

Syllabus

**International Doctoral Degree
Program
(2020-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					
<p>Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.</p> <p>Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.</p>					
Contents of class					
<p>Content of this class will be set in each laboratory.</p> <p>Content of this class will be set in each laboratory.</p>					
Self Preparation and Review					
<p>Preparation for next class and a review after each class are carried out.</p> <p>Preparation for next class and a review after each class are carried out.</p>					
Related subjects					
<p>Inquire this of your supervisor.</p> <p>Inquire this of your supervisor.</p>					
Notes for textbook					
<p>Inquire this of your supervisor.</p> <p>Inquire this of your supervisor.</p>					
Notes for reference					
<p>N/A</p> <p>N/A</p>					
Goals to be achieved					
<p>(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.</p> <p>(2) Contents of literature are understood and presented accurately and briefly.</p> <p>(3) Problem-setting is found by developing content of literature.</p> <p>(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.</p> <p>(2) Contents of literature are understood and presented accurately and briefly.</p> <p>(3) Problem-setting is found by developing content of literature.</p>					
Evaluation of achievement					
<p>The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>					
Examination					
<p>試験期間中には何も行わない</p> <p>None during exam period</p>					
Details of examination					
<p>None during exam period</p> <p>None during exam period</p>					
Other information					
<p>Inquire this of your supervisor.</p> <p>Inquire this of your supervisor.</p>					
Reference URL					
<p>N/A</p> <p>N/A</p>					

Office hours

Contact your supervisor.

Contact your supervisor.

Relations to attainment objectives of learning and education**機械工学専攻**

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(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.

Graduate Program of Mechanical Engineering for Doctoral Degree

(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

Mechanical engineering, Mechanical system design, Materials and manufacturing, System control and robotics, Environment and energy

Mechanical engineering, Mechanical system design, Materials and manufacturing, System control and robotics, Environment and energy

(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			Begging grade	D2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_DOC71015				
Objectives of class					
<p>Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.</p> <p>Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.</p>					
Contents of class					
<p>Content of this class will be set in each laboratory.</p> <p>Content of this class will be set in each laboratory.</p>					
Self Preparation and Review					
<p>Preparation for next class and a review after each class are carried out.</p> <p>Preparation for next class and a review after each class are carried out.</p>					
Related subjects					
<p>Inquire this of your supervisor.</p> <p>Inquire this of your supervisor.</p>					
Notes for textbook					
<p>Inquire this of your supervisor.</p> <p>Inquire this of your supervisor.</p>					
Notes for reference					
<p>N/A</p> <p>N/A</p>					
Goals to be achieved					
<p>(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.</p> <p>(2) Contents of literature are understood and presented accurately and briefly.</p> <p>(3) Problem-setting is found by developing content of literature.</p> <p>(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.</p> <p>(2) Contents of literature are understood and presented accurately and briefly.</p> <p>(3) Problem-setting is found by developing content of literature.</p>					
Evaluation of achievement					
<p>The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>					
Examination					
<p>試験期間中には何も行わない</p> <p>None during exam period</p>					
Details of examination					
<p>None during exam period</p> <p>None during exam period</p>					
Other information					
<p>Inquire this of your supervisor.</p> <p>Inquire this of your supervisor.</p>					
Reference URL					

N/A

N/A

Office hours

Contact your supervisor.

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Relations to attainment objectives of learning and education

機械工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(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.

Graduate Program of Mechanical Engineering for Doctoral Degree

(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

Mechanical engineering, Mechanical system design, Materials and manufacturing, System control and robotics, Environment and energy

Mechanical engineering, Mechanical system design, Materials and manufacturing, System control and robotics, Environment and energy

(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, kyouumu iinkai fukuiintyou				
Numbering	COM_DOC71015				
Objectives of class					
<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>					
Contents of class					
<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>4) Schedule of your presentation Please check the schedule given before the semester begins.</p> <p>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.</p> <p>(*) If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.</p> <p>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.</p> <p>1) Presentations In this class, each student will make a presentation to other students of different research fields.</p>					

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.

(*) If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.

Self Preparation and Review

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

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

Related subjects

N/A

N/A

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

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.

Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).

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

Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).

Examination

レポートで実施

By Report

Details of examination

N/A

N/A

Other information

Contact the educational affairs division for inquiry.

Contact the educational affairs division for inquiry.

Reference URL

N/A

N/A

Office hours

Before/after the class

Before/after the class

Relations to attainment objectives of learning and education

機械工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(D) グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力

社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身につけている。

(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

Graduate Program of Mechanical Engineering for Doctoral Degree

(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

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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

Interdisciplinary Research

Interdisciplinary Research

(D51020010)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D51020010	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 kyoumu iinkai fukuiintyou, TANAKA Saburo				
Numbering	COM_DOC51005				
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					
<ul style="list-style-type: none"> * 1st week(2020.10.7):Guidance Introduction face to face, 1st module(“Research Misconduct”) in e-learning * 2nd – 5th week(October 14 – November 4): 2nd – 6th modules in e-learning - 2nd moudle: “Ethical Issues in the Management of Data in Engineering Research” - 3rd moudle: “Responsible Authorship” - 4th moudle: “Ethical Issues in the Peer Review and Publication of Engineering Research” - 5th moudle: “Collaborative Research in Engineering Fields” - 6th moudle: “Whistleblowing and the Obligation to Protect the Public” - 7th moudle: “Managing Public Research Funds” <p>Submit the e-learning Certificate to the Education Division.</p> <ul style="list-style-type: none"> * 6th week(November 11 – November 17): Discussion with supervisor * 7th week(November 18 2020) : 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					
N/A					
Notes for reference					
<p>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)</p>					
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 report(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 reports, 90 or higher (out of 100 points). A: Obtained total points of reports, 80 or higher (out of 100 points). B: Obtained total points of reports, 70 or higher (out of 100 points). C: Obtained total points of reports, 60 or higher (out of 100 points).					
Examination					
レポートで実施 By Report					

<p>Details of examination By report</p>
<p>Other information N/A</p>
<p>Reference URL N/A</p>
<p>Office hours Before/after the class</p>
<p>Relations to attainment objectives of learning and education (B) 技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。 (A) 幅広い人間性と考え方 人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について考える能力を身につけている。 (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; and have the ability to set, solve and evaluate technical issues in society (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</p>
<p>Key words Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism</p>

(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]	柴田 隆行, 安部 洋平, 永井 萌土 SHIBATA Takayuki, ABE Yohei, NAGAI Moeto				
Numbering	MEC_DOC73025				
Objectives of class					
(Y. Abe) With the recent development of computers, numerical methods tend to be used in the field of manufacturing processes. Simulation such finite element simulation is commonly used for process design of metal forming. the objectives of this lecture is understanding of flow stress, failure, fracture, friction and lubrication in metal forming to use finite element simulation of metal forming process.					
(T. Shibata and M. Nagai) 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)".					
Contents of class					
(Y. Abe)					
(on-demand) 1st week:					
1) Simulation in metal forming. Slab method and finite element method.					
2) Stress-strain curves: flow stress. Uni-axial tension test. Flow curve.					
(on-demand) 2nd week: Stress-strain curves.					
1) Effect of temperature, strain rate and hydro static stress. Hot, worm and cold working.					
2) Uni-axial compression test.					
(on-demand) 3rd week: Stress-strain curves.					
1) Plane strain compression test.					
2) Temperatur rise during deformation.					
(on-demand) 4th week:					
1) Plastic anisotropy. r-value, Lankford value. Plastic anisotropy and deep drawing. Plastic anisotropy and yield criteria					
2) Failure and fracture of materials. Ductile fracture, Brittle fracture, buckling.					
3) Ductile fracture criteria. Cockcroft-Latham ductile fracture criteria. Nakajima test.					
(on-demand) 5th week:					
1) Formability of sheet metals. Forming Limit Diagram (FLD). Scribed circle method.					
2) Buckling of colum.					
3) Surface structure and properties.					
(on-demand) 6th week:					
1) Surface structure and properties.					
2) Determination of friction coefficient.					
(on-demand) 7th week:					
1) Lubrication.					
2) Reynolds equation in metal forming.					
(T. Shibata and M. Nagai)					
8th week: Introduction of MEMS/NEMS					
9th week: Photolithography					
10th week: Wet etching and dry etching					
11th week: Physical vapor deposition (PVD) and chemical vapor deposition (CVD)					
12th week: Plating, electroforming, and bonding process					
13th week: Surface micromachining and bulk micromachining					
14th week: Microactuators and scaling law					
15th week: State-of-the-art in micro/nanomarching technologies					
Self Preparation and Review					

Students are required to prepare and review each lesson.
Related subjects (Y. Abe) fundamentals of solid mechanics (T. Shibata and M. Nagai) Micromachining Engineering
Notes for textbook
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 (Y. Abe) To understand flow stress, failure, fracture, friction and lubrication in metal forming to use finite element simulation of metal forming process (T. Shibata and M. Nagai) 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
Evaluation of achievement (Y. Abe) Reports : 100% (T. Shibata and M. Nagai) Written report : 100%
Examination レポートで実施 By Report
Details of examination
Other information 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 (Y. Abe) http://mems.me.tut.ac.jp/ (T. Shibata and M. Nagai)
Office hours
Relations to attainment objectives of learning and education (C)高度な知識を統合的・発展的に活用できる実践力・創造力 機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。 (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 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					
<p>【face to face】1st: Introduction (MIURA) (Deformation, fracture and microstructural control of materials and the recent related topics)</p> <p>【on-demand】2nd: Microstructural control and improvement of mechanical property (MIURA)</p> <p>【on-demand】3rd: Dynamic recrystallization and microstructural control I (MIURA)</p> <p>【on-demand】4th: Dynamic recrystallization and microstructural control II (MIURA)</p> <p>【on-demand】5th: Static recrystallization and microstructural control (MIURA)</p> <p>【face to face】6th: Evaluation and analysis of material microstructure 1 (KOBAYASHI) (Synchrotron radiation, Imaging, Tomography)</p> <p>【on-demand】7th: Evaluation and analysis of material microstructure 2 (KOBAYASHI) (Image processing, Modeling)</p> <p>【on-demand】8th: Evaluation and analysis of material microstructure 3 (KOBAYASHI) (Orientation analysis)</p> <p>【on-demand】9th: Evaluation and analysis of material microstructure 4 (KOBAYASHI) (Texture analysis)</p> <p>【face to face】10th: Microstructure of Materials 1 (TODAKA) (Structure, Lattice Defect)</p> <p>【on-demand】11th: Microstructure of Materials 2 (TODAKA) (Phase Diagram, Solidification, Diffusion)</p> <p>【on-demand】12th: Microstructure of Materials 3 (TODAKA) (Deformed Structure, Recovery, Recrystallization, Phase Transformation)</p> <p>【on-demand】13th: Strength of Materials 1 (TODAKA) (Strengthening Mechanism, Heat Treatment and Deformation Process)</p> <p>【on-demand】14th: Strength of Materials 2 (TODAKA) (Plastic Deformation and Microstructure)</p> <p>-----</p> <p>* If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change. -----</p> <p>* If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM. -----</p> <p>【on-demand】: You can take the class whenever you want. 【face to face】: Regular face to face class. -----</p>					

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)						
Textbook1	Book title	N/A			ISBN	
	Author		Publisher		Publish year	
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 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 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						
レポートで実施						
By Report						
Details of examination						
Professors indicate individually.						
Other information						
<Miura> miura@me.tut.ac.jp						
<Kobayashi> m-kobayashi@me.tut.ac.jp						
todaka@me.tut.ac.jp						
When you take this lecture, please contact with three teachers.						
Reference URL						

<Miura> <http://str.me.tut.ac.jp>
<Kobayashi> <http://str.me.tut.ac.jp>
<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

