtain the research ability to integrate varieties of research fields. See the schedule.

1) Presentations

In this class, each student will make a presentation to other students of different research fields.

So the student who do the presentation will prepare the outline for approximately 2 pages (A4), and make a power-point. \*Supervisor will come and check his student's presentation, if available.

2) Title and abstract of presentation

Not only D2 students, but also other students are welcome to attend the presentation.

So please submit the title and abstract (200 words) 3 weeks before your presentation to Academic Affairs Division. We will post it on the bulletin board inside the campus.

#### 3) Report you will submit

You will be requested to submit a report after each presentation to your supervisor. As an initial training to create a new research project, students will work to make brief summary of a topic from other student's research filed with the goal of creating research project. And students will complete a research proposal that will be integrated from other scientific field and their own research filed.

4) Schedule of your presentation Please check the schedule given before the semester begins.

5) Absence from the class

Basically, you have to attend every class.

If you need to take absence due to the sickness or conference, please discuss with your supervisor what you should do instead.

Self Preparation and Review		
Related subjects		
Notes for textbook		
Notes for reference		
Goals to be achieved		

The purpose of this class is to recognize how interdisciplinary-based research provides important knowledge and insight into appropriate the unique advantages of integrative research and learning
Fullistion of achievement
Your supervisor will check your report, and submit your academic score to the member of Academic Affairs Committee at the
end of semester.
Examination
None during exam period
Details of examination
Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

# (D55010060)Ethics of Researcher[Ethics of Researcher]

Subject name[English]	Ethics of Researc	cher[Ethics o	f Rese	archer]						
Schedule number	D55010060	10060 Subject area		Advanced	Required or	Required				
				Architecture	elective					
				and Civil						
				Engineering						
Time of starting a course	Fall1 term	Day of	the	Wed.1~1	Credit(s)	1				
		week,perio	d							
Faculty	Graduate Progran	n for Doctora	al Degr	ee	Subject grade	1~1				
Department Offered	Architecture and	Civil Enginee	ering		Beggining	D1				
				man Lab.	grade					
Charge teacher name Roman	教務委員会副委員長, 原 邦彦, 上野 未貴 kyoumu iinkai fukuiintyou, HARA Kunihiko,									
alphabet markj										
Numbering										
Objectives of class										
Assist graduate students as they	undertake researc	h activities a	nd pro	mote an understand	ing of the inherent	ethical problems;				
lead students to think independe	ently and exercise	normative c	onscio	usness of research	ethics through et	hics education in				
research in accordance with goal	s of scientific educ	ation and res	earch	and characteristics o	of individual resear	ch specialties.				
Contents of class										
1st week: Introduction, 1st modul	e in e-learning									
2nd – 6th week: 2nd – 7th module	es in e−learning									
- 7th week: Discussion with supe	rvisor									
8th week: Examination										
e-learning										
1st module: Research Misconduct	t									
2nd module: Ethical Issues in the Management of Data in Engineering Research										
3rd module: Responsible Authorship										
4th module: Ethical Issues in the	Peer Review and P	ublication of	Engine	ering Research						
5th module: Collaborative Resear	ch in Engineering F	ields								
6th module: Whistleblowing and th	ne Obligation to Pro	otect the Pub	olic							
7th module: Managing Public Rese	earch Funds									
Self Preparation and Review										
Students will need to refer to the	ir textbook to prep	are for and r	eview e	each lesson.						
Related subjects										
Philosophy of Science and Techn	ology, Ethics for Er	ngineers								
Notes for textbook										
Notes for reference										
For the Sound Development of S	cience ?The Attitud	de of a Conso	cientiou	us Scientist						
Japan Society for the Promotion of Science Editing Committee, MARUZEN PUBLISHING										
2015 ISBN978-4-621-08938-5										
(PDF:https://www.jsps.go.jp/j-kousei/data/rinri.pdf)										
Goals to be achieved										
To prevent misconduct and promote fair research activities, this course provides knowledge and techniques regarding research										
ethics in accordance with charac	teristics of each gr	aduate stude	nt's re	esearch specialties.						
Evaluation of achievement										
[Evaluation method] Final exam(100%)										
[Evaluation basis]										
Those who take and pass the short test after each unit of e-learning contents will be evaluated with following basis.										
A: Achieved all goals and obtained	d 80 points or higher (out of 100) as total score of exams									
B: Achieved most goals and obtai	ned 65 points or higher (out of 100) as total score of exams									
C: Achieved more than half of sp	pecified goals and obtained 55 points or higher (out of 100) as total score of exams									
Examination										
Examination(Face to Face)										
Details of examination										

# Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

### Key words

Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism (D55030010)Advanced Mechanics and Design of Spatial Structure Systems[Advanced Mechanics and Design of Spatial Structure Systems]

Subject	Advanced Mechanics and Design of Spatial Structure Systems[Advanced Mechanics and Design of								
name[English]	Spatial Strue	Spatial Structure Systems]							
Schedule number	D55030010		Subject area	Advanced	Required or	Elective			
				Architecture	elective				
				and Civil					
				Engineering					
Time of starting a	Fall term		Day of the	Mon.3~3	Credit(s)	2			
course			week,period						
Faculty	Graduate Pr	ogram for Doctoral De	egree		Subject	1~			
					grade				
Department Offered	Architecture	and Civil Engineering	1		Beggining	D1			
	<u></u>				grade				
Charge teacher	甲澤 件—,	松本 辛大 NAKAZAV	VA Shoji, MATSU	MOTO Yukihiro					
name[Roman									
alphabet markj									
Numbering									
Objectives of class									
This lecture is concer	ned with the a	advanced theoretical	and applied struc	tural mechanics of	spatial structu	res. The primary			
purpose is to encour	age students	to gain the advance	ed concept and	to raise their engi	neering abilitie	s for innovative			
applications in the futu	re.								
Contents of class									
1. Introduction									
2. Analogical understan	rstanding of structural instability behavior								
3. Effects of imperfecti	perfections on the structural instability								
4. Structural instability	bility modes and large deflection modes								
5. Physical experiment	and its difficu	lty on structural insta	bility problems						
6. Mathematical analys	is and its diffic	ulty on structural ins	tability problems						
7. Relationship betweer	n experiments	and numerical simulat	tions						
8. Design procedures for	or the instabili	ty of spatial structure	S						
Self Preparation and R	eview								
Related subjects									
-									
Notes for textbook									
Defense of	De als Altie	The Theory of Dist.				0070050200			
Reference i	Book title	S Timeshanka		Ma Crean-Hill	Dublich	1064			
	Author	5. Timoshenko	Publisher	McGraw-Hill	Publish	1964			
				Publishing	year				
Defense of	Deals the	The second State of the		Company	ICDN	0406470070			
Referencez	BOOK LILIE	neory of Elastic S		Davas	19BN	04864/20/8			
	Author	5. Timoshenko	Publisher	Dover	Publish	1901			
D.C.	D. J. M.				year	4001001140			
keterence3	Book title	DYNAMIC ANALYS	IS OF EARTHQU	JAKE RESISTANT	ISBN	4861631149			
		STRUCTURES		***		0010			
	Author	Akenori Shibata	Publisher	果 北 天 字 出 版 へ	Publish	2010			
				<u></u>	year				
Notes for reference									
Goals to be achieved									
The primary purpose is to encourage students to gain the advanced concept and to raise their engineering abilities for									
innovative applications in the future.									
Evaluation of achievement									
Based on reports.									
Examination									
その他									

By Report					
Details of examination					
Other information					
Reference URL					
Nakazawa: http://www.st.ace.tut.ac.jp/~nakazawa/					
Matsumoto: http://sel.ace.tut.ac.jp					
Office hours					
Nakazawa; Monday, 16:20-17:50					
Matsumoto; Friday, 9:30–12:00					
Relations to attainment objectives of learning and education					
Key words					

