Syllabus

International Doctoral Degree Program

（2018-Fall Term）

(D51010010)Advanced Seminar on Mechanical Engineering 1[Advanced Seminar on Mechanical Engineering 1]

Subject name[English]	Advanced Seminar on Mechanical Engineering 1[Advanced Seminar on Mechanical Engineering 1]				
Schedule number	D51010010	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_DOC71015				

Objectives of class

The seminar aims to enhance the ability of each student to plan and accomplish research in the field of mechanical engineering through reviewing, reading, and discussing technical papers related to his/her doctor thesis research topic.

Contents of class

Each student reads English technical papers related to his/her doctor thesis, introduces the contents of the papers and discusses them with other students and his/her supervisor.

Self Preparation and Review

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 student to discuss his/her doctor thesis research topic and topics related to his/her research field with his/her supervisor and specialists in his/her field.
To acquire the ability to write English technical papers.

Evaluation of achievement

The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Inquire this of your supervisor.

Reference URL

Office hours

Inquire this of your supervisor.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner
Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniques for problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner.

Key words

(D51010020)Advanced Seminar on Mechanical Engineering 2[Advanced Seminar on Mechanical Engineering 2]

Subject name[English]	Advanced Seminar on Mechanical Engineering 2[Advanced Seminar on Mechanical Engineering 2]				
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 for Doctoral Degree			**Subject grade**	2～
Department Offered	Mechanical Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_DOC71015				

Objectives of class

The seminar aims to enhance the ability of each student to plan and accomplish his/her research in the field of mechanical engineering through reviewing, reading, and discussing technical papers related to his/her doctor thesis research topic.

Contents of class

Each student reads English technical papers related to his/her doctor thesis, introduces the contents of the papers and discusses them with other students and his/her supervisor.

Self Preparation and Review

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 student to discuss his/her doctor thesis research topic and topics related to his/her research field with his/her supervisor and specialists in his/her field.
To acquire the ability to write English technical papers.

Evaluation of achievement

The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Inquire this of your supervisor.

Reference URL

Office hours

Inquire this of your supervisor.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner
Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniques for problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner.

Key words

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

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D51010050	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Mon.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Mechanical Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S1系教務委員, 教務委員会副委員長 1kei kyomu Iin-S, kyoumu iinkai fukuiintyou				
Numbering	MEC_DOC71015				

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 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

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

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner

Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniques for problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner.

(D) Communication skills for global success

Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members, and the high ability to contribute to the goals of the team as a leader

(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment

Have the skills to investigate the nature of change in society, environment and technology, and voluntarily make plans and learn throughout one's life

Key words

(D51010070)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D51010070	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.1～1	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中　三郎, 上野　未貴 kyoumu iinkai fukuiintyou, TANAKA Saburo, UENO Miki				
Numbering	MEC_DOC81015				

Objectives of class

Assist graduate students as they undertake research activities and promote an understanding of the inherent ethical problems; lead students to think independently and exercise normative consciousness of research ethics through ethics education in research in accordance with goals of scientific education and research and characteristics of individual research specialties.

Contents of class

＊1st week(October 17,2018): Introduction, 1st module(″Research Misconduct″) in e-learning
＊2nd – 6th week(October 24 – November 21): 2nd – 6th modules in e-learning
– 2nd week: ″Ethical Issues in the Management of Data in Engineering Research″
– 3rd week: ″Responsible Authorship″
– 4th week: ″Ethical Issues in the Peer Review and Publication of Engineering Research″ & ″Collaborative Research in Engineering Fields″
– 5th week: ″Whistleblowing and the Obligation to Protect the Public″
– 6th week: ″Managing Public Research Funds″
＊~7th week (November 22 – November 27): Discussion with supervisor
＊8th week (November 28 2018) : make a final report

Self Preparation and Review

Students will need to refer to their textbook to prepare for and review each lesson.

Related subjects

Philosophy of Science and Technology, Ethics for Engineers

Notes for textbook

Notes for reference

For the Sound Development of Science ?The Attitude of a Conscientious 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 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.
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points)

Examination

レポートで実施
By Report

Details of examination

By report

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(B) Sound ethics and social awareness as highly advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as highly advanced-level engineers and researchers; and have the ability to discover, set, solve and evaluate technical issues in society

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 area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	森 謙一郎, 柴田 隆行, 安部 洋平, 永井 萌土 MORI Ken-Ichiro, SHIBATA Takayuki, ABE Yohei, NAGAI Moeto				
Numbering	MEC_DOC73025				

Objectives of class

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

In addition, the objectives of this course is to introduce fundamentals of conventional micromachining technologies and the-state-of-art nanomachining technologies, and their application in the development of "Micro/Nano Electro Mechanical System (MEMS/NEMS)". (T. Shibata and M. Nagai)

Contents of class

(K. Mori and Y. Abe)

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

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

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

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

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

6th week: Treatment of boundary conditions

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

8th week: Finite element method for plastic deformation

(T. Shibata and M. Nagai)

9th week: Introduction of MEMS/NEMS

10th week: Photolithography

11th week: Wet etching and dry etching

12th week: Physical vapor deposition (PVD) and chemical vapor deposition (CVD)

13th week: Plating, electroforming, and bonding process

14th week: Surface micromachining and bulk micromachining

15th week: Microactuators and scaling law

16th week: State-of-the-art in micro/nanomarching technologies

Self Preparation and Review

Students are required to prepare and review each lesson.

Related subjects

Strength of material, Solid mechanics, Numerical methods (K. Mori and Y. Abe)

Micromachining Engineering (T. Shibata and M. Nagai)

Notes for textbook

Handout

Notes for reference

(T. Shibata and M. Nagai)

Useful information on MEMS technologies can be obtained from the following website; http://www.memsnet.org/mems/

Reference: (1) M.J. Madou, "Fundamentals of Microfabrication, 2nd ed.", CRC Press, 2002. (2) S. Franssila, "Introduction to Microfabrication", John Wiley & Sons, 2004. (3) M. Gad-El-Hak, "The MEMS Handbook, 2nd ed.", CRC Pr I Llc, 2006.

Goals to be achieved

To understand the finite element method (K. Mori and Y. Abe)

To gain an understanding of the principles of micro/nanomachining technologies and to apply knowledge of the technologies to the design and manufacturing of a micro/nanodevice (T. Shibata and M. Nagai)

Evaluation of achievement

Reports of every week : 100% (K. Mori and Y. Abe)
Written report : 100% (T. Shibata and M. Nagai)

Examination

レポートで実施
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
Moeto Nagai: room D-607, extension number: 6701, e-mail: nagai@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 and M. Nagai)

Office hours

Monday (K. Mori and Y. Abe)
Anytime during regular working hours. Contact me by email before coming if possible. (T. Shibata and M. Nagai)

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner
Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniques for problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner.

Key words

K. Mori and Y. Abe: forming processes, solid mechanics, finite element method // T. Shibata and M. Nagai: micro/nanomachining, MEMS/NEMS

(D51030040)Advanced Materials Science[Advanced Materials Science]

Subject name[English]	Advanced Materials Science[Advanced Materials Science]				
Schedule number	D51030040	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Fri.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	三浦 博己, 戸高 義一, 小林 正和 MIURA Hiromi, TODAKA Yoshikazu, KOBAYASHI Masakazu				
Numbering	MEC_DOC74025				

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.

Reference1	**Book title**	Recrystallization and related annealing phenomena			**ISBN**	978-0-08-044164-1
	Author	F.J.Humphreys and M.Hatherly	**Publisher**	Elsevier	**Publish year**	2004
Reference2	**Book title**	Materials Science and Engineering: An Introduction, 8th Edition			**ISBN**	978-0470419977
	Author	William D. Callister, David G. Rethwisch	**Publisher**	John Wiley and Sons	**Publish year**	2009
Reference3	**Book title**	材料の科学と工学 <1> - <4>			**ISBN**	978-4563067120
	Author	W.D. キャリスター (著), William D.,Jr. Callister (原著), 入戸野 修 (翻訳)	**Publisher**	培風館	**Publish year**	2002

Notes for reference

参考書 4
書名「マテリアル工学シリーズ 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
書名「マテリアル工学シリーズ 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.

S: achieve all objectives and total marks of reports and exam. over 90.
A:achieve 7 objectives and total marks of reports and exam. over 80.
B:achieve 6 objectives and total marks of reports and exam. over 70.
C:achieve 5 objectives and total marks of reports and exam. over 60.

Examination

その他
Other

Details of examination

Other information

<Miura> miura@me.tut.ac.jp
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Reference URL

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<Todaka> http://martens.me.tut.ac.jp/

Office hours

<Miura> Please send e-mail in advance for appointment.
<Kobayashi> Please send e-mail in advance for appointment.
<Todaka> Please send e-mail in advance for appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner
Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniques for problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner.
(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment
Have the skills to investigate the nature of change in society, environment and technology, and voluntarily make plans and learn throughout one's life

Key words

Properties, crystal structure, microstructure, thermo process, mechanical process

(D51030080)Advanced Environmental Engineering[Advanced Environmental Engineering]

Subject name[English]	Advanced Environmental Engineering[Advanced Environmental Engineering]				
Schedule number	D51030080	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.1～1	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	柳田 秀記, 飯田 明由, 関下 信正, 横山 博史 YANADA Hideki, IIDA Akiyoshi, SEKISHITA Nobumasa, YOKOYAMA Hiroshi				
Numbering	MEC_DOC76025				

Objectives of class

エネルギーと環境問題に関して，特に熱流体工学の視点から検討できる高度な素養を身につけることを目標として，将来，環境問題に取り組むための理論と最近の技術動向について学ぶ.

The class aims to acquire advanced knowledge necessary for tackling energy and environmental problems in future from the standpoint of thermal and fluid engineering.