機械工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力

社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身につけている。

(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

Graduate Program of Mechanical Engineering for Doctoral Degree

(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, heat treatment, 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、攪拌技術、低騒音化技術等および流体现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					

特になし N/A
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 numerical 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 特になし N/A
Other information 連絡先 yanada@me.tut.ac.jp seki@me.tut.ac.jp iida@me.tut.ac.jp h-yokoyama@me.tut.ac.jp Contact yanada@me.tut.ac.jp seki@me.tut.ac.jp iida@me.tut.ac.jp h-yokoyama@me.tut.ac.jp
Reference URL 飯田研究室 http://aero.me.tut.ac.jp 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) 高度な知識を統合的・発展的に活用できる実践力・創造力 機械工学およびその関連分野に関する高度な知識を修得し, それらを広範囲に有機的に連携させた研究開発方法論を体得することで, 課題解決のための独創的な技術を創造し, 実践できる能力を身につけている。 (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. (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, Atmospheric diffusion, Liquid filtration, Aerodynamic noise, Numerical 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]	内山 直樹, 真下 智昭 UCHIYAMA Naoki, MASHIMO Tomoaki				
Numbering	MEC_DOC75025				
Objectives of class					
1)Learns some important methods in signal processing. 2)Provides analytical methods for nonlinear systems and their application to real systems.					
Contents of class					
[On-demand] 1st week: Piezoelectric phenomena [On-demand] 2nd week: Piezoelectric equation [On-demand] 3rd week: Analogy between electric and mechanical systems [On-demand] 4th week: Simple harmonic motion [On-demand] 5th week: Damped harmonic motion [On-demand] 6th week: Forced harmonic motion [On-demand] 7th week: Piezoelectric Vibration Lecturer: Mashimo					
(face to face) 8th week: Mathematical programming and application I (on-demand) 9th week: Mathematical programming and application II (face to face) 10th week: Mathematical programming and application III (on-demand) 11th week: Mathematical programming and application IV (face to face) 12th week: Mathematical programming and application V (on-demand) 13th week: Mathematical programming and application VI (on-demand) 14th week: Mathematical programming and application VII Lecturer: Uchiyama(The above subjects may be changed according to students' requests and backgrounds)					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change. If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.					
Face to face: Regular face to face class On-demand: You can take the class whenever you want.					
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 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,	Publisher	Springer	Publish year
					2007

		Zhong Zhang, Rafael Batres				
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 N/A						
Goals to be achieved 1) Learn the advanced signal processing methods and knowledge 2) Expected to understand analysis of nonlinear systems. 3) Be able to apply the analytical methods to real nonlinear systems						
Evaluation of achievement The final grade will be determined by report assignments of two lecturers (Each ratio is 100/2 %). 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 N/A						
Other information Mashimo E-mail: mashimo@me.tut.ac.jp Uchiyama E-mail: uchiyama@me.tut.ac.jp						
Reference URL N/A						
Office hours Mashimo(Contact by e-mail first.) Uchiyama(Contact by e-mail first.)						
Relations to attainment objectives of learning and education 機械工学専攻 (C) 高度な知識を統合的・発展的に活用できる実践力・創造力 機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。 Graduate Program of Mechanical Engineering for Doctoral Degree (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 Piezoelectric phenomena, Nonlinear systems, Systems engineering						

(D51030100)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D51030100	Subject area	Advanced Mechanical Engineering	Required or elective	Elective
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, kyouumu iinkai fukuiintyou				
Numbering	COM_DOC71025				
Objectives of class					
<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>					
Contents of class					
<p>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.</p> <p>1) Presentations</p> <p>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.</p> <p>2) Title and abstract of presentation</p> <p>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.</p> <p>3) Report you will submit</p> <p>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.</p> <p>4) Schedule of your presentation</p> <p>Please check the schedule given before the semester begins.</p> <p>5) Absence from the class</p> <p>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.</p> <p>(*) If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.</p> <p>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.</p> <p>1) Presentations</p> <p>In this class, each student will make a presentation to other students of different research fields.</p>					

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.

(*) If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.

Self Preparation and Review

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

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

Related subjects

N/A

N/A

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

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.

Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).

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

Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).

Examination

レポートで実施

By Report

Details of examination

N/A

N/A

Other information

Contact the educational affairs division for inquiry.

Contact the educational affairs division for inquiry.

Reference URL

N/A

N/A

Office hours

Before/after the class

Before/after the class

Relations to attainment objectives of learning and education

機械工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(D) グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力

社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身につけている。

(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

Graduate Program of Mechanical Engineering for Doctoral Degree

(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

Interdisciplinary Research

Interdisciplinary Research

(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 approaches 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					
N/A					
Related subjects					
N/A					
Notes for textbook					
Textbook or material will be made available from the supervisor. To be announced by individual supervisors.					
Notes for reference					
N/A					
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					
N/A					
Other information					
N/A					
Reference URL					
N/A					
Office hours					
N/A					
Relations to attainment objectives of learning and education					
<p>電気・電子情報工学専攻</p> <p>(C)高度な知識を統合的・発展的に活用できる実践力・創造力</p> <p>電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。</p> <p>(D)グローバルに活躍できるコミュニケーション力</p>					

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身に付けている。

(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力

社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身に付けている。

(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

Graduate Program of Engineering of Electrical and Electronic Information Engineering for Doctoral Degree

(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 approaches related to the electrical and electronic information engineering for the research work of his/her master thesis.					
Contents of class					
The class provides both of fundamental knowledge on the research work of master thesis and the most advanced results in the related field by reading research papers and monographs. Contents of the class depend on the supervisor. To be announced by individual supervisors.					
Self Preparation and Review					
N/A					
Related subjects					
N/A					
Notes for textbook					
Textbook or material will be made available from the supervisor. To be announced by individual supervisors.					
Notes for reference					
N/A					
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					
N/A					
Other information					
N/A					
Reference URL					
N/A					
Office hours					
N/A					
Relations to attainment objectives of learning and education					
<p>電気・電子情報工学専攻</p> <p>(C)高度な知識を統合的・発展的に活用できる実践力・創造力</p> <p>電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。</p> <p>(D)グローバルに活躍できるコミュニケーション力</p>					

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身に付けている。

(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力

社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身に付けている。

(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

Graduate Program of Engineering of Electrical and Electronic Information Engineering for Doctoral Degree

(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, kyouumu iinkai fukuintyou				
Numbering	COM_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					
N/A					
Related subjects					
Specialized and general subjects in each course.					
Notes for textbook					
N/A					
Notes for reference					
N/A					
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					
N/A					

Other information N/A
Reference URL N/A
Office hours N/A
<p>Relations to attainment objectives of learning and education</p> <p>電気・電子情報工学専攻 (C) 高度な知識を統合的・発展的に活用できる実践力・創造力 電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。 (D) グローバルに活躍できるコミュニケーション力 グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。 (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</p> <p>Graduate Program of Engineering of Electrical and Electronic Information Engineering for Doctoral Degree (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</p>
Key words

(D52020010)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D52020010	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 kyoumu iinkai fukuuintyou, TANAKA Saburo				
Numbering	COM_DOC51005				
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					
<p>* 1st week(2020.10.7):Guidance Introduction face to face, 1st module("Research Misconduct") in e-learning</p> <p>* 2nd – 5th week(October 14 – November 4): 2nd – 6th modules in e-learning</p> <p>– 2nd moudle: "Ethical Issues in the Management of Data in Engineering Research"</p> <p>– 3rd moudle: "Responsible Authorship"</p> <p>– 4th moudle: "Ethical Issues in the Peer Review and Publication of Engineering Research"</p> <p>– 5th moudle: "Collaborative Research in Engineering Fields"</p> <p>– 6th moudle: "Whistleblowing and the Obligation to Protect the Public"</p> <p>– 7th moudle: "Managing Public Research Funds"</p> <p>Submit the e-learning Certificate to the Education Division.</p> <p>* 6th week(November 11 – November 17): Discussion with supervisor</p> <p>* 7th week(November 18 2020) : make a final report</p>					
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					
N/A					
Notes for reference					
<p>For the Sound Development of Science ?The Attitude of a Conscientious Scientist</p> <p>Japan Society for the Promotion of Science Editing Committee , MARUZEN PUBLISHING</p> <p>2015 ISBN978-4-621-08938-5</p> <p>(PDF : https://www.jsps.go.jp/j-kousei/data/rinri.pdf)</p>					
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 report(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 reports, 90 or higher (out of 100 points).					
A: Obtained total points of reports, 80 or higher (out of 100 points).					
B: Obtained total points of reports, 70 or higher (out of 100 points).					
C: Obtained total points of 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 N/A
Reference URL N/A
Office hours Before/after the class
Relations to attainment objectives of learning and education (B) 技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。 (A) 幅広い人間性と考え方 人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について考える能力を身につけている。 (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; and have the ability to set, solve and evaluate technical issues in society (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
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, 加藤 亮 MATSUDA Atsunori, HATTORI Toshiaki, KATOH Ryo				
Numbering	ELC_DOC72025				
Objectives of class					
Learn basic and advanced research fields in materials electronics for photonics, ionics, sensing materials, and so on.					
Contents of class					
Based on the assignments preliminary provides by professors, lectures will be performed on the basis of students' investigation and class discussion.					
Important topics are as follows.					
Ionics: Basics and applications of advanced solid electrolytes and electrochemical devices such as Li-ion battery and fuel cells.					
Ion recognition reagents: Development of anion recognition reagent by using hydrogen bonding, and Development of moisture sensing in oil					
Sensing materials: Basics of advanced functional materials and its applications for sensing methods.					
Self Preparation and Review					
Student must prepare the coming lectures according to advance directives, assignments and distributed documents. They also must engage in the debate and discussion on the topics during classes.					
Related subjects					
Inorganic chemistry, Physical chemistry, Interface chemistry, Electrochemistry, Materials science for solid-state electronics					
Notes for textbook					
Papers(resume) will be distributed.					
Notes for reference					
N/A					
Goals to be achieved					
Learn following subjects and skill from lectures and discussion:					
1. Basics of physical and chemical phenomena concerning materials science for electronics.					
2. Presentation skill to explain the above phenomena for bachelor students based on the comprehensive understanding.					
Evaluation of achievement					
Total point is calculated on the basis of contents of presentaions and discussion on the themes given by each professor.					
Examination					
試験期間中には何も行わない None during exam period					
Details of examination					
None during exam period					
Other information					

N/A

Reference URL

Matsuda: <http://ion.ee.tut.ac.jp/>

Kato: <http://www.electroanal.ee.tut.ac.jp/>

Hattori: <http://www.electroanal.ee.tut.ac.jp/>

Office hours

As needed to corresponding professors by e-mail etc.

Relations to attainment objectives of learning and education

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(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

(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

Materials science for electronics

(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, 高橋 一浩 WAKAHARA Akihiro, OKADA Hiroshi, KAWANO Takeshi, TAKAHASHI Kazuhiro				
Numbering	ELC_DOC74025				
Objectives of class					
<p>学部で学んだ半導体工学を基礎として、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。</p> <p>このため、この講義の履修者は、半導体工学、固体物理などの講義を受講してこと。</p> <p>This class is designed based on semiconductor physics and solid-state physics, to understand advanced semiconductor technology, including theoretical treatment, design and processing of advanced semiconductor devices.</p> <p>So it is desirable to study after learning related classes.</p>					
Contents of class					
<p>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。</p> <ol style="list-style-type: none"> 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, 高橋) <p>講義は、隔週で、対面と遠隔を併用して行います。 遠隔講義は、配付した資料とオンラインでの Q&A を併用して行います。</p> <p>第1回(対面) ガイダンス後半のトピックスの選択、半導体物理の基礎(復習) 第2回(遠隔) 半導体物理の基礎に関する演習 第3回(対面) pn 接合(拡散電位、I-V 特性、C-V 特性) 第4回(遠隔) pn 接合に関する解析実習 第5回(対面) MOS ダイオード(バンド構造、蓄積・反転、C-V 特性) 第6回(遠隔) MOS ダイオードに関連した解析実習 第7回(対面) MOS-FET(トランジスタ特性) 第8回(遠隔) MOS-FET に関する解析実習 第9回(対面) 選択トピックス(概論) 第10回(遠隔) 選択トピックスに関する研究背景の調査研究 第11回(対面) 選択トピックスに関する調査研究内容の発表と、 第12回(遠隔) 選択トピックスに関するデバイス解析実習 第13回(対面) 選択トピックスに関する解析結果の発表と討議 第14回(対面) 全体の総括、期末試験</p> <p>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。</p> <p>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 topics.</p> <ol style="list-style-type: none"> 1. Fabrication and characterization technology for Nanosturcture devices (Prof. Okada) 2. Band engineering and quantum effect devices (Prof. Wakahara) 3. Advanced MEMS/NEMS technologies(Prof. Kawano, Prof. Takahashi) <p>Lectures are alternately done by face-to-face and remote teachings.</p>					

Remote lectures will be conducted by combining exercise based on the distributed materials and online Q&A.