#### (D55030020)Advanced Structural Design[Advanced Structural Design] Subject name[English] Advanced Structural Design[Advanced Structural Design] Schedule number D55030020 Subject area Advanced Required or Elective Architecture elective and Civil Engineering Time of starting a course Tue.4~4 Credit(s) Fall term Day of the 2 week.period Faculty Graduate Program for Doctoral Degree Subject grade 1~ Architecture and Civil Engineering D1 Department Offered Beggining grade Charge teacher name[Roman 齊藤 大樹, 松井 智哉 SAITOH Taiki, MATSUI Tomoya alphabet mark] Numbering **Objectives of class** Learn about a vibration analysis technology in seismic design of building and seismic design method **Contents of class** 1-2 weeks, Vibration of onde degree of freedom system 3-4 weeks, Elastic seismic response analysis, numerical integration method 5-6 weeks, Multi-degree-of-freedom system of vibration, Eigen value analysis 7-8 weeks, Response spectrum 9 week, Elastic-plastic seismic response analysis 10 week. Equivalent linearization method 11 week. Design input ground motion 12-13 weeks, Basic of the energy method 14-15 weeks, Basic of the limit strength calculation Self Preparation and Review **Related subjects** Notes for textbook Notes for reference Goals to be achieved Understand the background and theory of vibration analysis and the design method of the structure based on vibration analysis. **Evaluation of achievement** Examination By Report **Details of examination** Assessment Grade is evaluated based on the report in fall semester 1(50%), and the report and exam in fall semester 2(50%). Grading: A: exam, 80 or higher (out of 100 points) B: exam, 65 or higher (out of 100 points) C: exam, 55 or higher (out of 100 points) Other information Reference URL Office hours Relations to attainment objectives of learning and education
Key words

# (D55030040)Advanced Theory in Architectural Design[Advanced Theory in Architectural Design]

Subject name[English]	Advanced Theory	/ in Architectu	ral De	sign[Advanced Theo	ory in Architectural	Design]
Schedule number	D55030040	Subject are	a	Advanced	Required or	Elective
		Architecture		Architecture	elective	
				and Civil		
				Engineering		
Time of starting a course	Fall term	Day of week,period	the	Thu.5~5	Credit(s)	2
Faculty	Graduate Program	n for Doctoral	Degre	ee	Subject grade	1~
Department Offered	Architecture and	Civil Engineer	ing		Beggining	D1
					grade	
Charge teacher name[Roman	松島 史朗 MATS	SUSHIMA Shir	D			
alphabet mark]						
Numbering						
Objectives of class						
Contents of class						
Self Preparation and Review						
Related subjects						
Notes for textbook						
Notes for reference						
Goals to be achieved						
Evaluation of achievement						
Examination						
Details of examination						
Other information						
Reference URL						
Office hours						
Relations to attainment objective	s of learning and e	ducation				
Key words						

## (D55030060)Sustainable Urban Planning[Sustainable Urban Planning]

Subject name[English]	Sustainable Urbar	Planning[Sustainat	le Urban Planning]				
		Subject erec		Poguirad or	Flective		
Schedule number	Subject area		Auvanceu	Required or	LIECTIVE		
			Architecture	01000100			
			Engineering				
Time of starting a course	Fall term	Day of the	Eri 5~5	Credit(c)	2		
Time of starting a course		week period	111.5 - 5	Oreal((8)	2		
Faculty	Graduate Program	for Doctoral Degre		Subject grade	1~		
Department Offered	Architecture and	Civil Engineering		Beggining	D1		
				grade	ы		
Charge teacher name[Roman	浅野 純一郎 AS	ANO Junichiro		Brado			
alphabet mark]							
Numbering							
Objectives of class							
1) To gain the practical knowledge	e of Sustainable urt	oan planning.					
2) To learn the advanced method	s of urban planning	which is based on "	Sustainable develop	ment" conception.			
3) To learn the theory and the mo	ovement of recent i	urban planning from	EU, US, Japan.				
Contents of class							
The major topics that will be addr	essed in this class	are the followings,					
1. Overview of the theory about u	ırban planing based	on "Sustainability"	conception.				
2. Overview of policies and metho	ods about "Sustaina	ble urban planning"					
3. Practice by application of "Sus	stainable urban plar	ning" methods in th	ne fields of land use	, community, trans	portation, and so		
on				, · · · · <b>· · · · · · · · · · · · · </b>			
4 Practice by application of the	design methods a	hout "Sustainable i	ırhan nlanning" in t	he fields of creativ	e housing living		
environment and so on	design methods d				ve neusing, nving		
environment, and so on.							
Solf Droporation and Deview							
Seir Preparation and Review							
Related subjects							
The following knowledge is desirable,							
1) The basic knowledge on urban	planning and urban	design					
2) The knowledge on urban planni	ng system in your o	country					
3) The basic knowledge on GIS and CAD							
Notes for textbook							
Original textbook and papers are used in this class.							
Notes for reference							
Goals to be achieved							
Evaluation of achievement							
Evaluation standard will be explain	ned from each profe	essors individually.					
Examination							
その他							
By Report							
Details of examination							
Other information							
unichira ASANO(D-708) e-mail:asano@ace tut ac in							
Juriicriiro ASANU.(D-708),e-maii:asanowace.tut.ac.jp							
http://urhandesign.web.fc2.com/MOTHER-hn/TEA-hn/ton/o-main.html							
<b>B</b> 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<u>.</u>						
Relations to attainment objectives of learning and education							