Contents of class

後期1
第1回から第7回 自然エネルギー変換科学研究室（飯田・関下）
大気乱流や大気汚染，ビル風，ヒートアイランド，風力発電などについて，受講者が最近の英語論文の内容を紹介し，他の受講者や担当教員との間で討論を行う. この過程を通して，大気汚染や都市の熱流体問題や再生可能エネルギーについての基礎理論と最近の技術動向について学ぶ
8回目：まとめとレポート
後期2
第 8 回～15 回 省エネルギー研究室（柳田・横山）
力学現象を利用する流体の浄化技術，撹拌技術，低騒音化技術等および流体現象の数値解析技術について，受講者が最近の英語論文の内容を紹介し，他の受講者や担当教員との間で討論を行う. この過程を通して，浄化技術や空力音響についての基礎理論と最近の技術動向について学ぶ.
第16回 まとめとレポート

1st to 7th weeks:(Prof.Iida and Prof.Sekishita)
Each student is requested to read English papers that treat atmospheric turbulence, air pollution, building wind and heat island, to introduce the contents of the papers, and to discuss them with the other students and the lecturer. Fundamental theories and recent trend of heat and mass transfer problems and urban air pollution are acquired through this process.

8th week: Report and summary

9th to 15th weeks:(Prof.Yanada and Prof.Yokoyama)
Each student is requested to read a few English papers that treat fluid filtration technologies utilizing mechanical phenomena and numerical simulations of mixing, aeroacoustic and fluid phenomena, to introduce the contents of the papers, and to discuss them with the other students and the lecturer. Fundamental theories and recent trend of fluid filtration technologies and aeroacoustic are acquired through this process.

16th week: Report and summary

Self Preparation and Review

検索した論文の紹介に必要な理論などを各自でよく調べて授業に臨むこと.
Study the fundamental theories necessary for understanding the technical papers and carefully prepare for the introduction of the papers.

Related subjects

流体力学、計測工学、統計力学、数値流体力学
Hydrodynamics, Instrumentation engineering, Statistical mechanics, Computational fluid dynamics

Notes for textbook

英語論文を使用
English technical papers are used.

Notes for reference

Goals to be achieved

再生エネルギーに関する基本事項について理解する.
風力発電の基礎について理解する.
大気拡散, 大気汚染について, 基礎理論と技術動向を理解する.
力学現象を利用する流体の浄化技術について, 基礎理論と技術動向を理解する.
空力騒音, 数値解析について, 基礎理論と技術動向を理解する.
To understand the fundamentals of renewable energy and theory of wind turbine.
To understand fundamental theories and technical trends of Atmospheric Diffusion and Air Pollution.
To understand methods and theories of fluid filtration utilizing mechanical phenomena.
To understand methods and theories of aeroacoustics and numarical simulation.

Evaluation of achievement

評価法:課題レポートにより評価する(各レポートを 100 点満点で評価し, 平均点を評価点とする)
Report 100%

Examination

レポートで実施
By Report

Details of examination

Other information

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Reference URL

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Prof.Iida: http://aero.me.tut.ac.jp

Office hours

e-mail で時間を相談する。
Inquire this of the lecturers by e-mail.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner
Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniques for problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner.

Key words

エネルギー, 環境, 風力発電, 風車, 大気乱流, 大気拡散, 流体浄化, 空力騒音, 数値解析
Energy, Environment, Wind power generation, Windmill, Atmospheric turbulence, Atmosopheric diffusion, Liquid filtration, Aerodynamic noise, Numericl simulation

(D51030090)Advanced Systems and Instrumentation Engineering[Advanced Systems and Instrumentation Engineering]

Subject name[English]	Advanced Systems and Instrumentation Engineering[Advanced Systems and Instrumentation Engineering]				
Schedule number	D51030090	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	章　忠, 内山　直樹, 阪口　龍彦, 真下　智昭 SHO Tadashi, UCHIYAMA Naoki, SAKAGUCHI Tatsuhiko, MASHIMO Tomoaki				
Numbering	MEC_DOC75025				

Objectives of class

1)Learns some important methods in signal processing.
2)Understand some methods in image based recognition.
3)Provides analytical methods for nonlinear systems and their application to real systems.

Contents of class

1th week: Basic theory of the wavelet transforms
2th week: Theory of complex discrete wavelet transform
3th week: Design methods of complex discrete wavelet transform
4th week：Theory of complex wavelet packet transform
5th week：Design methods of complex wavelet packet transform
Lecturer: Sho

6th week: Linear programming problems
7th week: Linear programming algorithms
8th week: Integer programming problems
9th week: Integer programming algorithms
10th week: Combinatorial optimization problems
Lecturer: Sakaguchi(The above subjects may be changed according to students' requests and backgrounds)

11th week: Fundamental properties of nonlinear systems
12th week: Analysis of nonlinear systems I
13th week: Analysis of nonlinear systems II
14th week: Application of nonlinear analysis to real systems I
15th week: Application of nonlinear analysis to real systems II
Lecturer: Uchiyama(The above subjects may be changed according to students' requests and backgrounds)

Self Preparation and Review

Required to prepare for and review each lecture contents based on handouts provided.

Related subjects

1. Advanced signal measurements engineering
2. Advanced image measurements engineering
3. Advanced systems engineering

Notes for textbook

Handouts will be provided.

Rader & Gold:chap.5 in Theory and application of digital signal processing (Printice-Hall)

Reference1	**Book title**	Frontiers in Computing Technologies for Manufacturing Applications	**ISBN**	978-1-84628-954-

						5
	Author	Yoshiaki Shimizu, Zhong Zhang, Rafael Batres	**Publisher**	Springer	**Publish year**	2007
Reference2	**Book title**	Nonlinear Control of Engineering Systems: A Lyapunov-Based Approach			**ISBN**	0-8176-4265-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 signal processing methods and knowledge
2)Understand the theory of wavelet transform.
4)Learn mathematical methods in image processing and pattern recognition.
5)Apply the methods to pattern classification.
6)Expected to understand analysis of nonlinear systems.
7)Be able to apply the analytical methods to real nonlinear systems

Evaluation of achievement

The final grade will be determined by report assignments of three lecturers (Each ratio is 100/3 %).

Basically, students are expected to attend all courses.
The credit of this course is given if the score of the above reports is 60% or over.
Grade levels are C (60% – less than 70%), B (70 – less than 80%) and A (80% – less than 90%) and S (90% or over).

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Sho
E-mail: zhang@me.tut.ac.jp
Uchiyama
E-mail: uchiyama@me.tut.ac.jp
Sakaguchi
E-mail: sakaguchi@me.tut.ac.jp

Reference URL

Office hours

Sho(Accept at any time)
Sakaguchi(Accept at any time)
Uchiyama(Contact by e-mail first.)

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner
Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniques for problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner.

Key words

Signal processing, Pattern recognition, Nonlinear systems, Systems engineering

(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 Information Engineering 2]				
Schedule number	D52010020	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S2系教務委員 2kei kyomu Iin-S				
Numbering	ELC_DOC71015				

Objectives of class

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

Contents of class

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

Self Preparation and Review

Related subjects

Notes for textbook

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

Notes for reference

Goals to be achieved

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

Evaluation of achievement

Coursework, presentation and/or report.
Grades: S: 90-100, A:80-89, B:70-79, C:60-69

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
(E) Inquisitive mind and continuous learning skill for changes in the state-of-the-art technology and in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

Key words

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

Subject name[English]	Seminar on Electrical and Electronic Information Engineering 3[Seminar on Electrical and Electronic Information Engineering 3]				
Schedule number	D52010030	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S2系教務委員 2kei kyomu Iin-S				
Numbering	ELC_DOC71015				

Objectives of class

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

Contents of class

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

Self Preparation and Review

Related subjects

Notes for textbook

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

Notes for reference

Goals to be achieved

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

Evaluation of achievement

Coursework, presentation and/or report.
Grades: S: 90-100, A:80-89, B:70-79, C:60-69

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
(E) Inquisitive mind and continuous learning skill for changes in the state-of-the-art technology and in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

Key words

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

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D52010050	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Mon.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S2系教務委員, 教務委員会副委員長 2kei kyomu Iin-S, kyoumu iinkai fukuiintyou				
Numbering	ELC_DOC71015				

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.
Grades: S: 90-100, A:80-89, B:70-79, C:60-69

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education (C) Practical and creative skills to utilize advanced knowledge in an integrated manner Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner (D) Communication skills for global success Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
Key words

(D52010070)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D52010070	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Required
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.1～1	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中　三郎, 上野　未貴 kyoumu iinkai fukuiintyou, TANAKA Saburo, UENO Miki				
Numbering	ELC_DOC81015				

Objectives of class

Assist graduate students as they undertake research activities and promote an understanding of the inherent ethical problems; lead students to think independently and exercise normative consciousness of research ethics through ethics education in research in accordance with goals of scientific education and research and characteristics of individual research specialties.

Contents of class

* 1st week(October 17,2018): : Introduction, 1st module("Research Misconduct") in e-learning
* 2nd – 6th week(October 24 – November 21): 2nd – 6th modules in e-learning
– 2nd week: "Ethical Issues in the Management of Data in Engineering Research"
– 3rd week: "Responsible Authorship"
– 4th week: "Ethical Issues in the Peer Review and Publication of Engineering Research" & "Collaborative Research in Engineering Fields"
– 5th week: "Whistleblowing and the Obligation to Protect the Public"
– 6th week: "Managing Public Research Funds"
* ~7th week (November 22 – November 27): Discussion with supervisor
* 8th week(November 28 2018) : make a final report

Self Preparation and Review

Students will need to refer to their textbook to prepare for and review each lesson.