1st(Face-to-face):

Guidance and selection of topics in the latter half of this class. Review of semiconductor physics (basic).

2nd(Remote) :

Exercise of semiconductor physics.

3rd(Face to face) :

pn junction (diffusion potential, I-V characteristics, C-V characteristics)

4th(Remote) :

Practical analysis training on pn junction.

5th(Face to face) :

MOS diode (band structure, accumulation/inversion, C-V characteristics)

6th(Remote) :

Analysis practice related to MOS diode.

7th(Face to face) :

MOS-FET (transistor characteristics).

8th(Remote) :

Analysis practice related to MOS-FETs.

9th(Face-to-face) :

Topics by which students choosed (overview).

10th(Remote) :

Field research of background and the status for related to the topics.

11th(Face-to-face) :

Presentation and discussion of the results of 10th week field work.

12th(Remote) :

Device analysis training on selected topics

13th(Face-to-face) :

Presentation and discussion of analysis results related to selected topics

14th(Face-to-face) :

Overall summary, final exam.

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.

If there is any changes, we will notify you on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

特になし

N/A

Related subjects

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

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

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

特になし

N/A

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 an essential part of semiconductor device that satisfies the given specification.
3. Investigate on given topics, and give a lecture on this.

Evaluation of achievement

ケーススタディや研究調査の完成度で評価する。
Achievement of lectures of the case study, and writing research reports.

Examination

レポートで実施
By Report

Details of examination

特になし
N/A

Other information

選択に際しては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 : C-303B okada[at]ee.tut.ac.jp
河野剛士 : C-603 kawano[at]ee.tut.ac.jp
高橋一浩 : C-606 takahashi[at]ee.tut.ac.jp

Before choosing a sub-course, contact to following professors

Akihiro Wakahara : C-608 wakahara[at]ee.tut.ac.jp
Hiroshi Okada : C-303B okada[at]ee.tut.ac.jp
Takeshi Kawano : C-603 kawano[at]ee.tut.ac.jp
Kazuhiro Takahashi : C-606 takahashi[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

メール等でアポイントを取ってください。
Take an appointment by e-mail.

Relations to attainment objectives of learning and education

(C) 高度な知識を統合的に活用できる実践力・創造力
電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。

(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.4~4	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) electromaginetic wave system. 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. Wireless power transfer system based on filter theory					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.					
If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.					
Self Preparation and Review					
It is strongly recommended to prepare the lecture, e.g., to read the course materials and references before attending the corresponding lecture.					
The course materials and references will be shown by the lecturer whenever necessary.					
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

電気・電子情報工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

Graduate Program of Engineering of Electrical and Electronic Information Engineering for Doctoral Degree

(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, wireless power transfer, electromagnetic wave

(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					
N/A					
Related subjects					
N/A					
Notes for textbook					
Reference and material will be available from the supervisor.					
Notes for reference					
N/A					
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					
N/A					
Other information					
N/A					
Reference URL					
N/A					
Office hours					
N/A					
Relations to attainment objectives of learning and education					
<p>(C)高度な知識を統合的・発展的に活用できる実践力・創造力 電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。</p> <p>(D)グローバルに活躍できるコミュニケーション力 グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。</p> <p>(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</p>					

(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

(D52030100)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D52030100	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)	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 fukuuintyou				
Numbering	COM_DOC71025				
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					
N/A					
Related subjects					
Specialized and general subjects in each course.					
Notes for textbook					
N/A					
Notes for reference					
N/A					
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					
N/A					

Other information N/A
Reference URL N/A
Office hours N/A
<p>Relations to attainment objectives of learning and education</p> <p>電気・電子情報工学専攻 (C) 高度な知識を統合的・発展的に活用できる実践力・創造力 電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。 (D) グローバルに活躍できるコミュニケーション力 グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。 (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</p> <p>Graduate Program of Engineering of Electrical and Electronic Information Engineering for Doctoral Degree (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</p>
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					
<p>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。</p> <p>The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.</p> <p>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.</p>					
Contents of class					
<p>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。</p> <p>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。</p> <p>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.</p>					
Self Preparation and Review					
<p>教員が指定する内容に関し、予習・復習を行う。</p> <p>Consult with your advisor.</p>					
Related subjects					
<p>指導教員に問い合わせること。</p> <p>Consult with your advisor.</p>					
Notes for textbook					
<p>指導教員に問い合わせること。</p> <p>Consult with your advisor.</p>					
Notes for reference					
Goals to be achieved					
<p>(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。</p> <p>(2)技術的な情報を扱う英文が解釈でき、作文できる。</p> <p>(3)論文の標準的な構成ができる。</p> <p>(4)発表というスタイルでの情報提供ができる。</p> <p>(5)情報の不足を質問という形式で指摘できる。</p> <p>(1) To understand English literature on state-of-the-art areas of expertise, and to explain clearly.</p> <p>(2) To interpret technical information written in English, and to write such information in English.</p> <p>(3) To make a standard construction of a technical paper.</p> <p>(4) To provide information by oral presentation.</p> <p>(5) To point out the lack of information by questions.</p>					
Evaluation of achievement					
<p>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。</p> <p>The score is assigned by the supervisor considering autonomy for the discovery and understanding of technical information, the method of the description, the answer to the question determines, and the participation to the discussion.</p>					
S: more than or equal to 90, A: more than or equal to 80, B: more than or equal to 60, C: more than or equal to 60.					

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

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。

(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力

社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身につけている。

(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.

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

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

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					
<p>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。</p> <p>The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.</p> <p>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.</p>					
Contents of class					
<p>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。</p> <p>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。</p> <p>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.</p>					
Self Preparation and Review					
<p>教員が指定する内容に関し、予習・復習を行う。</p> <p>Consult with your advisor.</p>					
Related subjects					
<p>指導教員に問い合わせること。</p> <p>Consult with your advisor.</p>					
Notes for textbook					
<p>指導教員に問い合わせること。</p> <p>Consult with your advisor.</p>					
Notes for reference					
Goals to be achieved					
<p>(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。</p> <p>(2)技術的な情報を扱う英文が解釈でき、作文できる。</p> <p>(3)論文の標準的な構成ができる。</p> <p>(4)発表というスタイルでの情報提供ができる。</p> <p>(5)情報の不足を質問という形式で指摘できる。</p> <p>(1) To understand English literature on state-of-the-art areas of expertise, and to explain clearly.</p> <p>(2) To interpret technical information written in English, and to write such information in English.</p> <p>(3) To make a standard construction of a technical paper.</p> <p>(4) To provide information by oral presentation.</p> <p>(5) To point out the lack of information by questions.</p>					
Evaluation of achievement					
<p>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。</p> <p>The score is assigned by the supervisor considering autonomy for the discovery and understanding of technical information, the method of the description, the answer to the question determines, and the participation to the discussion.</p>					
S:more than or equal to 90, A:more than or equal to 80, B:more than or equal to 70, C:more than or equal to 60					

<p>Examination 試験期間中には何も行わない None during exam period</p>
<p>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.</p>
<p>Other information</p>
<p>Reference URL</p>
<p>Office hours 指導教員に問い合わせること。 Consult with your advisor.</p>
<p>Relations to attainment objectives of learning and education</p> <p>(C) 高度な知識を統合的・発展的に活用できる実践力・創造力 情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。</p> <p>(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力 社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身につけている。</p> <p>(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.</p> <p>(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology Have the skills to research the essence of changes in society, environment, and technology. Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology</p>
<p>Key words</p>

(D53020010)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D53020010	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 kyoumu iinkai fukuuintyou, TANAKA Saburo				
Numbering	COM_DOC51005				
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(2020.10.7):Guidance Introduction face to face, 1st module("Research Misconduct") in e-learning					
* 2nd – 5th week(October 14 – November 4): 2nd – 6th modules in e-learning					
– 2nd moudle: "Ethical Issues in the Management of Data in Engineering Research"					
– 3rd moudle: "Responsible Authorship"					
– 4th moudle: "Ethical Issues in the Peer Review and Publication of Engineering Research"					
– 5th moudle: "Collaborative Research in Engineering Fields"					
– 6th moudle: "Whistleblowing and the Obligation to Protect the Public"					
– 7th moudle: "Managing Public Research Funds"					
Submit the e-learning Certificate to the Education Division.					
* 6th week(November 11 – November 17): Discussion with supervisor					
* 7th week(November 18 2020) : 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					
N/A					
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 report(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 reports, 90 or higher (out of 100 points).					
A: Obtained total points of reports, 80 or higher (out of 100 points).					
B: Obtained total points of reports, 70 or higher (out of 100 points).					
C: Obtained total points of 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
N/A
Reference URL
N/A
Office hours
Before/after the class
Relations to attainment objectives of learning and education
<p>(B) 技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。</p> <p>(A) 幅広い人間性と考え方 人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について考える能力を身につけている。</p> <p>(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; and have the ability to set, solve and evaluate technical issues in society</p> <p>(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</p>
Key words
Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism

(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
Charge teacher name[Roman alphabet mark]	藤戸 敏弘 FUJITO Toshihiro				
Numbering	CMP_DOC72025				
Objectives of class					
<p>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.</p> <p>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.</p>					
Contents of class					
<p>1(対面). 線形計画問題と整数計画問題 2(オンデマンド). 離散最適化問題と整数計画問題 3(オンデマンド). 凸多面体の基礎 4(オンデマンド). 凸多面体の整数性 5(オンデマンド). 完全双対整数性と完全ユニモジュラ行列 6(オンデマンド). 完全双対整数性: ネットワークフロー 7(対面). 定期試験</p> <p>1(face-to-face). Linear Program and Integer Program 2(on-demand). Combinatorial Optimization and Integer Program 3(on-demand). Basics of Convex Polytopes 4(on-demand). Integrality of Convex Polytopes 5(on-demand). Total Dual Integrality and Totally Unimodular Matrices 6(on-demand). Total Dual Integrality: Network Flow 7(face-to-face). Final exam</p>					
Self Preparation and Review					
<p>ガイダンス資料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.</p> <p>It is highly recommended to go through the guidance materials provided on the Google classroom for self preparation and reviews.</p>					
Related subjects					
<p>「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)</p> <p>"Algorithms and Data Structures" (to the lesser extent, "Theory of Computation" and "Formal Languages" are also related).</p>					
Notes for textbook					
<p>Google classroom より資料を配布する.</p> <p>All the course materials used will be provided through the Google classroom.</p>					
Reference1	Book title	最適化法		ISBN	4320016165
	Author	田村 明久, 村松 正和著	Publisher	共立出版	Publish year 2002
Reference2	Book title	Combinatorial optimization		ISBN	047155894X
	Author	William J. Cook ... [et al.]	Publisher	Wiley	Publish year 1998
Reference3	Book title	Combinatorial Optimization		ISBN	3540443894
	Author	Alexander Schrijver	Publisher	Springer	Publish year 2003
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で評価する。