Key words

### (D55030070)Advanced Geologic Hazard Mitigation Planning[Advanced Geologic Hazard Mitigation Planning]

Subject name[English]	Advanced Geologic Hazard Mitigation Planning[Advanced Geologic Hazard Mitigation Planning]					
Schedule number	D55030070	Subject are	a	Advanced Architecture and Civil Engineering	Required or elective	Elective
Time of starting a course	Fall term	Day of week,period	the	Fri.2~2	Credit(s)	2
Faculty	Graduate Program	n for Doctora	Subject grade	1~		
Department Offered	Architecture and Civil Engineering			Beggining grade	D1	
Charge teacher name[Roman alphabet mark] Numbering	三浦 均也, 松田 達也 MIURA Kinya, MATSUDA Tatsuya					
Numbering						

## **Objectives of class**

For mitigation planning of natural disaster such as earthquakes, it is necessary to find out the optimum program to control the complex system which is composed of human activity and natural phenomena. The objectives of this lecture are learning of the mitigation planning mentioned above and the understanding the component of the complex system such as soils.

### **Contents of class**

concerning the regional disaster mitigation for the natural disaster such as earthquakes and the component of the complex system such as soils, following matters are explained.

### Self Preparation and Review

#### Related subjects

**Geotechnical Analysis** 

Notes for textbook

none

Notes for reference

### Goals to be achieved

The goal to be achieved is understanding the basic concept of the regional disaster mitigation for earthquakes and the future of the soils which is the component of the complex system.