Related subjects

Philosophy of Science and Technology, Ethics for Engineers

Notes for textbook

Notes for reference

For the Sound Development of Science ?The Attitude of a Conscientious 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 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.
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination By report
Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education (A) Personality and outlook with a broad perspective Have an international mindset to see human society from various angles with a global perspective; the ability to consider the symbiosis between humans and nature as well as public welfare (B) Sound ethics and social awareness as advanced-level engineers and researchers Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; have the ability to set, solve and evaluate technical issues in society
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 Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	松田　厚範, 服部　敏明, 石山　武, 加藤　亮 MATSUDA Atsunori, HATTORI Toshiaki, ISHIYAMA Takeshi, KATOH Ryo				
Numbering	ELC_DOC72025				

Objectives of class

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

Contents of class

"Advanced Electronic Materials 2" is composed of advanced topics of functional materials, photonics, and electrodics, 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.

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 Kreuer	**Publisher**	Springer	**Publish year**	2013
Reference2	**Book title**	Solid State Ionics for Batteries			**ISBN**	978-4-431-24974-0
	Author	Tsutomu Minami et al	**Publisher**	Springer	**Publish year**	2005

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

レポートで実施

By Report

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

Electrodics; Toshiaki Hattori and Ryo Kato

Photonics; Takeshi Ishiyama

Reference URL

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

Office hours

one hour after every classes

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner

Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

Key words

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

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

Subject name[English]	Advanced Electrical Systems 1[Advanced Electrical Systems 1]				
Schedule number	D52030030	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	滝川 浩史, 櫻井 庸司, 穂積 直裕 TAKIKAWA Hirofumi, SAKURAI Yoji, HOZUMI Naohiro				
Numbering	ELC_DOC73025				

Objectives of class

This series of lectures is implemented as an introduction to electrical energy systems and intended for students and other engineering disciplines. It is being useful as reference and self-study guide for the professional dealing with this important area. There are following three sub courses to choose from.

Contents of class

Sub Course 1
1. Generation and control of various plasmas
2. Characteristics and diagnostics of plasma
3. Applications of functional plasma and trends

Sub Course 2
1. Li-ion and Post Li-ion Batteries
2. Materials for Advanced Batteries
3. Modern Aspects of Electrochemical Energy Conversion Devices

Sub Course 3
1. Ultrasonic techniques for medical use
2. Diagnosing techniques for industrial use
3. Assessment for high voltage insulation system

Self Preparation and Review

Related subjects

Notes for textbook

Materials will be prepared by the lecturers.

(Reference)
(1) E. Kuffel, W. Zaengel and J. Kuffel: High Voltage Engineering (Newnes), (2) D. Linden: Handbook of Batteries (McGraw-Hill), (3) J. Larminie and A. Dicks: Fuel Cell Systems Explained (Wiley)

Notes for reference

Goals to be achieved

Evaluation of achievement

Marks are based on reports(100%)

Examination

レポートで実施
By Report

Details of examination

By report

Other information

Office, Tel and E-mail:
Y. Sakurai: C-305, 0532-44-6722, sakurai@ee.tut.ac.jp
H. Takikawa: C-311, 0532-44-6727, takikawa@ee.tut.ac.jp
N. Hozumi: C-309, 0532-44-6958, hozumi@ee.tut.ac.jp

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

Key words

(D52030060)Advanced Microelectronics 2[Advanced Microelectronics 2]

Subject name[English]	Advanced Microelectronics 2[Advanced Microelectronics 2]				
Schedule number	D52030060	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	若原 昭浩, 岡田 浩, 河野 剛士 WAKAHARA Akihiro, OKADA Hiroshi, KAWANO Takeshi				
Numbering	ELC_DOC74025				

Objectives of class

先端的な半導体デバイスのための理論、デバイス構造、設計や作製プロセスを理解することを目標とする。
To understand semiconductor physics, structure, design, and processing of advanced semiconductor devices.

Contents of class

この科目は前半と後半の2つの部分から構成される。前半では pn 接合や MOS 構造における多数および少数キャリアの振る舞いについて扱う。注入された少数キャリアのダイナミクスについても触れる。後半では学生が以下から1つのトピックスを選択する。

1. ナノ構造デバイスの作製および評価技術（岡田）
2. バンドエンジニアリングと量子効果デバイス（若原）
3. 先端 MEMS/NEMS 技術（河野）

講義に加えて学生が主体的に取り組むケーススタディも実施する。学生は与えられた課題についての調査研究や、要求を満足するデバイスを設計するなどの課題に取り組み、プレゼンテーションを行う。
This subject consists of two parts. The first half begins by introducing majority- and minority-carrier behavior in fundamental pn-junction and MOS structures. Injected minority carrier dynamics in semiconductors is also included. On the latter half, student choose one from following three topics.

1. Fabrication and characterization technology for Nanosturecture devices (Prof. Okada)
2. Band engineering and quantum effect devices (Prof. Wakahara)
3. MEMS/NEMS technology(Prof. Kawano)

Adding to lectures by professors, in this subject, a case study is also conducted. Namely, students are required to give a presentation on researches on the given topics, and on design of devices that satisfies required specifications.

Self Preparation and Review

Related subjects

solid-state physics, basic of semiconductor physics, quantum mechanics, thermodynamics, and electronics

Master's course: Semiconductor physics 1 & 2

solid-state physics, basic of semiconductor physics, quantum mechanics, thermodynamics, and electronics

Master's course: Semiconductor physics 1 & 2

Notes for textbook

S.M.Sze, Physics of Semiconductor Devices (Wiley)

関連する参考文献やデータ、資料などは講義で配布する。
S.M.Sze, Physics of Semiconductor Devices (Wiley)

Related references, data, printed matters will be given in the class.

Notes for reference

Goals to be achieved

1. 半導体における基本的な物理現象を深く理解し、基本的な半導体デバイスの動作原理を修士課程学生に説明できること
2. 与えられた要求仕様を満足する半導体デバイスの基本部分を設計することができること
3. 与えられたトピックスを調査し、講義できること

You will be able to:

1. Deeply understand fundamental phenomena in semiconductors, and explain operation principle of basic semiconductor devices to master course students.
2. Design a essential part of semiconductor devcie that satisfies the given specification.
3. Investigate on given topics, and give a lecture on this.

Evaluation of achievement

ケーススタディ発表(50%)および研究調査レポート(50%)で評価する。
S:ケーススタディの解説・レポートの合計点(100 点満点)が 90 点以上
A:ケーススタディの解説・レポートの合計点(100 点満点)が 80 点以上
B:ケーススタディの解説・レポートの合計点(100 点満点)が 70 点以上
C:ケーススタディの解説・レポートの合計点(100 点満点)が 60 点以上
Achievement of presentation of the case study(50%), and writing research reports(50%).
S:Total score is over 90/100
A:Total score is over 80/100
B:Total score is over 70/100
C:Total score is over 60/100

Examination

その他
Other

Details of examination

評価方法については講義の中で指示する。
Qualification will be directed in the class.

Other information

履修要件などを指導教員と相談の上,予め下記の教員にコンタクトすること。

若原昭浩:C-608 wakahara[at]ee.tut.ac.jp
岡田浩:B-304 okada[at]las.tut.ac.jp
河野剛士:C-603 kawano[at]ee.tut.ac.jp
Before choosing this class, get advice of your supervisor(s), and then contact to following professors.

Akihiro Wakahara:C-608 wakahara[at]ee.tut.ac.jp
Hiroshi Okada:B-304 okada[at]las.tut.ac.jp
Takeshi Kawano:C-603 kawano[at]ee.tut.ac.jp

Reference URL

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

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

Key words

Solid-state electronics, semiconductor physics, laser diode, low-dimensional quantum devices
Solid-state electronics, semiconductor physics, laser diode, low-dimensional quantum devices

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

Subject name[English]	Advanced Information and Communication Systems 2[Advanced Information and Communication Systems 2]				
Schedule number	D52030080	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	市川 周一, 田村 昌也 ICHIKAWA Shuichi, TAMURA Masaya				
Numbering	ELC_DOC75025				

Objectives of class

This lecture introduces some advanced topics on (1) computer system engineering and (2) analog filters. The 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 architecture,
3. Custom computing circuit, special-purpose computing system.

The topics of item (2) include the following items:
1. Analog filter consisting of passive components
2. Design of microwave filter used in wireless communications
3. Fusion of microwave filter and one's expertise

Self Preparation and Review

Related subjects

The students who register for this lecture must have studied the Advanced Electronic Information System 1 and 2 (Ichikawa, Tamura) in master course program, or its equivalent.
All courses taken at other universities must be approved by the lecturers before registering for this course.

Notes for textbook

Course materials and references are shown by lecturers.

Notes for reference

Goals to be achieved

The students are required to obtain the advanced knowledge on the above-mentioned items for their research activities in doctoral program.

Evaluation of achievement

There will be assignments for the topics shown above; course grades will be the average of these assignments.
Attendance to all lectures is compulsory; the absence without permission will result in a substantial penalty.

Examination

レポートで実施
By Report

Details of examination

Other information

Ichikawa, Room C-404, ichikawa@tut.jp
Tamura, Room C-405, tamura@ee.tut.ac.jp

Reference URL

Ichikawa http://www.ccs.ee.tut.ac.jp/~ichikawa/index-e.html
Tamura http://www.comm.ee.tut.ac.jp/em/index_en.html

Office hours

Please make an appointment via e-mail.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

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 Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S2系教務委員 2kei kyomu Iin-S				
Numbering	ELC_DOC78025				

Objectives of class

The class aims to provide a basic understanding of R&D methodology related to the electrical and electronic information engineering for the research work of his/her doctor thesis.