S: 90 点以上、A: 80 点以上、B: 70 点以上、C: 60 点以上

[Evaluation basis]

Students will be evaluated, in terms of goals to be achieved, based on their scores of final exam as follows:

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

定期試験を実施(対面)

Examination(Face to Face)

Details of examination**Other information****Reference URL**

特になし

N/A

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) 高度な知識を統合的・発展的に活用できる実践力・創造力

情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。

(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 in an integrated manner

(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

(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

algorithms, combinatorial optimization, linear programming, computational complexity

(D53030390)Advanced Robotic Perception and Human-Robot Interaction 1[Advanced Robotic Perception and Human-Robot Interaction 1]

Subject name[English]	Advanced Robotic Perception and Human-Robot Interaction 1[Advanced Robotic Perception and Human-Robot Interaction 1]				
Schedule number	D53030390	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: statistical sensor fusion with Bayes filters, object tracking and identification, robotic mapping and localization, observation planning, human detection and identification, and task-oriented human-robot interaction.					
Contents of class					
Week 1: Introduction, probability basics, and sensor fusion by Bayesian inference. Week 2: Object tracking by Bayesian filters. Week 3: Mobile robot localization. Week 4: Mapping and SLAM (simultaneous localization and mapping) Week 5: Observation planning. Week 6: Human detection and identification. Week 7: Task-oriented human-robot interaction.					
Self Preparation and Review					
Regularly reviewing and preparing for the lecture using provided materials are desirable.					
Related subjects					
Fundamental knowledge of linear algebra and probability theory is useful.					
Notes for textbook					
Handouts with video explanation will be provided. The main reference is shown below.					
Reference1	Book title	Probabilistic robotics		ISBN	978-0262201629
	Author	Sebastian Thrun, Wolfram Burgard, Dieter Fox	Publisher	MIT Press	Publish year 2006
Notes for reference					
N/A					
Goals to be achieved					
To understand the fundamental and advanced issues in intelligent robotics, especially in robotic perception and human-robot interaction.					
Evaluation of achievement					
Students who attend all classes will be evaluated as follows: S: Achieved all goals, and obtained total points of the final assignment is 90 or higher (out of 100 points). A: Achieved all goals, and obtained total points of the final assignment is 80 or higher (out of 100 points). B: Achieved 80% of goals, and obtained total points of the final assignment is 70 or higher (out of 100 points). C: Achieved 60% of goals, and obtained total points of the final assignment is 60 or higher (out of 100 points).					
Examination					
レポートで実施 By Report					
Details of examination					
N/A					
Other information					

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

Reference URL

All materials are delivered by Google Classroom. The class code is: gcerkz4

Office hours

Make an appointment beforehand by email.

Relations to attainment objectives of learning and education

情報・知能工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。

Graduate Program of Computer Science and Engineering for Doctoral Degree

(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, sensor fusion, robotic perception, human-robot interaction

(D53030400)Advanced Robotic Perception and Human-Robot Interaction 2[Advanced Robotic Perception and Human-Robot Interaction 2]

Subject name[English]	Advanced Robotic Perception and Human-Robot Interaction 2[Advanced Robotic Perception and Human-Robot Interaction 2]				
Schedule number	D53030400	Subject area	Advanced Computer Science and Engineering	Required or elective	Elective
Time of starting a course	Fall2 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]	大島 直樹, 大村 廉 OSHIMA Naoki, OMURA Ren				
Numbering	CMP_DOC73225				
Objectives of class					
The aim of this course is to utilize tools and platforms to construct human-robot affective communication in a real-world scenario.					
Contents of class					
Week 1: Building interactive sociable robots of the future Week 2-3: Real-time multimodal processing for constructing sociable robot's conversation system Week 4: Cloud network for sociable robot manipulation Week 5: 3D robot printing technology Week 6-7: Final assignment(project work: proposing and prototyping sociable robots of the future), evaluation and review					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.					
On-demand(You can take the class whenever you want.)					
Self Preparation and Review					
Reviewing and preparing for the lecture using provided materials are desirable.					
Related subjects					
N/A					
Notes for textbook					
Handouts will be prepared. The main reference is shown below.					
Reference1	Book title	Designing Sociable Robots		ISBN	
	Author	C. Breazeal	Publisher	A Bradford Book	Publish year 2004
Notes for reference					
N/A					
Goals to be achieved					
Understanding fundamental and advanced issues for building interactive sociable robots.					
Evaluation of achievement					
The grade will be determined by the class assignments and the final report (the total points are 100). S: the total points are 90 or higher. A: the total points are 80 or higher. B: the total points are 70 or higher. C: the total points are 60 or higher.					
Examination					
試験期間中には何も行わない None during exam period					
Details of examination					
N/A					
Other information					
N/A					
Reference URL					

N/A

Office hours

Tuesday, 15:00–16:00. Make an appointment beforehand by email.

Relations to attainment objectives of learning and education

情報・知能工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。

Graduate Program of Computer Science and Engineering for Doctoral Degree

(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

robot, design engineering, communication

(D53030430)Advanced 3D Vision Computation 1[Advanced 3D Vision Computation 1]

Subject name[English]	Advanced 3D Vision Computation 1[Advanced 3D Vision Computation 1]				
Schedule number	D53030430	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 3D reconstruction from images.					
This course involves fundamentals and advanced issues on 3D reconstruction from images.					
Contents of class					
All lectures will be done by "remote simultaneous interactive" and "on-demand". Each "On-demand" lecture material will be available after the corresponding on-line class.					
1st week: Introduction & Projective Geometry 2nd week: Epipolar Geometry 3rd week: 3-D Reconstruction from Two Views 4th week: Affine Projection 5th week: Uncalibrated Stereo 6th week: Structure from Motion 7th week: Robust Estimation in Computer Vision					
ll lectures will be done by "remote simultaneous interactive" and "on-demand". Each "On-demand" lecture material will be available after the corresponding on-line class.					
1st week: Introduction & Projective Geometry 2nd week: Epipolar Geometry 3rd week: 3-D Reconstruction from Two Views 4th week: Affine Projection 5th week: Uncalibrated Stereo 6th week: Structure from Motion 7th week: Robust Estimation in Computer Vision					
Self Preparation and Review					
Since the handouts are available via web page beforehand, please read the handouts and the corresponding part on reference books.					
Since the handouts are available via web page beforehand, please read the handouts and the corresponding part on reference books.					
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					
<p>Understanding of the fundamentals and advanced issues on image processing and computer vision including:</p> <ul style="list-style-type: none"> - camera model, - epipolar geometry, - 3-D reconstruction from images, - optimization <p>Understanding of the fundamentals and advanced issues on image processing and computer vision including:</p> <ul style="list-style-type: none"> - camera model, - epipolar geometry, - 3-D reconstruction from images, - optimization 					
Evaluation of achievement					
<p>Grade will be determined by all submitted reports:</p> <p>S: score ≥ 90 A: score ≥ 80 B: score ≥ 70 C: score ≥ 60</p> <p>Grade will be determined by all submitted reports:</p> <p>S: score ≥ 90 A: score ≥ 80 B: score ≥ 70 C: score ≥ 60</p>					
Examination					
<p>レポートで実施 By Report</p>					
Details of examination					
Other information					
<p>Room F-404, Ext. 6888, Email: kanazawa@cs.tut.ac.jp (Yasushi Kanazawa)</p> <p>Room F-404, Ext. 6888, Email: kanazawa@cs.tut.ac.jp (Yasushi Kanazawa)</p>					
Reference URL					
<p>http://www.img.cs.tut.ac.jp/ http://www.img.cs.tut.ac.jp/</p>					
Office hours					
Relations to attainment objectives of learning and education					
<p>(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 in an integrated manner</p> <p>(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner</p>					
Key words					
<p>3D reconstruction, computer vision, image processing 3D reconstruction, computer vision, image processing</p>					

(D53030440)Advanced 3D Vision Computation 2[Advanced 3D Vision Computation 2]

Subject name[English]	Advanced 3D Vision Computation 2[Advanced 3D Vision Computation 2]				
Schedule number	D53030440	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					
(face to face) 1: Mathematical introduction					
(face to face) 2: Minimization of quadratic functions and least squares					
(face to face) 3: Maximum likelihood estimation					
(on demand) 4: Exercise 1					
(face to face) 5: Iterative methods					
(face to face) 6: Applications of computer vision					
(on demand) 7: Exercise 2					
(face to face) 1: Mathematical introduction					
(face to face) 2: Minimization of quadratic functions and least squares					
(face to face) 3: Maximum likelihood estimation					
(on demand) 4: Exercise 1					
(face to face) 5: Iterative methods					
(face to face) 6: Applications of computer vision					
(on demand) 7: Exercise 2					
Self Preparation and Review					
The handouts are available via web page(google classroom) beforehand.					
The handouts are available via web page(google classroom) 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					
特になし					
N/A					
Goals to be achieved					

<p>Understanding of the fundamentals and advanced issues on image processing and computer vision including:</p> <ul style="list-style-type: none"> - minimization of quadratic functions, - implementation of least squares and maximum likelihood methods, - implementation of iterative methods, for example, Gauss-Newton method <p>Understanding of the fundamentals and advanced issues on image processing and computer vision including:</p> <ul style="list-style-type: none"> - minimization of quadratic functions, - implementation of least squares and maximum likelihood methods, - implementation of iterative methods, for example, Gauss-Newton method
<p>Evaluation of achievement</p> <p>Grade will be determined by all submitted reports:</p> <p>S: score \geq 90 A: score \geq 80 B: score \geq 70 C: score \geq 60</p> <p>Grade will be determined by all submitted reports:</p> <p>S: score \geq 90 A: score \geq 80 B: score \geq 70 C: score \geq 60</p>
<p>Examination</p> <p>レポートで実施 By Report</p>
<p>Details of examination</p> <p>特になし N/A</p>
<p>Other information</p> <p>Room C-507, Ext. 6760, Email: sugaya@iim.cs.tut.ac.jp (Yasuyuki Sugaya)</p> <p>Room C-507, Ext. 6760, Email: sugaya@iim.cs.tut.ac.jp (Yasuyuki Sugaya)</p>
<p>Reference URL</p> <p>Google classroom (class code: tho4zvs) Google classroom (class code: tho4zvs)</p>
<p>Office hours</p> <p>week day Please send an appointment e-mail in advance.</p> <p>week day Please send an appointment e-mail in advance.</p>
<p>Relations to attainment objectives of learning and education</p> <p>(C) 高度な知識を統合的・発展的に活用できる実践力・創造力 情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。</p> <p>(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 in an integrated manner</p> <p>(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner</p> <p>(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.</p>
<p>Key words</p> <p>コンピュータビジョン、最適化手法 computer vision, optimization</p>

(D53030460)Complex and Intelligent Systems[Complex and Intelligent Systems]