### Evaluation of achievement

Report and the presentation based on the report

Examination

その他

By Report

## **Details of examination**

Other information

D-803, 0532-44-6844, k-miura@ace.tut.ac.jp

Reference URL

prepairing Office hours

12:00-14:00 on Tuesday

Relations to attainment objectives of learning and education

## Key words

Disaster, Earthquake, Geologic Hazards, Numerical Analysis

# (D55030080)Advanced Water Environmental Engineering[Advanced Water Environmental Engineering]

Subject name[English]	Advanced Water	Environmenta	l Engir	neering[Advanced Wa	ater Environmenta	l Engineering]
Schedule number	D55030080	Subject are		Advanced	Required or	Elective
			Architecture	elective		
				and Civil	0.000.00	
				Engineering		
Time of starting a course	Fall term	Day of	the	Thu.1~1	Credit(s)	2
-		week,period	ł			
Faculty	Graduate Program	m for Doctora	l Degr	ee	Subject grade	1~
Department Offered	Architecture and	Civil Enginee	ring		Beggining	D1
					grade	
Charge teacher name[Roman	井上 隆信,加藤	茂,横田 久	.里子1	NOUE Takanobu, K/	ATO Shigeru, YOK	OTA Kuriko
alphabet mark						
Numbering						
Objectives of class						
Acquiring wide knowledge and inf	ormation concernin	ng on water en	vironn	nent for thesis work		
T. Inoue: Studying chemical aspec	ct of river and lake	environment				
S. Kato : Studying physical aspec	t of coastal, ocean	& estuarine e	enviror	ment and disaster		
K. Yokota: Studying importance o	f field investigation	on water env	/ironm	ent in river		
Contents of class						
T. Inoue (1-5) :						
- Valuation method of river and la	ake water quality					
- Restoration of river and lake er	ivironment					
S. Kato (6–10) :						
- Coastal, ocean & estuarine env	ironment and disas	ter				
- Water flow and material transpo	art in coastal zone	ocean & estu	arv			
K Yokota $(11-15)$			u y			
- Experimental and field measure	ment method for m	aterial dynam	ice inv	estigation		
- Analysis of material dynamics in	ment method for n		105 111	esugation		
	i water					
(Attention)						
- Contact one of instructors in a	dvance.					
- There are cases where the ord	er of instructors is	changed.				
Self Preparation and Review					, .	
Students are required to review	the contents of e	ach lecture, a	and to	refer some textboo	oks and/or materia	als related to the
next lecture as preparation.						
Related subjects						
Notes for textbook						
No specific textbook is used.						
The resume or related handouts	are distributed.					
Notes for reference						
Goals to be achieved						
(1) Inderstanding river and lake environmental problems and chemical approach to the solution						
(2) Understanding a situation of coastal ocean and estuarine environment and disacter, and counter-measurements for related						
problems						
(3) Understanding methods of measurement and analysis for material dynamics analysis in water						
		., sie for mate	ar uy			
Evoluation of achievement						
		ala faca de la com	(100			
Evaluation is based primarily on reports given by each instructor (100 points).						
Each report is evaluated by each instructor.						
I he average of report scores is used as subject evaluation.						
Grade, A: 80 or higher, B: 65 or higher to lower than 80, C: 55 or higher to lower than 65.						
-						

Examination
その他
Other
Details of examination
Reports and/or oral examination by each instructor
The detail is decided by each instructor.
Other information
T. Inoue : D-811, inoue@ace.tut.ac.jp
S. Kato   : D-812, s-kato@ace.tut.ac.jp
K. Yokota: D-810, yokota@ace.tut.ac.jp
Reference URL
Office hours
T. Inoue: Wednesday 12:30–13:30
S. Kato : At any time (It is desirable to contact Kato about visit time by e-mail in advance.)
K. Yokota: Monday, 13:00–14:00

# Relations to attainment objectives of learning and education

# Key words

water quality, water environment, river, lake, coast, ocean, estuary, natural disaster, material dynamics, field measurement, experiment

### (D55030100)Advanced Environmental Economics and Planning[Advanced Environmental Economics and Planning]

Subject	Advanced Environmental Economics and Planning[Advanced Environmental Economics and Planning]					
name[English]						
Schedule number	D55030100	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Elective	
Time of starting a course	Fall term	Day of the week.period	Fri.4~4	Credit(s)	2	
Faculty	Graduate Program for Doctoral	Degree	I	Subject grade	1~	
Department Offered	Architecture and Civil Engineeri	ng		Beggining grade	D1	
Charge teacher name[Roman alphabet mark] Numbering	宮田 譲 MIYATA Yuzuru					

## **Objectives of class**

To undestand the analysis of regional economic activities.

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

### Contents of class

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

Topics

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

The handout will be distributed to students. Students must learn the contents of the handout before and after each lecture. Self Preparation and Review

### **Related** subjects

microeconomics (undergraduate), macroeconomics(undergraduate), environmental economics (master course)								
Textbook1	Book title	Environmental	Economics :	An Elementary	ISBN	9780801848636		
		Introduction						
	Author	Turner, R.	Publisher	Johns Hopkins	Publish			
		Kerry/ Pearce,		Univ Press	year			
		David/						
		Bateman, Ian						

# Notes for textbook

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

Notes for reference

### Goals to be achieved

By applying mathematical/numerical models;

To undestand the analysis of national/regional economic activities.

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

## Evaluation of achievement

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

Examination

# By Report

Details of examination

Other information

room # : D806 phone : 0532-44-6955 e-mail address : miyata@ace.tut.ac.jp

Reference URL

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

Office hours

16:00 to 17:00 on every Tuesday

Relations to attainment objectives of learning and education

Key words

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