Contents of class

The class provides some fundamental tips to conduct R&D work effectively. Contents of the class depend on the supervisor. To be announced by individual supervisors.

Self Preparation and Review

Related subjects

Notes for textbook

Reference and material will be available from the supervisor.

Notes for reference

Goals to be achieved

To acquire the ability of identifying and formulating research problem, planning and implementing specific research tasks, troubleshooting and communicating outcomes.

Evaluation of achievement

Coursework and presentation are evaluated generally.
Grades: S: 90-100, A:80-89, B:70-79, C:60-69

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

Key words

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

Subject name[English]	Seminar on Computer Science and Engineering 1[Seminar on Computer Science and Engineering 1]				
Schedule number	D53010010	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S3系教務委員 3kei kyomu Iin-S				
Numbering	CMP_DOC71015				

Objectives of class

各研究室が指定する情報学に関する最先端の技術情報(特に英語による最先端の技術情報)を発見する能力、ならびに、その技術情報を理解、説明、質疑・応答できる能力を養う。

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

教員が指定する最先端の技術情報(特に英語による最先端の技術情報)について理解したところを説明する。

教員は技術情報の内容の発見、理解、説明、質疑・応答する方法について直接指導を行う。

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

Self Preparation and Review

教員が指定する内容に関し、予習・復習を行う。

Consult with your advisor.

Related subjects

指導教員に問い合わせること。

Consult with your advisor.

Notes for textbook

指導教員に問い合わせること。

Consult with your advisor.

Notes for reference

Goals to be achieved

(1)最先端の専門分野の英文が理解でき、わかりやすく説明できる。

(2)技術的な情報を扱う英文が解釈でき、作文できる。

(3)論文の標準的な構成ができる。

(4)発表というスタイルでの情報提供ができる。

(5)情報の不足を質問という形式で指摘できる。

(1) To understand English literature on state-of-the-art areas of expertise, and to explain clearly.

(2) To interpret technical information written in English, and to write such information in English.

(3) To make a standard construction of a technical paper.

(4) To provide information by oral presentation.

(5) To point out the lack of information by questions.

Evaluation of achievement

技術情報の発見に向けた自主性、技術情報の理解度、説明の方法、質問への回答、議論への参加の様子等から総合的に指導教員が判定する。

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

Examination

試験期間中には何も行わない

None during exam period

Details of examination

課題レポートやプレゼンテーションに基づいて評価する。

Your supervisor will evaluate your presentation and your reports.

Other information

Reference URL

Office hours

指導教員に問い合わせること。

Consult with your advisor.

Relations to attainment objectives of learning and education

Key words

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

Subject name[English]	Seminar on Computer Science and Engineering 2[Seminar on Computer Science and Engineering 2]				
Schedule number	D53010020	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Computer Science and Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S3系教務委員 3kei kyomu Iin-S				
Numbering	CMP_DOC71015				

Objectives of class

各研究室が指定する情報学に関する最先端の技術情報(特に英語による最先端の技術情報)を発見する能力、ならびに、その技術情報を理解、説明、質疑・応答できる能力を養う。

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

教員が指定する最先端の技術情報(特に英語による最先端の技術情報)について理解したところを説明する。

教員は技術情報の内容の発見、理解、説明、質疑・応答する方法について直接指導を行う。

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

Self Preparation and Review

教員が指定する内容に関し、予習・復習を行う。

Consult with your advisor.

Related subjects

指導教員に問い合わせること。

Consult with your advisor.

Notes for textbook

指導教員に問い合わせること。

Consult with your advisor.

Notes for reference

Goals to be achieved

(1)最先端の専門分野の英文が理解でき、わかりやすく説明できる。

(2)技術的な情報を扱う英文が解釈でき、作文できる。

(3)論文の標準的な構成ができる。

(4)発表というスタイルでの情報提供ができる。

(5)情報の不足を質問という形式で指摘できる。

(1) To understand English literature on state-of-the-art areas of expertise, and to explain clearly.

(2) To interpret technical information written in English, and to write such information in English.

(3) To make a standard construction of a technical paper.

(4) To provide information by oral presentation.

(5) To point out the lack of information by questions.

Evaluation of achievement

技術情報の発見に向けた自主性、技術情報の理解度、説明の方法、質問への回答、議論への参加の様子等から総合的に指導教員が判定する。

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

Examination

試験期間中には何も行わない

None during exam period

Details of examination

課題レポートやプレゼンテーションに基づいて評価する。

Your supervisor will evaluate your presentation and your reports.

Other information

Reference URL

Office hours

指導教員に問い合わせること。

Consult with your advisor.

Relations to attainment objectives of learning and education

Key words

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

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D53010050	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Mon.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Computer Science and Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S3系教務委員, 教務委員会副委員長 3kei kyomu Iin-S, kyoumu iinkai fukuiintyou				
Numbering	CMP_DOC71015				

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.
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 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.

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.
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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
教員が指定する内容に関し、予習・復習を行う。
Consult with your advisor.

Related subjects
指導教員に問い合わせること。
Consult with your advisor.

Notes for textbook
指導教員に問い合わせること。
Consult with your advisor.

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.
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.
Your supervisor will check your report, and submit your academic score to the member of Academic Affairs Committee at the end of semester.

Examination
試験期間中には何も行わない
None during exam period

Details of examination
課題レポートやプレゼンテーションに基づいて評価する。
Your supervisor will evaluate your presentation and your reports.

Other information

Reference URL

Office hours
指導教員に問い合わせること。
Your supervisor will evaluate your presentation and your reports.

Relations to attainment objectives of learning and education

(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members.
Have sophisticated ability as a leader to contribute for the achievement the goal of team.

Key words

(D53010070)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D53010070	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.1～1	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中　三郎, 上野　未貴 kyoumu iinkai fukuiintyou, TANAKA Saburo, UENO Miki				
Numbering	CMP_DOC81015				

Objectives of class

Assist graduate students as they undertake research activities and promote an understanding of the inherent ethical problems; lead students to think independently and exercise normative consciousness of research ethics through ethics education in research in accordance with goals of scientific education and research and characteristics of individual research specialties.

Contents of class

* 1st week(October 17,2018): : Introduction, 1st module("Research Misconduct") in e-learning
* 2nd – 6th week(October 24 – November 21): 2nd – 6th modules in e-learning
– 2nd week: "Ethical Issues in the Management of Data in Engineering Research"
– 3rd week: "Responsible Authorship"
– 4th week: "Ethical Issues in the Peer Review and Publication of Engineering Research" & "Collaborative Research in Engineering Fields"
– 5th week: "Whistleblowing and the Obligation to Protect the Public"
– 6th week: "Managing Public Research Funds"
* ~7th week(November 22 – November 27): Discussion with supervisor
* 8th week(November 28 2018) : make a final report

Self Preparation and Review

Students will need to refer to their textbook to prepare for and review each lesson.

Related subjects

Philosophy of Science and Technology, Ethics for Engineers

Notes for textbook

Notes for reference

For the Sound Development of Science ?The Attitude of a Conscientious 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 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.
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination

By report

Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education (B) Sound ethics and social awareness as leading-level engineers and researchers Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; and have the ability to set, solve and evaluate technical issues in society
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 name[English]	Brain and Neural System Engineering[Brain and Neural System Engineering]				
Schedule number	D53030060	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.5～5	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	中内 茂樹, 北﨑 充晃 NAKAUCHI Shigeki, KITAZAKI Michiteru				
Numbering	CMP_DOC73025				

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
2. Questions and research methodology
3-4. Sensation and psychophysics
5-6. Basics in perception
7-8. Depth perception
9-10. Motion perception
11. Mid-level vision (surface and objects)
12. High-level vision (Attention and consciousness)
13-14. Virtual reality
15. Discussion

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 Neuroscience; Fourth International Student edition			**ISBN**	978-0393922288
	Author	Michael S. Gazzaniga	**Publisher**	W. W. Norton & Company	**Publish year**	2008
Reference2	**Book title**	イラストレクチャー認知神経科学			**ISBN**	978-4274208225
	Author	村上郁也 編著	**Publisher**	オーム社	**Publish year**	2010

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 (50%) and the final report (50%)
S: 90 points or higher (out of 100)
A: 80 points or higher (out of 100)
B: 70 points or higher (out of 100)
C: 60 points or higher (out of 100)

Examination

レポートで実施
By Report

Details of examination

Other information

Reference URL

Office hours

Contact by e-mail

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

Key words

cognitive neurosciences, perception

(D53030130)Robotics Intelligence 1[Robotics Intelligence 1]

Subject name[English]	Robotics Intelligence 1[Robotics Intelligence 1]				
Schedule number	D53030130	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Tue.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	三浦 純 MIURA Jun				
Numbering	CMP_DOC73225				

Objectives of class

Fundamental and advanced issues in intelligent robotics will be discussed. Topics included are probabilistic sensor fusion techniques (e.g., Kalman filter and particle filter) and its application to mobile robot localization and mapping.

Contents of class

Week 1: Introduction to scene recognition and sensor fusion.
Week 2: Probability basic and Bayes filter.
Week 3: Kalman filter and its extensions.
Week 4: Nonparametric filters.
Week 5: Mobile robot localization.
Week 6: Mobile robot mapping.
Week 7: SLAM (Simultaneous Localization and Mapping).
Week 8: Presentations of students' reports and conclusions.

Self Preparation and Review

Related subjects

Fundamental knowledge of linear algebra and probability theory is useful.

Notes for textbook

Handouts will be prepared. The main reference is shown below.

Reference1	**Book title**	Probabilistic Robotics			**ISBN**	978-0262201629
	Author	S. Thrun, W. Burgard, D. Fox	**Publisher**	The MIT Press	**Publish year**	2005

Notes for reference

Goals to be achieved

Understanding of the fundamentals of sensor fusion strategies and algorithms.