Subject name[English]	Complex and Intelligent Systems[Complex and Intelligent Systems]				
Schedule number	D53030460	Subject area	Advanced Computer Science and Engineering	Required or elective	Elective
Time of starting a course	Fall1 term	Day of the week,period	Tue.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]	石田 好輝 ISHIDA Yoshiteru				
Numbering	CMP_DOC73125				
Objectives of class					
<p>Focusing on: Matching Automaton as a modeling and design framework This course provides opportunities to learn the followings:</p> <ul style="list-style-type: none"> * 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. <p>Recent topics on complex systems and learning systems will be also discussed in the course.</p>					
Contents of class					
<p>(Face to Face) 1st week: Introduction on Self-Action model (Face to Face) 2nd week: Matching Automaton (on-demand) 3rd week: Classification of Stable Marriage Problem (chap. 3) (on-demand) 4th week: Visualization of Stable Marriage Problem (chap. 4) (on-demand) 5th week: Discrete Modeling of Visual Recognition (chap. 5) (on-demand) 6th week: Discrete Modeling of Auditory Recognition (chap. 6) (Face to Face) 7th week: Design by Matching Automaton (chap.7-10)</p>					
Self Preparation and Review					
Related subjects					
Notes for textbook					
<p>No textbook. References other than below will be suggested at the first class. Roth, A.E., Sotomayor, M.A.O.: Two-sided matching: A study in game-theoretic modeling and analysis. vol. 18. Cambridge University Press, (1992); Gale, D., Shapley, L.S.: College admissions and the stability of marriage. American mathematical monthly, 9-15 (1962); Gusfield, D., Irving, R.W.: The stable marriage problem: structure and algorithms. MIT press, (1989); 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);</p>					
Notes for reference					
Goals to be achieved					
Evaluation of achievement					
<p>Class performance (50%) and term-end report (50%)</p> <p>Course Evaluation Evaluation is based on class performance(presentations) and reports (100 points). S: total points of reports and presentations, 90 or higher (out of 100 points). A: total points of reports and presentations, 80 or higher (out of 100 points). B: total points of reports and presentations, 70 or higher (out of 100 points). C: total points of reports and presentations, 60 or higher (out of 100 points).</p>					
Examination					

その他
Other

Details of examination

Other information

Room F-504, Ext. 6895

Reference URL

Office hours

Tuesday 16:30-17:00

Relations to attainment objectives of learning and education

情報・知能工学専攻

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。

(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

Graduate Program of Computer Science and Engineering for Doctoral Degree

(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

(D53030470)Advanced Human Sensation and Perception 1[Advanced Human Sensation and Perception 1]

Subject name[English]	Advanced Human Sensation and Perception 1[Advanced Human Sensation and Perception 1]				
Schedule number	D53030470	Subject area	Advanced Computer Science and Engineering	Required or elective	Elective
Time of starting a course	Fall1 term	Day of the week,period	Tue.4~4	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]	中内 茂樹 NAKAUCHI Shigeki				
Numbering	CMP_DOC73025				
Objectives of class					
<p>This course is designed to introduce you to the scientific study of human nature. You will learn why and how scientists ask question about the sensation and perception and the relation of brain and behavior.You will also learn about the research methods to measure the perception and cognition used in the field of psychology and cognitive science.Finally, you will be able to create your own experiments using the ‘OpenSesame’, worldwide well-known software for creating experiments for psychology, cognitive science, neuroscience and experimental economics.</p> <p>This course is designed to introduce you to the scientific study of human nature. You will learn why and how scientists ask question about the sensation and perception and the relation of brain and behavior.You will also learn about the research methods to measure the perception and cognition used in the field of psychology and cognitive science.Finally, you will be able to create your own experiments using the ‘OpenSesame’, worldwide well-known software for creating experiments for psychology, cognitive science, neuroscience and experimental economics.</p>					
Contents of class					
<p>1. [face-to-face or remote] Introduction to “Science of Human Sensation and Perception”</p> <p>2. [on-demand] Video (MIT open courseware) and short quiz (assignment)</p> <p>3. [face-to-face or remote] Measuring Perception – research methodology –</p> <p>4. [on-demand] Short quiz and Online experiment (assignment)</p> <p>5. [face-to-face or remote] Workshop for creating experiments using ”OpenSesame”</p> <p>6-7. [on-demand] Perform experiment and analyze your own data (assignment)</p> <p>Note: If there is any changes about a class schedule, it will be informed on Google Classroom or KYOMU JOHO SYSTEM.</p> <p>1. [face-to-face or remote] Introduction to “Science of Human Sensation and Perception”</p> <p>2. [on-demand] Video (MIT open courseware) and short quiz (assignment)</p> <p>3. [face-to-face or remote] Measuring Perception – research methodology –</p> <p>4. [on-demand] Short quiz and Online experiment (assignment)</p> <p>5. [face-to-face or remote] Workshop for creating experiments using ”OpenSesame”</p> <p>6-7. [on-demand] Perform experiment and analyze your own data (assignment)</p> <p>Note: If there is any changes about a class schedule, it will be informed on Google Classroom or KYOMU JOHO SYSTEM.</p>					
Self Preparation and Review					
<p>Read the documents provided before each lecture. Review the lectures in consultation with the references and other resources such as the Internet.</p> <p>Read the documents provided before each lecture. Review the lectures in consultation with the references and other resources such as the Internet.</p>					
Related subjects					
Human Sensation and Perception I I					
Human Sensation and Perception I I					
Notes for textbook					
Documents (pdfs of the textbook and slides) will be provided via web before commencement of the lectures.					
Documents (pdfs of the textbook and 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.	Publisher	W. W. Norton & Company	Publish year
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						
N/A						
N/A						
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						
To be able to explain the differences between traditional information processing and human information processing						
To be able to discuss research concepts based on cognitive neurosciences, which will replace current technologies						
To be able to discuss human-machine symbiosis						
Evaluation of achievement						
Grades will be based on theme reports from each lecture (60%) and the final report (40%)						
S: total points, 90 or higher (out of 100 points).						
A: total points, 80 or higher (out of 100 points).						
B: total points, 70 or higher (out of 100 points).						
C: total points, 60 or higher (out of 100 points).						
Grades will be based on theme reports from each lecture (60%) and the final report (40%)						
S: total points, 90 or higher (out of 100 points).						
A: total points, 80 or higher (out of 100 points).						
B: total points, 70 or higher (out of 100 points).						
C: total points, 60 or higher (out of 100 points).						
Examination						
レポートで実施						
By Report						
Details of examination						
N/A						
N/A						
Other information						
Please contact Prof. Nakauchi (F2-702-2, nakauchi@tut.jp) if you have any questions.						
Please contact Prof. Nakauchi (F2-702-2, nakauchi@tut.jp) if you have any questions.						
Reference URL						
Will be announced during the lecture.						
Will be announced during the lecture.						
Office hours						
Anytime, but contact to Prof.Nakauchi by e-mail beforehand.						
Anytime, but contact to Prof.Nakauchi by e-mail beforehand.						
Relations to attainment objectives of learning and education						
(C) 高度な知識を統合的・発展的に活用できる実践力・創造力 情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。						
(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, vision						
cognitive neurosciences, perception, vision						

(D53030490)Advanced X Reality and Psychology 1[Advanced X Reality and Psychology 1]

Subject name[English]	Advanced X Reality and Psychology 1[Advanced X Reality and Psychology 1]				
Schedule number	D53030490	Subject area	Advanced Computer Science and Engineering	Required or elective	Elective
Time of starting a course	Fall1 term	Day of the week,period	Thu.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]	北崎 充晃 KITAZAKI Michiteru				
Numbering	CMP_DOC73025				
Objectives of class					
<p>After the course, students will understand the principles of X reality (cross reality: XR) including virtual reality (VR), mixed reality (MR), and augmented reality (AR) on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.</p> <p>After the course, students will understand the principles of X reality (cross reality: XR) including virtual reality (VR), mixed reality (MR), and augmented reality (AR) on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.</p>					
Contents of class					
<p>講義は全て英語で行われます(All lectures are conducted in English).</p> <p>X Reality including Virtual Reality, Mixed Reality, and Augmented Reality is explained about its mechanisms and functions not only in the engineering perspective but also psychological perspective. The final part of the class is composed of students' presentations of their original application, device or idea on X Reality and the discussion on it.</p> <p>(on-demand) 1. Introduction to XR and Psychology (on-demand) 2. Two components of reality (on-demand) 3. Visual reality, Mixed Reality and Augmented reality (on-demand) 4. Multi- and Cross-modality phenomenon (face-to-face / online interactive) 5. Embodied cognition and Augmented human (face-to-face / online interactive) 6. Presentations by students (face-to-face / online interactive) 7. Presentations by students</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.</p> <p>X Reality including Virtual Reality, Mixed Reality, and Augmented Reality is explained about its mechanisms and functions not only in the engineering perspective but also psychological perspective. The final part of the class is composed of students' presentations of their original application, device or idea on X Reality and the discussion on it.</p> <p>(on-demand) 1. Introduction to XR and Psychology (on-demand) 2. Two components of reality (on-demand) 3. Visual reality, Mixed Reality and Augmented reality (on-demand) 4. Multi- and Cross-modality phenomenon (face-to-face / online interactive) 5. Embodied cognition and Augmented human (face-to-face / online interactive) 6. Presentations by students (face-to-face / online interactive) 7. Presentations by students</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.</p>					
Self Preparation and Review					
<p>Read the documents provided before each lecture. Review the lectures in consultation with the references provided and other resources such as scientific articles and research youtube video.</p> <p>Read the documents provided before each lecture. Review the lectures in consultation with the references provided and other resources such as scientific articles and research youtube video.</p>					
Related subjects					
X Reality and Psychology 2					

<p>Sensation and Perception 1 and 2 X Reality and Psychology 2 Sensation and Perception 1 and 2</p>
<p>Notes for textbook NA NA</p>
<p>Notes for reference Read the documents provided before each lecture. Review the lectures in consultation with references and other resources such as scientific articles and youtube research video. Read the documents provided before each lecture. Review the lectures in consultation with references and other resources such as scientific articles and youtube research video.</p>
<p>Goals to be achieved To understand fundamentals on perception and cognition as basics for virtual reality (VR) To understand principles of virtual reality (VR), mixed reality (MR), and augmented reality (AR) To understand current findings on VR/MR/AR research To consider the benefits and challenges of VR/MR/AR on the future society To understand fundamentals on perception and cognition as basics for virtual reality (VR) To understand principles of virtual reality (VR), mixed reality (MR), and augmented reality (AR) To understand current findings on VR/MR/AR research To consider the benefits and challenges of VR/MR/AR on the future society</p>
<p>Evaluation of achievement Grades will be based on performance in each lecture (30%) and the final report (70%) 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) Grades will be based on performance in each lecture (30%) and the final report (70%) 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)</p>
<p>Examination レポートで実施 By Report</p>
<p>Details of examination N/A N/A</p>
<p>Other information N/A N/A</p>
<p>Reference URL N/A N/A</p>
<p>Office hours One hour after lecture One hour after lecture</p>
<p>Relations to attainment objectives of learning and education</p> <p>(C) 高度な知識を統合的・発展的に活用できる実践力・創造力 情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。</p> <p>(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.</p>
<p>Key words virtual reality, augmented reality, cognition virtual reality, augmented reality, cognition</p>

(D53030500)Advanced X Reality and Psychology 2[Advanced X Reality and Psychology 2]

Subject name[English]	Advanced X Reality and Psychology 2[Advanced X Reality and Psychology 2]				
Schedule number	D53030500	Subject area	Advanced Computer Science and Engineering	Required or elective	Elective
Time of starting a course	Fall2 term	Day of the week,period	Thu.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]	松井 淑恵, 南 哲人 MATSUI Toshie, MINAMI Tetsuto				
Numbering	CMP_DOC73025				
Objectives of class					
<p>仮想現実(virtual reality, VR)、複合現実(mixed reality, MR)、拡張現実(augmented reality, AR)、およびクロスリアリティ(cross reality, XR)の原理を、心理的、生理学的、および機能レベルで理解できるようになります。また、将来の社会におけるVR/MR/AR/XRの利点と課題についての理解を深めます。</p> <p>After the course, students will understand the principles of virtual reality (VR), mixed reality (MR), augmented reality (AR), and X reality (cross reality: XR), on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.</p>					
Contents of class					
<p>X reality and Psychology I(第一クォーター)で学んだ、視覚認知、聴覚認知、触覚およびその他のモダリティの認知、クロスモーダル認知、VR、MR、およびARについて、関連する話題についての講義と演習を行います。</p> <p>第1週 導入(対面) 第2週 計測手法一般(オンデマンド) 第3週 脳波(オンデマンド) 第4週 眼球運動(オンデマンド) 第5週 空間聴覚(オンデマンド) 第6週 バイノーラル聴覚と音のリアリティ(オンデマンド) 第7週 視覚と聴覚のインタラクション(オンデマンド)</p> <p>本学の新型コロナウイルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。</p> <p>授業実施形態が変更になる場合は、GoogleClassroomまたは教務情報システムより通知します。</p> <p>Lectures and project works related topics on X reality and Psychology I (1st quarter): visual cognition, auditory cognition, tactile and other modality cognition, cross-modal cognition, VR, MR, and AR.</p> <p>Week 1. Introduction (face to face) Week 2. Methods of X reality and Psychology (On-demand) Week 3. EEG (On-demand) Week 4. Eye-tracking (On-demand) Week 5. Spatial hearing (On-demand) Week 6. Binaural hearing and sound reality (On-demand) Week 7. Interaction between the visual and auditory system (On-demand)</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change. If there is any changes about a class schedule, we will inform you on Google Classroom or KYOMU JOHO SYSTEM.</p>					
Self Preparation and Review					
Related subjects					
<p>X Reality and Psychology I Human perception and sensation X Reality and Psychology I Human perception and sensation</p>					
Notes for textbook					
授業中にハンドアウトを配布します。					

Handouts will be distributed in the class.

Notes for reference

特になし
N/A

Goals to be achieved

仮想現実 (Virtual Reality)、複合現実 (Mixed Reality)、拡張現実 (Augmented Reality)、およびクロスリアリティ (Crossed reality) の原理を、心理的、生理学的、および機能レベルにおける理解。また、将来の社会における VR/MR/AR/XR の利点と課題についての理解

To understand the principles of virtual reality (VR), mixed reality (MR), augmented reality (AR), and X reality (cross reality: XR), on psychological, physiological, and functional levels. And to understand the benefits and challenges of VR/MR/AR/XR on the future society.

Evaluation of achievement

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

S: レポートの合計点 (100 点満点) が 90 点以上

A: レポートの合計点 (100 点満点) が 80 点以上

B: レポートの合計点 (100 点満点) が 70 点以上

C: レポートの合計点 (100 点満点) が 60 点以上

Students who attend all the classes will be evaluated as follows:

S: Obtained total points of weekly assignments, 90 or higher (out of 100 points).

A: Obtained total points of weekly assignments, 80 or higher (out of 100 points).

B: Obtained total points of weekly assignments, 70 or higher (out of 100 points).

C: Obtained total points of weekly assignments, 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

特になし
N/A

Other information

特になし
N/A

Reference URL

特になし
N/A

Office hours

必要に応じて随時対応します。メールなどで事前に連絡を取ってください。

On a necessary basis. Please contact me by e-mail in advance.

Relations to attainment objectives of learning and education

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

情報・知能工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、身につけている。

(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

(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	Applied Chemistry and Life Science			Begging 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	COM_DOC71015				
Objectives of class					
<p>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.</p> <p>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.</p>					
Contents of class					
<p>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.</p> <p>1) Presentations</p> <p>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.</p> <p>2) Title and abstract of presentation</p> <p>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.</p> <p>3) Report you will submit</p> <p>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.</p> <p>4) Schedule of your presentation</p> <p>Please check the schedule given before the semester begins.</p> <p>5) Absence from the class</p> <p>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.</p>					
Self Preparation and Review					
Related subjects					
N/A					
Notes for textbook					
N/A					
Notes for reference					
N/A					
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

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

Key words

(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 elective or	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	CHE_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 lesson 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://chem.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

(D54010090)Seminar on Applied Chemistry and Life Science 2[Seminar on Applied Chemistry and Life Science 2]

Subject name[English]	Seminar on Applied Chemistry and Life Science 2[Seminar on Applied Chemistry and Life Science 2]				
Schedule number	D54010090	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	CHE_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 lesson for the students is to expand the knowledge and presentation skills acquired in Seminar on Seminar on Applied Chemistry 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 Applied Chemistry and Life Sciences 1 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://chem.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

(D54020010)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D54020010	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	Applied Chemistry and Life Science			Begging grade	D1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中 三郎 kyoumu iinkai fukuuintyou, TANAKA Saburo				
Numbering	COM_DOC51005				
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					
<p>* 1st week(2020.10.7):Guidance Introduction face to face, 1st module("Research Misconduct") in e-learning</p> <p>* 2nd – 5th week(October 14 – November 4): 2nd – 6th modules in e-learning</p> <p>– 2nd moudle: "Ethical Issues in the Management of Data in Engineering Research"</p> <p>– 3rd moudle: "Responsible Authorship"</p> <p>– 4th moudle: "Ethical Issues in the Peer Review and Publication of Engineering Research"</p> <p>– 5th moudle: "Collaborative Research in Engineering Fields"</p> <p>– 6th moudle: "Whistleblowing and the Obligation to Protect the Public"</p> <p>– 7th moudle: "Managing Public Research Funds"</p> <p>Submit the e-learning Certificate to the Education Division.</p> <p>* 6th week(November 11 – November 17): Discussion with supervisor</p> <p>* 7th week(November 18 2020) : make a final report</p>					
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					
N/A					
Notes for reference					
<p>For the Sound Development of Science ?The Attitude of a Conscientious Scientist</p> <p>Japan Society for the Promotion of Science Editing Committee , MARUZEN PUBLISHING</p> <p>2015 ISBN978-4-621-08938-5</p> <p>(PDF : https://www.jsps.go.jp/j-kousei/data/rinri.pdf)</p>					
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 report(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 reports, 90 or higher (out of 100 points).					
A: Obtained total points of reports, 80 or higher (out of 100 points).					
B: Obtained total points of reports, 70 or higher (out of 100 points).					
C: Obtained total points of 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
N/A
Reference URL
N/A
Office hours
Before/after the class
Relations to attainment objectives of learning and education
(B) 技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。
(A) 幅広い人間性と考え方 人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について考える能力を身につけている。
(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; and have the ability to set, solve and evaluate technical issues in society
(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
Key words
Research Ethics, Conflict of Interest, Legal Compliance, Research Misconduct, Confidentiality Obligation, Security Export Control Policy, Copyright, Professionalism

(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	Applied Chemistry and Life Science			Beggining grade	D1
Charge teacher name[Roman alphabet mark]	吉田 絵里, 沼野 利佳, 吉田 祥子 YOSHIDA Eri, NUMANO Rika, YOSHIDA Sachiko				
Numbering	CHE_DOC73225				
Objectives of class					
To acquire knowledge of advanced biotechnology including biology, biochemistry, physiology and engineering.					
Contents of class					
<p>1. Neural physiology and sensing (Yoshida, S) remote simultaneous interactive 1-1 Function and diversity of physiological substances remote simultaneous interactive 1-2 Information transmission between neurons remote simultaneous interactive 1-3 Brain function and neuronal circuits remote simultaneous interactive 1-4 Neuronal development and environmental materials remote simultaneous interactive 1-5 Memory and emotion</p> <p>2. Neural physiology and sensing (Numano, R) 2-1 The method to visualize biological phenomena (mainly on circadian rhythms) 2-2 The science topics 2-3 topicsThe method to visualize biological phenomena (mainly on neurosciences) 2-4 The science topics 2.Molecular biology 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)</p> <p>3. Bio-related polymer chemistry and engineering (Yoshida, E) (on demand) 3-1 Bio-related nanomaterials (on demand) 3-2 Design of bio-related polymers (on demand) 3-3 Molecular self-assembly in vivo (on demand) 3-4 Self-assembly of synthetic polymers (on demand) 3-5 Supramolecular chemistry and engineering</p> <p>Due to changes in the standards for activities to prevent the spread of COVID-19 infection at Toyohashi University of Technology, there may be changes in the class content and grade evaluation method. When the class form changes, you will be notified from GoogleClassroom or the Academic Affairs Information System.</p>					
Self Preparation and Review					
Related subjects					
Advanced Polymer Engineering					
Notes for textbook					
No textbook is needed.					
Notes for reference					
N/A					
Goals to be achieved					
To understand cutting-edge biotechnology based on cell biology, physiology, RNA engineering, molecular self-assembly, and bio-related nanomaterials.					
Evaluation of achievement					

Course Grade:

Reports (by Yoshida S, Numano, and Yoshida E) = 100%

Evaluating:

S: Total score of 90 or higher

A: 80 through 89

B: 70 through 79

C: 60 through 69

Examination

レポートで実施

By Report

Details of examination

N/A

Other information

Sachiko Yoshida: ex.6802, syoshida@tut.jp, B-406

Rika Numano: ex.6902, numano@tut.jp, G-407

Eri Yoshida: ex.6814, yoshida.eri.gu@tut.jp, B-503

Reference URL

N/A

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	Applied Chemistry and Life Science			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	CHE_DOC72225				
Objectives of class					
<p>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.</p>					
Contents of class					
<p>[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)</p> <p>[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)</p> <p>[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).</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change. If there is any changes in the class schedule, we will inform you on Google Classroom or KYOMU JOHO SYSTEM.</p>					
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	Publisher	Springer	Publish year 2009

		Lahmani				
Notes for reference						
<p>#2 can be accessed in the university network. http://link.springer.com/book/10.1007%2F978-3-540-88633-4 (R. Tero)</p>						
Goals to be achieved						
To obtain the in-depth understanding of topic relevant to Environmental and Life Science.						
Evaluation of achievement						
The evaluation will be made based on the score of the report and presentation.						
<p>[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).</p>						
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@chem.tut.ac.jp), phone: 6803 R.Tero: room (G-402), e-mail (tero@tut.jp), phone: 6917						
Reference URL						
Office hours						
Anytime if available, however, an appointment by e-mail is strongly recommended.						
Relations to attainment objectives of learning and education						
<p>(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</p>						
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	Fri.2~2	Credit(s)	2
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]	松本 明彦, 水嶋 生智, 小口 達夫, 高島 和則 MATSUMOTO Akihiko, MIZUSHIMA Takanori, OGUCHI Tatsuo, TAKASHIMA Kazunori				
Numbering	CHE_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 explained in the course.					
1. Physical chemistry and inorganic chemistry for an understanding of state-of-art technologies used in various fields including environmental protection and/or restoration (1) Physical chemistry and colloid & interface science [A. Matsumoto] (Face to Face) (2) Inorganic chemistry and catalysis chemistry [T. Mizushima] (3) Reaction mechanism of combustion and related phenomena.[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 examples of the techniques [All instructors]					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of COVID-19, the course content and evaluation of achievement are subject to change. If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.					
Self Preparation and Review					
Follow the instructions of each professors.					
Related subjects					
Basic understanding on physical chemistry and inorganic chemistry is essential.					
Notes for textbook					
Reference handouts will be provided in each class.					
Notes for reference					
N/A					
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-chem.tut.ac.jp (replace "-at-" by "@")
Takanori Mizushima: room # B-303, E-mail: mizushima-at-chem.tut.ac.jp (replace "-at-" by "@")
Tatsuo Oguchi: room # G-406, E-mail: oguchi-at-tut.jp(replace "-at-" by "@")
Kazunori Takashima: room # G-504, E-mail: takashima-at-ens.tut.ac.jp(replace "-at-" with "@")

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

Reference URL

N/A

Office hours

At any time but booking is required in advance.