Evaluation of achievement

The grade will be determined by the presentation and the report.

Examination

レポートで実施
By Report

Details of examination

Other information

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

Reference URL

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

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

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner

Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

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 area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Mon.5～5	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	栗山 繁 KURIYAMA Shigeru				
Numbering	CMP_DOC72425				

Objectives of class

本講義では、大規模または多次元のデータを効率的かつ効果的に表示する可視化の設計手法を講述し、対象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プログラム化する制作実習によって、実践的な応用開発力を習得する。

This class teaches design methodology of developing data exploration tools by efficiently and effectively visualizing huge size or dimension of a dataset. Practical skill of developing visualization tools is learned by the practice of actual programming.

Contents of class

第1週目：情報可視化の導入と概要説明
第2週目：可視化 API とグラフ描画演習
第3週目：相関の可視化（多変量データ）
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 of information visualization
Week 2. API for drawing diagram
Week 3. Correlation visualization of multivariate data
Week 4. Relation visualization with hierarchical and network representation
Week 5. Visualization of relation (graph and network)
Week 6. Visualization of textual information and time-variation
Week 7+0.5. The exercise of developing a visualization tool

Self Preparation and Review

予習・復習のために、それまでに講義した内容と翌週の講義内容を Web でのe-ラーニングシステム（Moodle）で公開する。
A digital textbook is freely supplied on E-learning system developed on 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 analysis, Advanced Data Mining and Visualization 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用する.
A digital textbook is supplied on an E-learning system of moodle.

Notes for reference

Goals to be achieved

大規模、多次元のデータを効率的かつ効果的に可視化するデザイン手法を理解し、与えられたデータの性質を考慮して最適な可視化のプログラムを制作できる技能を習得する
The goal of this class is to teach design methodology of the visualization system for efficiently and effectively visualize the huge size of multi-dimensional datasets.

Evaluation of achievement

中間レポート 20 点，出席 20 点，および制作課題 60 点の合計 100 点で採点する。
S：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 90 点以上
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 70 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 60 点以上

中間レポート 20 点，出席 20 点，および制作課題 60 点の合計 100 点で採点する。
S: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 90 点以上
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 70 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 60 点以上

Examination

レポートで実施

By Report

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 a reservation by E-mail.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner

Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

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 Informatics 1]				
Schedule number	D53030190	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	村越 一支 MURAKOSHI Kazushi				
Numbering	CMP_DOC73125				

Objectives of class

This course provides opportunities to learn the followings:
* Modeling and analysis on complex systems and learning systems,
* System theoretic analysis on complex systems and learning systems,
* Computer simulations and implications, and
* Implementation of complex systems and learning systems.

Recent topics on complex systems and learning systems will be also discussed in the course.

Contents of class

A. Introduction on complex dynamical systems
B. Dynamical systems
C. Complex networks and interactions
D. neural networks
E. Information Processing by complex systems
F. Learning algorithms
G. Biological systems and information processing

Self Preparation and Review

Review each lecture and prepare for the next class with reference to the textbook.

Related subjects

You must take the credits of "Complex Systems and Intelligent Informatics" in master course in advance.

Notes for textbook

No textbook.

Notes for reference

N/A

Goals to be achieved

Understand and imolement modeling / analysys in complex dynamical systems

Evaluation of achievement

Class performance (50%) and term-end report (50%)

Examination

その他
Other

Details of examination

N/A

Other information

E-mail: mura[at]tut.jp (replace [at] with @)
Room F-507, Ext. 6899

Reference URL

N/A

Office hours

After this class

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

Key words
N/A

(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 Informatics 2]				
Schedule number	D53030200	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Wed.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	石田　好輝 ISHIDA Yoshiteru				
Numbering	CMP_DOC73125				

Objectives of class

This course provides opportunities to learn the followings:
* Modeling and analysis on complex systems and learning systems,
* System theoretic analysis on complex systems and learning systems ,
* Computer simulations and implications, and
* Implementation of complex systems and learning systems.
Recent topics on complex systems and learning systems will be also discussed in the course.

Contents of class

1. Introduction on complex dynamical systems
2. Dynamical systems
3. Complex networks and interactions
4. Cellular automata and neural networks
5. Information Processing by complex systems
6. Emergence of cooperation in autonomous agents
7. Learning algorithms for agents
8. Evolutionary algorithms for agents
9. Biological systems and information processing

Self Preparation and Review

Related subjects

Notes for textbook

No textbook. References other than below will be suggested at the first class.
Ishida, Y.: Immunity-Based Systems, Springer (2004);
Ishida, Y : Self-Repair Networks, Springer (2015);
Barabasi, A.L.: Linked, Perseus, (2002);
Strogatz, S. H. Sync, Hyperion (2003);

Notes for reference

Goals to be achieved

Evaluation of achievement

Class performance (50%) and term-end report (50%)

Examination

その他
Other

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

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

Key words

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

(D53030270)Pattern Information Processing 1[Pattern Information Processing 1]

Subject name[English]	Pattern Information Processing 1[Pattern Information Processing 1]				
Schedule number	D53030270	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Tue.2～2	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	金澤 靖 KANAZAWA Yasushi				
Numbering	CMP_DOC72525				

Objectives of class

This course involves fundamentals and advanced issues on image processing and computer vision.

This course involves fundamentals and advanced issues on image processing and computer vision.

Contents of class

1: Introduction
2: Projective Geometry
3: Epipolar Geometry
4: 3-D Reconstruction from Two Views
5: Affine Projection
6: Uncalibrated Stereo
7: Structure from Motion
8: Experiments
1: Introduction
2: Projective Geometry
3: Epipolar Geometry
4: 3-D Reconstruction from Two Views
5: Affine Projection
6: Uncalibrated Stereo
7: Structure from Motion
8: Experiments

Self Preparation and Review

The handouts are available via web page beforehand.
The handouts are available via web page beforehand.

Related subjects

Geometry, Linear Algebra, Statistics.
Geometry, Linear Algebra, Statistics.

Notes for textbook

Handouts will be prepared.
Handouts will be prepared.

Reference1	**Book title**	Multiple View Geometry			**ISBN**	
	Author	R.I. Hartley and A. Zisserman	**Publisher**	Cambridge University Press	**Publish year**	2000
Reference2	**Book title**	Computer Vision -- A Modern Approach --			**ISBN**	
	Author	D.A. Forsyth and J. Ponce	**Publisher**	Prentice Hall	**Publish year**	2003
Reference3	**Book title**	Guide to 3D Vision Computation			**ISBN**	
	Author	K. Kanatani, Y. Sugaya, and Y. Kanazawa	**Publisher**	Springer	**Publish year**	2016

Notes for reference

Goals to be achieved

Understanding of the fundamentals and advanced issues on image processing and computer vision including:
- camera model,
- epipolar geometry,
- 3-D reconstruction from images,
- optimization

Understanding of the fundamentals and advanced issues on image processing and computer vision including:
- camera model,
- epipolar geometry,
- 3-D reconstruction from images,
- optimization

Evaluation of achievement

Grade will be determined by all submitted reports:
S: score >= 90
A: score >= 80
B: score >= 70
C: score >= 60

Grade will be determined by all submitted reports:
S: score >= 90
A: score >= 80
B: score >= 70
C: score >= 60

Examination

レポートで実施
By Report

Details of examination

Other information

Room F-404, Ext. 6888, Email: kanazawa@cs.tut.ac.jp (Yasushi Kanazawa)

Room F-404, Ext. 6888, Email: kanazawa@cs.tut.ac.jp (Yasushi Kanazawa)

Reference URL

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

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

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

Key words

image processing, computer vision

image processing, computer vision

(D53030280)Pattern Information Processing 2[Pattern Information Processing 2]

Subject name[English]	Pattern Information Processing 2[Pattern Information Processing 2]				
Schedule number	D53030280	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Tue.2～2	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	菅谷 保之 SUGAYA Yasuyuki				
Numbering	CMP_DOC72525				

Objectives of class

このコースではコンピュータビジョンにおける最適化手法について学習します。

This course involves fundamental and advanced optimization methods on computer vision.

Contents of class

1: Mathematical Introduction
2: Limits of Functions
3: Optimization of Functions
4: Least Squares
5: Advance of Least Squares
6: Non-linear Optimization
7: Maximum Likelihood
8: Examination
1: Mathematical Introduction
2: Limits of Functions
3: Optimization of Functions
4: Least Squares
5: Advance of Least Squares
6: Non-linear Optimization
7: Maximum Likelihood
8: Examination

Self Preparation and Review

The handouts are available via web page beforehand.
The handouts are available via web page beforehand.

Related subjects

Geometry, Linear Algebra, Statistics.
Geometry, Linear Algebra, Statistics.

Notes for textbook

Handouts will be prepared.
Handouts will be prepared.