Relations to attainment objectives of learning and education

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

応用化学・生命工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(E) 最新の技術や社会環境の変化に対する探究心と持続的学習力

社会、環境、技術等の変化の本質を探求し、生涯にわたって自発的に計画し学習する能力を身につけている。

(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

(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

(D54030090)Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]

Subject name[English]	Seminar on Interdisciplinary Research[Seminar on Interdisciplinary Research]				
Schedule number	D54030090	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.3~3	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, 教務委員会副委員長 4kei kyomu Iin-S, kyoumu iinkai fukuuintyout				
Numbering	COM_DOC71025				
Objectives of class					
<p>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.</p> <p>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.</p>					
Contents of class					
<p>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.</p> <p>1) Presentations</p> <p>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.</p> <p>2) Title and abstract of presentation</p> <p>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.</p> <p>3) Report you will submit</p> <p>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.</p> <p>4) Schedule of your presentation</p> <p>Please check the schedule given before the semester begins.</p> <p>5) Absence from the class</p> <p>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.</p>					
Self Preparation and Review					
Related subjects					
N/A					
Notes for textbook					
N/A					
Notes for reference					
N/A					
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

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

Key words

(D55020010)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	D55020010	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			Begging grade	D1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中 三郎 kyoumu iinkai fukuuintyou, TANAKA Saburo				
Numbering	COM_DOC51005				
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(2020.10.7):Guidance Introduction face to face, 1st module("Research Misconduct") in e-learning					
* 2nd – 5th week(October 14 – November 4): 2nd – 6th modules in e-learning					
– 2nd moudle: "Ethical Issues in the Management of Data in Engineering Research"					
– 3rd moudle: "Responsible Authorship"					
– 4th moudle: "Ethical Issues in the Peer Review and Publication of Engineering Research"					
– 5th moudle: "Collaborative Research in Engineering Fields"					
– 6th moudle: "Whistleblowing and the Obligation to Protect the Public"					
– 7th moudle: "Managing Public Research Funds"					
Submit the e-learning Certificate to the Education Division.					
* 6th week(November 11 – November 17): Discussion with supervisor					
* 7th week(November 18 2020) : 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					
N/A					
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 report(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 reports, 90 or higher (out of 100 points).					
A: Obtained total points of reports, 80 or higher (out of 100 points).					
B: Obtained total points of reports, 70 or higher (out of 100 points).					
C: Obtained total points of 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
N/A
Reference URL
N/A
Office hours
Before/after the class
Relations to attainment objectives of learning and education
<p>(B) 技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。</p> <p>(A) 幅広い人間性と考え方 人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について考える能力を身につけている。</p> <p>(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; and have the ability to set, solve and evaluate technical issues in society</p> <p>(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</p>
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					
<ol style="list-style-type: none"> 1. Introduction and Analogical understanding of structural instability behavior 2. Effects of imperfections on the structural instability 3. Structural instability modes and large deflection modes 4. Physical experiment and its difficulty on structural instability problems 5. Mathematical analysis and its difficulty on structural instability problems 6. Relationship between experiments and numerical simulations 7. Design procedures for the instability of spatial structures 					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change. If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.					
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			Begging 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					
建築物の耐震設計における振動解析技術と耐震設計法を学ぶ Learn about a vibration analysis technology in seismic design of building and seismic design method					
Contents of class					
1-2 週間、1 自由度システムの振動 3-4 週、弾性地震応答解析、数値積分法 5-6 週、多自由度振動系、固有値解析 7-8 週間、応答スペクトル 9 週目、弾塑性地震応答解析 10 週目、等価線形化法 11 週、設計入力地盤運動 12~13 週、エネルギー法の基本 14 週、限界強度計算の基本					
「大学の新型コロナウイルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。」 1-2 weeks, Vibration of one 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 weeks, Basic of the limit strength calculation					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.					
Self Preparation and Review					
Related subjects					
Notes for textbook					
Notes for reference					
Goals to be achieved					
振動解析の背景と理論を理解し、振動解析に基づく構造物の設計手法を理解する。 Understand the background and theory of vibration analysis and the design method of the structure based on vibration analysis.					
Evaluation of achievement					
レポートに基づき評価する Grade is evaluated based on the report.					
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 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

(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					
<p>1) To gain the practical knowledge of Sustainable urban planning.</p> <p>2) To learn the advanced methods of urban planning which is based on “Sustainable development” conception.</p> <p>3) To learn the theory and the movement of recent urban planning from EU, US, Japan.</p>					
Contents of class					
<p>all classes but the first guidance and the last oral presentation will be done by on-demand(You can take the class whenever you want.)</p> <p>The major topics that will be addressed in this class are the followings,</p> <ol style="list-style-type: none"> 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. <p>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.</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.</p>					
Self Preparation and Review					
Related subjects					
<p>The following knowledge is desirable,</p> <ol style="list-style-type: none"> 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					
<ol style="list-style-type: none"> 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					
<p>Evaluation is based primarily on reports given by each instructor(100 points).</p> <p>Each report is evaluated by each instructor.</p> <p>The average of report scores is used as subject evaluation.</p> <p>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.</p>					
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
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

(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 特になし N/A					
Notes for reference 特になし N/A					
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 特になし N/A					
Other information 特になし D-803, 0532-44-6844, k-miura@ace.tut.ac.jp D-808, 0532-44-6849, t.matsuda@ace.tut.ac.jp					
Reference URL preparing					
Office hours 12:00-14:00 on Tuesday:Miura, 12:00-13:00 on Wenesday:Matsuda					
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			Begging grade	D1
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

(S51010080)Japanese Industrial Internship Program[Japanese Industrial Internship Program]

Subject name[English]	Japanese Industrial Internship Program[Japanese Industrial Internship Program]				
Schedule number	S51010080	Subject area	Advanced Mechanical Engineering	Required or elective	Required
Time of starting a course	Fall term	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]	柴田 隆行 SHIBATA Takayuki				
Numbering	COM_DOC79015				
Objectives of class	<p>博士後期課程2年次に、日本企業(地域の中堅・中小企業等)での1か月間程度の長期インターンシップを実施し、日本企業のものづくりの理念と方法論を体験的に学習することで、母国の企業と日本企業との橋渡し人材を育成することを目的とする。</p> <p>In the second year of the doctoral program, the long-term internship for about one month is conducted at a Japanese industrial company (e.g., small and medium-sized enterprises in the neighboring areas). The aim is to develop human resources that can bridge between Japanese companies and their home country through hands-on learning of the manufacturing philosophy and methodology of Japanese industrial companies.</p>				
Contents of class	<p>企業や研究機関などでの実践的な問題解決能力と技術を養うために、指導教員および企業指導責任者との密接なコミュニケーションを通じて、各専門分野での解決すべき研究開発課題を提供する。</p> <p>In order to cultivate the practical problem-solving ability and techniques in industries or research institutions, academic and company/institutional supervisors will provide practical problems in a specialized field through close communication.</p>				
Self Preparation and Review	<p>インターンシップ開始前に実施内容について指導教員と十分に話し合うこと。</p> <p>Students are expected to discuss a preferable internship topic with academic supervisors before the starting internship.</p>				
Related subjects	特になし N/A				
Notes for textbook	実務訓練先の担当者の指示に従うこと。 Follow instructions provided by your company/institutional supervisors.				
Notes for reference	特になし N/A				
Goals to be achieved	<p>特に企業・研究機関等で実務に従事することによって、実践的な問題解決能力・計画力・創造力等を体得するとともに、日本企業のものづくりの理念と方法論の基礎知識を修得する。</p> <p>While engaging practical activities in an industrial company or research institution, students are expected to improve the practical problem-solving ability, planning ability, and creativity, as well as gaining basic knowledge about the manufacturing philosophy and methodology of Japanese industrial companies.</p>				
Evaluation of achievement	<p>実務訓練担当者の評価書および/若しくは学生の最終成果報告書(レポート)によって総合的に評価する。 評価S:90点以上, 評価A:80点以上, 評価B:70点以上, 評価C:60点以上</p> <p>Comprehensive evaluation based on evaluation sheets by company/institutional supervisors and/or students' final reports. Grade levels are C (60% - less than 70%), B (70%- less than 80%), A (80% - less than 90 %) and S (90% or over).</p>				
Examination	試験期間中には何も行わない None during exam period				
Details of examination	特になし N/A				
Other information	詳細については指導教員に問い合わせること。 For any questions, contact your supervisor.				
Reference URL	特になし				

N/A

Office hours

特になし

N/A

Relations to attainment objectives of learning and education

(B) 技術者・研究者としての正しい倫理観と社会性

高度上級技術者・研究者としての専門的・倫理的責任を有し、社会における技術的課題を発見・設定・解決・評価する能力を身につけている

(C) 高度な知識を統合的・発展的に活用できる実践力・創造力

機械工学およびその関連分野に関する高度な知識を修得し、それらを広範囲に有機的に連携させた研究開発方法論を体得することで、

課題解決のための独創的な技術を創造し、実践できる能力を身につけている。

(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

(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

インターンシップ

Internship

(S51010090)Teaching Practice on Global Education[Teaching Practice on Global Education]

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S51010090	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	1~
Department Offered	Mechanical Engineering			Beggining grade	D1
Charge teacher name[Roman alphabet mark]	池松 峰男 IKEMATSU Mineo				
Numbering	COM_DOC71011				
Objectives of class					
As a result of this course, students will develop: -English presentation skills relating to course topics -STEM education skills applying design thinking -Intercultural communication skills to give lectures for multi-cultural students As a result of this course, students will develop: -English presentation skills relating to course topics -STEM education skills applying design thinking -Intercultural communication skills to give lectures for multi-cultural students					
Contents of class					
- Class preparation (orientation, lecture about the presentation, etc.) - Students will provide active learning lectures for TUT students and local high school students. - Class preparation (orientation, lecture about the presentation, etc.) - Students will provide active learning lectures for TUT students and local high school students.					
Self Preparation and Review					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English. Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Related subjects					
N/A N/A					
Notes for textbook					
N/A N/A					
Notes for reference					
N/A N/A					
Goals to be achieved					
Students will be able to: -provide lectures using English presentation slide -give lectures to develop students' STEM skills applying design thinking -understand intercultural communication to accomplish these lectures Students will be able to: -provide lectures using English presentation slide -give lectures to develop students' STEM skills applying design thinking -understand intercultural communication to accomplish these lectures					
Evaluation of achievement					
Report (30%), Contribution (participation, presentation, etc.) (70%) S: ≥ 90 A: ≥ 80					

B: ≥ 70
C: ≥ 60
Report (30%), Contribution (participation, presentation, etc.) (70%)
S: ≥ 90
A: ≥ 80
B: ≥ 70
C: ≥ 60

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A
N/A

Other information

N/A
N/A

Reference URL

N/A
N/A

Office hours

Drop-in basis.
Drop-in basis.