Reference1	**Book title**	Multiple View Geometry			**ISBN**	
	Author	R.I. Hartley and A. Zisserman	**Publisher**	Cambridge University Press	**Publish year**	2000
Reference2	**Book title**	Computer Vision -- A Modern Approach --			**ISBN**	
	Author	D.A. Forsyth and J. Ponce	**Publisher**	Prentice Hall	**Publish year**	2003
Reference3	**Book title**	Guide to 3D Vision Computation			**ISBN**	
	Author	K. Kanatani, Y. Sugaya, and Y. Kanazawa	**Publisher**	Springer	**Publish year**	2016

Notes for reference

Goals to be achieved

Understanding of the fundamentals and advanced issues on image processing and computer vision including:
- camera model,
- epipolar geometry,
- 3-D reconstruction from images,
- optimization

Understanding of the fundamentals and advanced issues on image processing and computer vision including:
- camera model,
- epipolar geometry,
- 3-D reconstruction from images,
- optimization

Evaluation of achievement

Grade will be determined by all submitted reports:
S: score >= 90
A: score >= 80
B: score >= 70
C: score >= 60

Grade will be determined by all submitted reports:
S: score >= 90
A: score >= 80
B: score >= 70
C: score >= 60

Examination

レポートで実施
By Report

Details of examination

Other information

Room C-507, Ext. 6760, Email: sugaya@iim.cs.tut.ac.jp (Yasuyuki Sugaya)

Room C-507, Ext. 6760, Email: sugaya@iim.cs.tut.ac.jp (Yasuyuki Sugaya)

Reference URL

http://www.iim.cs.tut.ac.jp/~sugaya/lecture/e-image/

http://www.iim.cs.tut.ac.jp/~sugaya/lecture/e-image/

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

Key words

コンピュータビジョン、最適化手法
computer vision, optimization

(D53030290)Theoretical Computer Science, Advanced[Theoretical Computer Science, Advanced]

Subject name[English]	Theoretical Computer Science, Advanced[Theoretical Computer Science, Advanced]				
Schedule number	D53030290	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.4～4	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1, D2
Charge teacher name[Roman alphabet mark]	藤戸　敏弘 FUJITO Toshihiro				
Numbering	CMP_DOC72025				

Objectives of class

離散最適化問題に対する数理計画的手法，および効率的アルゴリズムの設計方法を習得する．時間が許せば，計算困難（NP困難）な場合の対処法として，高精度近似アルゴリズムの設計方法を習得する．

To learn mathematical programming approaches for combinatorial optimization problems and how to design efficient algorithms for them. Designing high-performance approximation algorithms for computationally hard (NP-hard) problems will be covered as well, if time permits.

Contents of class

1．離散最適化問題へのイントロ
2．シュタイナー木問題の近似
3．TSP とオイラー閉路
4．TSP と集合被覆
5．線型計画法
6．線型計画の双対性
7．線形計画の（確率的）丸め法

1. Introduction to combinatorial optimization problems
2. Steiner Tree Approximation
3. TSP and Eulerian Cycles
4. TSP and Set Cover
5. Linear Programming
6. Linear Programming Duality
7. (Randomized) Rounding Linear Programs

Self Preparation and Review

ウェルカムページで事前に公開されている講義計画・講義用資料を参照して，予習・復習により講義内容とその理解を確認すること．

It is highly recommended to go through the course materials provided on the course welcome pages for self preparation and reviews.

Related subjects

「アルゴリズムとデータ構造」（「計算理論」や「形式言語論」も履修していることが望ましい）

"Algorithms and Data Structures" (to the lesser extent, "Theory of Computation" and "Formal Languages" are also related).

Notes for textbook

資料を配布する。

All the course materials used will be provided through the course home pages.

Reference1	**Book title**	Approximation Algorithms			**ISBN**	3540653678
	Author	Vijay V. Vazirani	**Publisher**	Springer	**Publish year**	2001
Reference2	**Book title**	Combinatorial Optimization: Exact and Approximate Algorithms			**ISBN**	
	Author	Luca Trevisan	**Publisher**		**Publish year**	

Notes for reference

Goals to be achieved

離散最適化問題の構造解析や効率的解法設計のために，線形計画を中心として数理計画法によるモデル化や双対定理，最大最小定理といった系統的手法を身につける.
To earn the ability of problem modelings, based on mathematical programmings (and LP in particular), and applying systematic approaches for structure analysis and algorithm designing for combinatorial optimization problems.

Evaluation of achievement

達成目標全体の達成を総合的に評価する定期試験(80%)およびレポート(20%)で評価する.
博士前期課程 1 年・博士後期課程 1 年／S:90 点以上，A:80 点以上、B:70 点以上、C:60 点以上
博士前期課程 2 年・博士後期課程 2，3 年／A:80 点以上、B:65 点以上、C:55 点以上
[Evaluation basis]
Students will be evaluated, in terms of goals to be achieved, based on total scores of exams (80%) and home works (20%) as follows:
For 1st year students in Master or Doctorate course,
S: 90 or higher (out of 100 points).
A: 80 or higher (out of 100 points).
B: 70 or higher (out of 100 points).
C: 60 or higher (out of 100 points).
For 2nd (or higher) year students in Master or Doctorate course,
A: 80 or higher (out of 100 points).
B: 65 or higher (out of 100 points).
C: 55 or higher (out of 100 points).

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination

Other information

Reference URL

http://www.algo.cs.tut.ac.jp/~fujito/class/AlgEng/
http://www.algo.cs.tut.ac.jp/~fujito/class/AlgEng/

Office hours

随時（e メールにより事前にアポイントメントをとってください）.
e メールによる質問も歓迎.
Arranged by appointment..

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology
of research, creating original technology, and integrating all knowledges organically

Key words

アルゴリズム　組合せ最適化　線形計画法　計算量　近似アルゴリズム
algorithms, combinatorial optimization, linear programming, computational complexity, approximation algorithms

(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 Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	ENV_DOC75015				

Objectives of class

This course will provide the students with opportunities to study on his/her research subjects on advanced environmental and life sciences by reading scientific papers under the guidance of his/her supervisor. The aim of the lessen for the students is to expand the knowledge and presentation skills acquired in Seminar on Environmental and Life Science 1.

Contents of class

The students will be required to read scientific papers written by other language than Japanese, especially English, which are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.

Self Preparation and Review

Related subjects

Seminar on Environmental & Life Sciences 1
All other relevant subjects in Advanced Environmental and Life Sciences

Notes for textbook

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

Notes for reference

Goals to be achieved

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

Evaluation of achievement

The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations of his/her research in the seminar. His/her supervisor evaluates the scores.
A: 80 or higher (out of 100 points),
B: 65 or higher (out of 100 points),
C: 55 or higher (out of 100 points)

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Supervisor(s)

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

Key words

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

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D54010050	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Mon.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Environmental and Life Sciences			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S4系教務委員, 教務委員会副委員長 4kei kyomu Iin-S, kyoumu iinkai fukuiintyou				
Numbering	ENV_DOC71015				

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 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 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

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(A) Personality and outlook with a broad perspective

Have an international mindset to see human society from various angles with a global perspective; and the ability to consider the symbiosis between humans and nature as well as public welfare

(D) Communication skills for global success

Have the communication skills to effectively express and disseminate one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members as well as leadership ability to contribute to the team's achievements

Key words

(D54010070)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D54010070	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.1～1	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Environmental and Life Sciences			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中　三郎, 上野　未貴 kyoumu iinkai fukuiintyou, TANAKA Saburo, UENO Miki				
Numbering	ENV_DOC81015				

Objectives of class

Assist graduate students as they undertake research activities and promote an understanding of the inherent ethical problems; lead students to think independently and exercise normative consciousness of research ethics through ethics education in research in accordance with goals of scientific education and research and characteristics of individual research specialties.

Contents of class

＊1st week(October 17,2018): Introduction, 1st module(″Research Misconduct″) in e-learning
＊2nd – 6th week(October 24 – November 21): 2nd – 6th modules in e-learning
– 2nd week: ″Ethical Issues in the Management of Data in Engineering Research″
– 3rd week: ″Responsible Authorship″
– 4th week: ″Ethical Issues in the Peer Review and Publication of Engineering Research″ & ″Collaborative Research in Engineering Fields″
– 5th week: ″Whistleblowing and the Obligation to Protect the Public″
– 6th week: ″Managing Public Research Funds″
＊~7th week(November 22 – November 27): Discussion with supervisor
＊8th week (November 28 2018) : make a final report

Self Preparation and Review

Students will need to refer to their textbook to prepare for and review each lesson.

Related subjects

Philosophy of Science and Technology, Ethics for Engineers

Notes for textbook

Notes for reference

For the Sound Development of Science ?The Attitude of a Conscientious 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 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.
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination

By report

Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education (B) Sound ethics and social awareness as advanced-level engineers and researchers Be conscious of specialized and ethical responsibilities as highly advanced-level engineers and researchers; and have the ability to find, set, solve and evaluate technical issues in society
Key words Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism

(D54010080)Seminar on Applied Chemistry and Life Science 1[Seminar on Applied Chemistry and Life Science 1]

Subject name[English]	Seminar on Applied Chemistry and Life Science 1[Seminar on Applied Chemistry and Life Science 1]				
Schedule number	D54010080	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	ENV_DOC75015				

Objectives of class

This course will provide the students with opportunities to study on his/her research subjects on applied chemistry and life science by reading scientific papers under the guidance of his/her supervisor. The aim of the lessen for the students is to learn the latest knowledge and presentation skills required for his/her research in the seminar as well as to deepen his/her understanding of applied chemistry and life science.

Contents of class

The students will be required to read scientific papers written by other language than Japanese, especially English, which are suggested by his/her supervisor, and to report and discuss deeply on his/her research subject in the seminar.

Self Preparation and Review

Related subjects

Seminar on Applied Chemistry and Life Sciences 2
All other relevant subjects in Applied Chemistry and Life Science

Notes for textbook

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

Notes for reference

Goals to be achieved

To acquire advanced knowledge on applied chemistry and life science
To understand the contents of scientific papers in a given field of applied chemistry and life science
To be able to make oral and poster presentations relevant to papers he/she has read.

Evaluation of achievement

The evaluation is based on the scores of reading textbooks and scientific papers, discussions, reports and presentations of his/her research in the seminar. His/her supervisor evaluates the scores.
S: 90 or higher (out of 100 points),
A: 80 or higher (out of 100 points),
B: 70 or higher (out of 100 points),
C: 60 or higher (out of 100 points)

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Supervisor(s)

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

Key words
Applied chemistry, Life science, Materials science and engineering

(D54030050)Advanced Biotechnology 2[Advanced Biotechnology 2]

Subject name[English]	Advanced Biotechnology 2[Advanced Biotechnology 2]				
Schedule number	D54030050	**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.5～5	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Environmental and Life Sciences			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	吉田 絵里, 吉田 祥子, 梅影 創, 沼野 利佳 YOSHIDA Eri, YOSHIDA Sachiko, UMEKAGE So, NUMANO Rika				
Numbering	ENV_DOC73225				

Objectives of class

To acquire knowledge of advanced biotechnology including biology, biochemistry, physiology and engineering.

Contents of class

1. Neural physiology and sensing (Yoshida, S)
1-1 Function and diversity of physiological substances
1-2 Information transmission between neurons
1-3 Brain function and neuronal circuits
1-4 Imaging engineering for neuronal functions

2.Molecular biology (Numano, R)
2-1 History of molecular biology
2-2 Technique of molecular biology
2-3 Topic of molecular biology1 (Genome)
2-4 Topic of molecular biology2 (Circadian Rhythms)

3. RNA engineering (Umekage, S)
3-1 functional RNA (tentative)
3-2 antisense RNA, ribozyme, siRNA (tentative)
3-3 aptamer (tentative)
3-4 CRISPR-Cas system (tentative)

4. Bio-related polymer chemistry and engineering (Yoshida, E)
4-1 Bio-related nanomaterials
4-2 Design of bio-related polymers
4-3 Molecular self-assembly
4-4 Supramolecular chemistry and engineering

Self Preparation and Review

Related subjects

Advanced Polymer Engineering

Notes for textbook

No textbook is needed.

Notes for reference

Goals to be achieved

To understand cutting-edge biotechnology based on cell biology, physiology, RNA engineering, molecular self-assembly, and bio-related nanonaterilas.

Evaluation of achievement

Course Grade:
For each lecture, reports will be due by the designated time.

Evaluating:
Reports 100% (25% for each instructor)
S: Total score of 90 or higher
A: 80 through 89

B: 70 through 79
C: 60 through 69

Examination
授業を実施
Regular Class

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

(C) Practical and creative skills to utilize advanced knowledge in an integrated and constructive manner
Have the ability to create imaginative technology to solve problems and put them into practice through learning, by experience, methodologies for research and development on the basis of the integration of extensive knowledge about applied chemistry, life science and their related fields
(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment
Have the ability to explore the nature of changes in society, environment and technology and to voluntarily make plans and learn throughout one's life

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 Degree			**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	ENV_DOC72225				

Objectives of class

Since Enviromental 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 Enviromental 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

Notes for textbook

Related materials will be provided.

Reference1	**Book title**	Poly(lactic acid): Synthesis, Structures, Properties, Processing, and Applications			**ISBN**	0470293667
	Author	Rafael A. Auras, Loong-Tak Lim, Susan E. M. Selke, Hideto Tsuji	**Publisher**	Wiley	**Publish year**	2010
Reference2	**Book title**	Nanoscience: Nanobiotechnology and Nanobiology			**ISBN**	978-3-540-88633-4
	Author	Patrick Boisseau & Marcel Lahmani	**Publisher**	Springer	**Publish year**	2009

Notes for reference

#2 can be accessed in the university network.
http://link.springer.com/book/10.1007%2F978-3-540-88633-4

(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.

[Evaluation basis] Students who attend all classes will be evaluated as follows:
S: Achieved all goals and obtained total points of presentation or reports, 90 or higher (out of 100 points).
A: Achieved 80 % of goals and obtained total points of presentation or reports, 80 or higher (out of 100 points).
B: Achieved 70 % of goals and obtained total points of presentation or reports, 70 or higher (out of 100 points).
C: Achieved 60 % of goals and obtained total points of presentation or reports, 60 or higher (out of 100 points).

Examination

レポートで実施
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-402), 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

(C) Practical and creative skills to utilize advanced knowledge in an integrated and constructive manner
Have the ability to create imaginative technology to solve problems and put them into practice through learning, by experience, methodologies for research and development on the basis of the integration of extensive knowledge about applied chemistry, life science and their related fields
(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment
Have the ability to explore the nature of changes in society, environment and technology and to voluntarily make plans and learn throughout one's life

Key words

(D54030080)Advanced Chemical Technology[Advanced Chemical Technology]

Subject name[English]	Advanced Chemical Technology[Advanced Chemical Technology]				
Schedule number	D54030080	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.4～4	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Environmental and Life Sciences			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	松本　明彦, 小口　達夫, 水嶋　生智, 髙島　和則 MATSUMOTO Akihiko, OGUCHI Tatsuo, MIZUSHIMA Takanori, TAKASHIMA Kazunori				
Numbering	ENV_DOC72225				

Objectives of class

This course aims to fundamental understanding of state-of-art technologies on the basis of physical and inorganic chemistry.

Contents of class

The following articles will be commentated in the course.

1. Physical chemistry and inorganic chemistry for understanding of state-of-art technologies used in various fields indcluding environmental protection and/or restoration
(1) Physical chemistry and colloid & interface science [A. Matsumoto]
(2) Inorganic chemistry and catalysis chemistry [T. Mizushima]
(3) Reaction mechanism of combustion in internal-combustion engines [T. Oguchi]
(4) Atmospheric pressure reactive plasma [K. Takashima]

2. The features of the techniques used in environmental protection and restoration
(1) Adsorption and separation technology [A. Matsumoto]
(2) Catalysis technology [T. Mizushima]]
(3) Combustion control of fuels [T. Oguchi]
(4) Plasma catalysis technology [K. Takashima]

3. Practical example of the techniques
[All instructors]

Self Preparation and Review

Related subjects

Basic understanding on physical chemistry and inorganic chemitry is essential.

Notes for textbook

Reference handouts will be provided in the class.

Notes for reference

Goals to be achieved

Evaluation of achievement

30 % Homework report and 70 % Final report
S: 90 or higher (out of 100 points)
A: 80 or higher (out of 100 points)
B: 70 or higher (out of 100 points)
C: 60 or higher (out of 100 points)

Examination

レポートで実施
By Report

Details of examination

Other information

Akihiko Matsumoto: room # B-505, E-mail: aki-at-ens.tut.ac.jp (replace "-at-" by "@" when sending e-mail)
Takanori Mizushima: room # B-303, E-mail: mizushima-at-ens.tut.ac.jp (replace "-at-" by "@" when sending e-mail)

Tatsuo Oguchi: room # G-406, E-mail: oguchi-at-tut.jp(replace "-at-" by "@" when sending e-mail)
Kazunori Takashima: room # G-504, E-mail: takashima-at-ens.tut.ac.jp(replace "-at-" with "@" when sending e-mail)

Students who intend to take the class are asked to contact with one of the instructors before registration.

Reference URL

Office hours

At any time but booking is required in advance.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and constructive manner
Have the ability to create imaginative technology to solve problems and put them into practice through learning, by experience, methodologies for research and development on the basis of the integration of extensive knowledge about applied chemistry, life science and their related fields
(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment
Have the ability to explore the nature of changes in society, environment and technology and to voluntarily make plans and learn throughout one's life

Key words

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

Subject name[English]	Seminar on Architecture and Civil Engineering 1[Seminar on Architecture and Civil Engineering 1]				
Schedule number	D55010010	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_DOC71015				

Objectives of class

All the students are required to attend all the seminars, which is arranged by the laboratory supervisor for the special study subjects related to the current research activity of the laboratory. The scheduled program of the seminars is announced by the supervisor at the guidance of the seminar.

Contents of class

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

Report

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner

Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

(D) Communication skills for global success

Have the communication skills to effectively express and transmit one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members.

Have sophisticated ability as a leader to contribute for the achievement the goal of team.

(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment

Have the skills to investigate the essence of changes in society, environment and technology.
Have the skills to voluntarily make plans and learn throughout one's life.

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]				
Schedule number	D55010020	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_DOC71015				

Objectives of class

All the students are required to attend all the seminars, which is arranged by the laboratory supervisor for the special study subjects related to the current research activity of the laboratory. The scheduled program of the seminars is announced by the supervisor at the guidance of the seminar.

Contents of class

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

Report

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner

Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

(D) Communication skills for global success

Have the communication skills to effectively express and transmit one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members.

Ha(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment

Have the skills to investigate the essence of changes in society, environment and technology.

Have the skills to voluntarily make plans and learn throughout one's life.
ve sophisticated ability as a leader to contribute for the achievement the goal of team.

Key words

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

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D55010050	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Mon.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S5系教務委員, 教務委員会副委員長 5kei kyomu Iin-S, kyoumu iinkai fukuiintyou				
Numbering	ARC_DOC71015				

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 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 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

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner

Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

(D) Communication skills for global success

Have the communication skills to effectively express and transmit one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members.

Ha(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment

Have the skills to investigate the essence of changes in society, environment and technology.

Have the skills to voluntarily make plans and learn throughout one's life.

ve sophisticated ability as a leader to contribute for the achievement the goal of team.

Key words

(D55010070)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D55010070	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.1～1	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中　三郎, 上野　未貴 kyoumu iinkai fukuiintyou, TANAKA Saburo, UENO Miki				
Numbering	ARC_DOC81015				

Objectives of class

Assist graduate students as they undertake research activities and promote an understanding of the inherent ethical problems; lead students to think independently and exercise normative consciousness of research ethics through ethics education in research in accordance with goals of scientific education and research and characteristics of individual research specialties.

Contents of class

* 1st week(October 17,2018): Introduction, 1st module("Research Misconduct") in e-learning
* 2nd – 6th week(October 24 – November 21): 2nd – 6th modules in e-learning
– 2nd week: "Ethical Issues in the Management of Data in Engineering Research"
– 3rd week: "Responsible Authorship"
– 4th week: "Ethical Issues in the Peer Review and Publication of Engineering Research" & "Collaborative Research in Engineering Fields"
– 5th week: "Whistleblowing and the Obligation to Protect the Public"
– 6th week: "Managing Public Research Funds"
* ~7th week (November 22 – November 27): Discussion with supervisor
* 8th week(November 28 2018): make a final report

Self Preparation and Review

Students will need to refer to their textbook to prepare for and review each lesson.

Related subjects

Philosophy of Science and Technology, Ethics for Engineers

Notes for textbook

Notes for reference

For the Sound Development of Science ?The Attitude of a Conscientious Scientist
Japan Society for the Promotion of Science Editing Committee , MARUZEN PUBLISHING
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(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.
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination

By report

Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education (B) Sound ethics and social awareness as advanced-level engineers and researchers Be conscious of specialized and ethical responsibilities as leading -level engineers and researchers; and have the ability to discover, set, solve and evaluate technical issues in society
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 name[English]	Advanced Mechanics and Design of Spatial Structure Systems[Advanced Mechanics and Design of Spatial Structure Systems]				
Schedule number	D55030010	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	中澤 祥二, 松本 幸大 NAKAZAWA Shoji, MATSUMOTO Yukihiro				
Numbering	ARC_DOC72125				

Objectives of class

This lecture is concerned with the advanced theoretical and applied structural mechanics of spatial structures. The primary purpose is to encourage students to gain the advanced concept and to raise their engineering abilities for innovative applications in the future.

Contents of class

1. Introduction
2. Analogical understanding of structural instability behavior
3. Effects of imperfections on the structural instability
4. Structural instability modes and large deflection modes
5. Physical experiment and its difficulty on structural instability problems
6. Mathematical analysis and its difficulty on structural instability problems
7. Relationship between experiments and numerical simulations
8. Design procedures for the instability of spatial structures

Self Preparation and Review

Related subjects

Notes for textbook

Reference1	**Book title**	The Theory of Plates and Shells			**ISBN**	0070858209
	Author	S. Timoshenko	**Publisher**	McGraw-Hill Publishing Company	**Publish year**	1964
Reference2	**Book title**	Theory of Elastic Stability			**ISBN**	0486472078
	Author	S. Timoshenko	**Publisher**	Dover Publications	**Publish year**	1961
Reference3	**Book title**	DYNAMIC ANALYSIS OF EARTHQUAKE RESISTANT STRUCTURES			**ISBN**	4861631149
	Author	Akenori Shibata	**Publisher**	東北大学出版会	**Publish year**	2010

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

Other

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

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner
Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

Key words

(D55030020)Advanced Structural Design[Advanced Structural Design]

Subject name[English]	Advanced Structural Design[Advanced Structural Design]				
Schedule number	D55030020	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.4～4	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	齊藤 大樹, 松井 智哉 SAITOH Taiki, MATSUI Tomoya				
Numbering	ARC_DOC72125				

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

レポートで実施
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

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner
Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

Key words

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

Subject name[English]	Advanced Theory in Architectural Design[Advanced Theory in Architectural Design]				
Schedule number	D55030040	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.5～5	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	松島 史朗, 水谷 晃啓 MATSUSHIMA Shiro, MIZUTANI Akihiro				
Numbering	ARC_DOC73225				

Objectives of class

This is essentially a class for research method that students involved are expected to play intiative roles. Because students come with different back ground and have different interests, the research topics may be diverse and, hence, In this class, students should take own topics and write reports on thr progress status. And they may be required to give presenrations on their research using a simple and comprehensive format to other faculty members.

Contents of class

1 Guidance
2-3 Discussion about the big questions that well descericbe what the students want to do.
4-5 To find and clarify supporting ideas that may be necessary to focus on the big question.
6-7 To develop and propose research method write interim report.
8 Mid term review: students are to give presentations in casual mode
9-13 To develop the structure of dissertation in order to write the final paper. Particulary research methods are to be evaluated if they are feasible to the reserch.

14 Review session
15 Final presentation and Summary

*schedule is subject to change due to student background and research contents.
Lectures may be given by guest speakers and instructor.

Self Preparation and Review

Students are required to write progress reports during the course of the classes in order to think and develop her/his own ideas step by step..

Related subjects

Notes for textbook

Reading materials are to be uploaded on Dreamcampus, so every student who registers the class can have an access and retrieve.

Notes for reference

Supplemental materials are to be uploaded when instructor thinks it is necessary.

Goals to be achieved

1)to clarify the causarity, that is very basic nethodology to pursue the facts.
2)to acquire and understand the fundamental knowledge about the research topics, and
3)to enhance the skills and knowledge that are necessary to evaluate the findings.

Evaluation of achievement

Evaluation of performance : some reports
origiality, feasibility, and contribution to other research are to be counted.

Examination

レポートで実施
By Report

Details of examination

Since this class adopted a sort of active learning method, students paticipation is indispensable, and their contribution to the class is to be counted as a part f grading systems.

Other information

Reference URL

Office hours

12:30–14:30 on Tuesdays

Relations to attainment objectives of learning and education

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Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

Key words

Architectural Planning、space composition、Human life, Culture, Behavior and Activities, function
Architectural Planning、space composition、Human life, Culture, Behavior and Activities, function

(D55030060)Sustainable Urban Planning[Sustainable Urban Planning]

Subject name[English]	Sustainable Urban Planning[Sustainable Urban Planning]				
Schedule number	D55030060	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Fri.5～5	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	浅野　純一郎, 小野　悠 ASANO Junichiro, ONO Haruka				
Numbering	ARC_DOC73025				

Objectives of class

1) To gain the practical knowledge of Sustainable urban planning.
2) To learn the advanced methods of urban planning which is based on “Sustainable development” conception.
3) To learn the theory and the movement of recent urban planning from EU, US, Japan.

Contents of class

The major topics that will be addressed in this class are the followings,
1. Overview of the theory about urban planing based on “Sustainability” conception.
2. Overview of policies and methods about “Sustainable urban planning”.
3. Practice by application of “Sustainable urban planning” methods in the fields of land use, community, transportation, and so on.
4. Practice by application of the design methods about “Sustainable urban planning” in the fields of creative housing, living environment, and so on.

Anyway, regarding on the mentioned general contents above, the concrete topic in each semester would be pointed out on the first guidance by the lecturers with related papers or books which the students should read.

Self 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 planning system in your 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

1) To be able to understand the practical knowledge of Sustainable urban planning.
2) To be able to understand the advanced methods of urban planning which is based on “Sustainable development” conception.
3) To be able to understand the theory and the movement of recent urban planning from EU, US, Japan.

Evaluation of achievement

Evaluation is based primarily on reports given by each instructor(100 points).
Each report is evaluated by each instructor.
The average of report scores is used as subject evaluation.
Grade, S:90 or higher, A: 80 or higher to lower than 90, B: 70 or higher to lower than 80, C: 60 or higher to lower than 70.

Examination

その他
Other

Details of examination

Other information

Junichiro ASANO:(D-708),e-mail:asano@ace.tut.ac.jp
Haruka Ono:(D-704) ono.haruka@ace.tut.ac.jp

Reference URL

http://urbandesign.web.fc2.com/MOTHER-hp/TEA-hp/top/e-main.html

Office hours

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner
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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 area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Fri.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	三浦 均也, 松田 達也 MIURA Kinya, MATSUDA Tatsuya				
Numbering	ARC_DOC72725				

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

レポートで実施

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

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner

Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

Key words
Disaster, Earthquake, Geologic Hazards, Numerical Analysis

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

Subject name[English]	Advanced Water Environmental Engineering[Advanced Water Environmental Engineering]				
Schedule number	D55030080	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.1～1	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	井上 隆信, 加藤 茂, 横田 久里子 INOUE Takanobu, KATO Shigeru, YOKOTA Kuriko				
Numbering	ARC_DOC74325				

Objectives of class

Acquiring wide knowledge and information concerning on water environment for thesis work
T. Inoue: Studying chemical aspect of river and lake environment
S. Kato : Studying physical aspect of coastal, ocean & estuarine environment and disaster
K. Yokota: Studying importance of field investigation on water environment in river

Contents of class

T. Inoue (1-5) :
01 : Introduction
02 : Valuation method of river and lake water quality
03 : Restoration of river and lake environment (1)
04 : Restoration of river and lake environment (2)
05 : Presentation by students
S. Kato (6-10) :
06 : Introduction
07 : Present situation about coastal, ocean & estuarine environment and disaster
08 : Cause and countermeasure for problems in coastal zone, ocean and estuary
09 : Water flow and material transport in coastal zone, ocean and estuary
10 : Presentation by students
K. Yokota (11-15) :
11 : Introduction
12 : Experimental method for material dynamics investigation
13 : Field measurement method for material dynamics investigation
14 : Analysis of material dynamics in water
15 : Presentation by students

(Attention)
- Contact one of instructors in advance.
- There are cases where the order of instructors is changed.

Self Preparation and Review

Students are required to review the contents of each lecture, and to refer some textbooks and/or materials 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) Understanding river and lake environmental problems and chemical approach to the solution
(2) Understanding the situation on coastal, ocean and estuarine environment and disaster, and countermeasures for related problems

(3) Understanding methods of measurement and analysis for material dynamics analysis in water

Evaluation of achievement

Evaluation is based primarily on reports given by each instructor (100 points).
Each report is evaluated by each instructor.
The average of report scores is used as subject evaluation.
Grade, S: 90 or higher, A: 80 or higher to lower than 90, B: 70 or higher to lower than 80, C: 60 or higher to lower than 70.

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 (You should contact to Kato about your visit time by e-mail in advance.)
K. Yokota: Monday, 13:00-14:00

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner
Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

Key words

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