Relations to attainment objectives of learning and education

機械工学専攻

(D) グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Mechanical Engineering for Doctoral Degree

(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

Key words

(S52010080)Japanese Industrial Internship Program[Japanese Industrial Internship Program]

Subject name[English]	Japanese Industrial Internship Program[Japanese Industrial Internship Program]				
Schedule number	S52010080	Subject area	Advanced Electrical and Electronic Information Engineering	Required or elective	Required
Time of starting a course	Fall term	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			Begging grade	D2
Charge teacher name[Roman alphabet mark]	柴田 隆行 SHIBATA Takayuki				
Numbering	COM_DOC79015				
Objectives of class					
<p>博士後期課程2年次に、日本企業(地域の中堅・中小企業等)での1か月間程度の長期インターンシップを実施し、日本企業のものづくりの理念と方法論を体験的に学習することで、母国の企業と日本企業との橋渡し人材を育成することを目的とする。</p> <p>In the second year of the doctoral program, the long-term internship for about one month is conducted at a Japanese industrial company (e.g., small and medium-sized enterprises in the neighboring areas). The aim is to develop human resources that can bridge between Japanese companies and their home country through hands-on learning of the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Contents of class					
<p>企業や研究機関などでの実践的な問題解決能力と技術を養うために、指導教員および企業指導責任者との密接なコミュニケーションを通じて、各専門分野での解決すべき研究開発課題を提供する。</p> <p>In order to cultivate the practical problem-solving ability and techniques in industries or research institutions, academic and company/institutional supervisors will provide practical problems in a specialized field through close communication.</p>					
Self Preparation and Review					
<p>インターンシップ開始前に実施内容について指導教員と十分に話し合うこと。</p> <p>Students are expected to discuss a preferable internship topic with academic supervisors before the starting internship.</p>					
Related subjects					
<p>特になし N/A</p>					
Notes for textbook					
<p>実務訓練先の担当者の指示に従うこと。</p> <p>Follow instructions provided by your company/institutional supervisors.</p>					
Notes for reference					
<p>特になし N/A</p>					
Goals to be achieved					
<p>特に企業・研究機関等で実務に従事することによって、実践的な問題解決能力・計画力・創造力等を体得するとともに、日本企業のものづくりの理念と方法論の基礎知識を修得する。</p> <p>While engaging practical activities in an industrial company or research institution, students are expected to improve the practical problem-solving ability, planning ability, and creativity, as well as gaining basic knowledge about the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Evaluation of achievement					
<p>実務訓練担当者の評価書および/若しくは学生の最終成果報告書(レポート)によって総合的に評価する。</p> <p>評価S:90点以上, 評価A:80点以上, 評価B:70点以上, 評価C:60点以上</p> <p>Comprehensive evaluation based on evaluation sheets by company/institutional supervisors and/or students' final reports. Grade levels are C (60% - less than 70%), B (70%- less than 80%), A (80% - less than 90 %) and S (90% or over).</p>					
Examination					
<p>試験期間中には何も行わない None during exam period</p>					
Details of examination					
<p>特になし N/A</p>					
Other information					
<p>詳細については指導教員に問い合わせること。</p>					

For any questions, contact your supervisor.

Reference URL

特になし
N/A

Office hours

特になし
N/A

Relations to attainment objectives of learning and education

Key words

インターンシップ
Internship

(S52010090)Teaching Practice on Global Education[Teaching Practice on Global Education]

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S52010090	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	1~
Department Offered	Electrical and Electronic Information Engineering			Beggining grade	D1
Charge teacher name[Roman alphabet mark]	池松 峰男 IKEMATSU Mineo				
Numbering	COM_DOC71011				
Objectives of class					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
Contents of class					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
Self Preparation and Review					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Related subjects					
N/A					
N/A					
Notes for textbook					
N/A					
N/A					
Notes for reference					
N/A					
N/A					
Goals to be achieved					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Evaluation of achievement					
Report (30%), Contribution (participation, presentation, etc.) (70%)					

S: ≥ 90

A: ≥ 80

B: ≥ 70

C: ≥ 60

Report (30%), Contribution (participation, presentation, etc.) (70%)

S: ≥ 90

A: ≥ 80

B: ≥ 70

C: ≥ 60

Examination

試験期間中には何も行わない

None during exam period

Details of examination

N/A

N/A

Other information

N/A

N/A

Reference URL

N/A

N/A

Office hours

Drop-in basis.

Drop-in basis.

Relations to attainment objectives of learning and education

電気・電子情報工学専攻

(A) 幅広い人間性と考え方

人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について俯瞰的にとらえる能力を身につけている。

(D) グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Engineering of Electrical and Electronic Information Engineering for Doctoral Degree

(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

(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

(S53010080)Japanese Industrial Internship Program[Japanese Industrial Internship Program]

Subject name[English]	Japanese Industrial Internship Program[Japanese Industrial Internship Program]				
Schedule number	S53010080	Subject area	Advanced Computer Science and Engineering	Required or elective	Required
Time of starting a course	Fall term	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]	柴田 隆行 SHIBATA Takayuki				
Numbering	COM_DOC79015				
Objectives of class					
<p>博士後期課程2年次に、日本企業（地域の中堅・中小企業等）での1か月間程度の長期インターンシップを実施し、日本企業のものづくりの理念と方法論を体験的に学習することで、母国の企業と日本企業との橋渡し人材を育成することを目的とする。</p> <p>In the second year of the doctoral program, the long-term internship for about one month is conducted at a Japanese industrial company (e.g., small and medium-sized enterprises in the neighboring areas). The aim is to develop human resources that can bridge between Japanese companies and their home country through hands-on learning of the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Contents of class					
<p>企業や研究機関などでの実践的な問題解決能力と技術を養うために、指導教員および企業指導責任者との密接なコミュニケーションを通じて、各専門分野での解決すべき研究開発課題を提供する。</p> <p>In order to cultivate the practical problem-solving ability and techniques in industries or research institutions, academic and company/institutional supervisors will provide practical problems in a specialized field through close communication.</p>					
Self Preparation and Review					
<p>インターンシップ開始前に実施内容について指導教員と十分に話し合うこと。</p> <p>Students are expected to discuss a preferable internship topic with academic supervisors before the starting internship.</p>					
Related subjects					
<p>特になし N/A</p>					
Notes for textbook					
<p>実務訓練先の担当者の指示に従うこと。 Follow instructions provided by your company/institutional supervisors.</p>					
Notes for reference					
<p>特になし N/A</p>					
Goals to be achieved					
<p>特に企業・研究機関等で実務に従事することによって、実践的な問題解決能力・計画力・創造力等を体得するとともに、日本企業のものづくりの理念と方法論の基礎知識を修得する。</p> <p>While engaging practical activities in an industrial company or research institution, students are expected to improve the practical problem-solving ability, planning ability, and creativity, as well as gaining basic knowledge about the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Evaluation of achievement					
<p>実務訓練担当者の評価書および/若しくは学生の最終成果報告書(レポート)によって総合的に評価する。 評価S:90点以上, 評価A:80点以上, 評価B:70点以上, 評価C:60点以上</p> <p>Comprehensive evaluation based on evaluation sheets by company/institutional supervisors and/or students' final reports. Grade levels are C (60% - less than 70%), B (70%- less than 80%), A (80% - less than 90 %) and S (90% or over).</p>					
Examination					
<p>試験期間中には何も行わない None during exam period</p>					
Details of examination					
<p>特になし N/A</p>					
Other information					
<p>詳細については指導教員に問い合わせること。 For any questions, contact your supervisor.</p>					

Reference URL

特になし

N/A

Office hours

特になし

N/A

Relations to attainment objectives of learning and education**Key words**

インターンシップ

Internship

(S53010090)Teaching Practice on Global Education[Teaching Practice on Global Education]

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S53010090	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	1~
Department Offered	Computer Science and Engineering			Beggining grade	D1
Charge teacher name[Roman alphabet mark]	池松 峰男 IKEMATSU Mineo				
Numbering	COM_DOC71011				
Objectives of class					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
Contents of class					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
Self Preparation and Review					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Related subjects					
N/A					
N/A					
Notes for textbook					
N/A					
N/A					
Notes for reference					
N/A					
N/A					
Goals to be achieved					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Evaluation of achievement					
Report (30%), Contribution (participation, presentation, etc.) (70%)					
S: ≥ 90					

A: ≥ 80

B: ≥ 70

C: ≥ 60

Report (30%), Contribution (participation, presentation, etc.) (70%)

S: ≥ 90

A: ≥ 80

B: ≥ 70

C: ≥ 60

Examination

試験期間中には何も行わない

None during exam period

Details of examination

N/A

N/A

Other information

N/A

N/A

Reference URL

N/A

N/A

Office hours

Drop-in basis.

Drop-in basis.

Relations to attainment objectives of learning and education

情報・知能工学専攻

(A) 幅広い人間性と考え方

人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について俯瞰的にとらえる能力を身につけている。

(D) グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、身につけている。

Graduate Program of Computer Science and Engineering for Doctoral Degree

(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 one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members. Has sophisticated ability as a leader to contribute for the achievement the goal of team.

Key words

(S54010100)Japanese Industrial Internship Program[Japanese Industrial Internship Program]

Subject name[English]	Japanese Industrial Internship Program[Japanese Industrial Internship Program]				
Schedule number	S54010100	Subject area	Advanced Applied Chemistry and Life Science	Required or elective	Required
Time of starting a course	Fall term	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]	柴田 隆行 SHIBATA Takayuki				
Numbering	COM_DOC79015				
Objectives of class					
<p>博士後期課程2年次に、日本企業(地域の中堅・中小企業等)での1か月間程度の長期インターンシップを実施し、日本企業のものづくりの理念と方法論を体験的に学習することで、母国の企業と日本企業との橋渡し人材を育成することを目的とする。</p> <p>In the second year of the doctoral program, the long-term internship for about one month is conducted at a Japanese industrial company (e.g., small and medium-sized enterprises in the neighboring areas). The aim is to develop human resources that can bridge between Japanese companies and their home country through hands-on learning of the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Contents of class					
<p>企業や研究機関などでの実践的な問題解決能力と技術を養うために、指導教員および企業指導責任者との密接なコミュニケーションを通じて、各専門分野での解決すべき研究開発課題を提供する。</p> <p>In order to cultivate the practical problem-solving ability and techniques in industries or research institutions, academic and company/institutional supervisors will provide practical problems in a specialized field through close communication.</p>					
Self Preparation and Review					
<p>インターンシップ開始前に実施内容について指導教員と十分に話し合うこと。</p> <p>Students are expected to discuss a preferable internship topic with academic supervisors before the starting internship.</p>					
Related subjects					
<p>特になし N/A</p>					
Notes for textbook					
<p>実務訓練先の担当者の指示に従うこと。 Follow instructions provided by your company/institutional supervisors.</p>					
Notes for reference					
<p>特になし N/A</p>					
Goals to be achieved					
<p>特に企業・研究機関等で実務に従事することによって、実践的な問題解決能力・計画力・創造力等を体得するとともに、日本企業のものづくりの理念と方法論の基礎知識を修得する。</p> <p>While engaging practical activities in an industrial company or research institution, students are expected to improve the practical problem-solving ability, planning ability, and creativity, as well as gaining basic knowledge about the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Evaluation of achievement					
<p>実務訓練担当者の評価書および/若しくは学生の最終成果報告書(レポート)によって総合的に評価する。 評価S:90点以上, 評価A:80点以上, 評価B:70点以上, 評価C:60点以上</p> <p>Comprehensive evaluation based on evaluation sheets by company/institutional supervisors and/or students' final reports. Grade levels are C (60% - less than 70%), B (70%- less than 80%), A (80% - less than 90 %) and S (90% or over).</p>					
Examination					
<p>試験期間中には何も行わない None during exam period</p>					
Details of examination					
<p>特になし N/A</p>					
Other information					
<p>詳細については指導教員に問い合わせること。 For any questions, contact your supervisor.</p>					

Reference URL

特になし

N/A

Office hours

特になし

N/A

Relations to attainment objectives of learning and education**Key words**

インターンシップ

Internship

(S54010110)Teaching Practice on Global Education[Teaching Practice on Global Education]

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S54010110	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	1~
Department Offered	Applied Chemistry and Life Science			Begging grade	D1
Charge teacher name[Roman alphabet mark]	池松 峰男 IKEMATSU Mineo				
Numbering	COM_DOC71015				
Objectives of class					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
Contents of class					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
Self Preparation and Review					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Related subjects					
N/A					
N/A					
Notes for textbook					
N/A					
N/A					
Notes for reference					
N/A					
N/A					
Goals to be achieved					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Evaluation of achievement					
Report (30%), Contribution (participation, presentation, etc.) (70%)					
S: ≥ 90					

A: ≥ 80

B: ≥ 70

C: ≥ 60

Report (30%), Contribution (participation, presentation, etc.) (70%)

S: ≥ 90

A: ≥ 80

B: ≥ 70

C: ≥ 60

Examination

試験期間中には何も行わない

None during exam period

Details of examination

N/A

N/A

Other information

N/A

N/A

Reference URL

N/A

N/A

Office hours

Drop-in basis.

Drop-in basis.

Relations to attainment objectives of learning and education

応用化学・生命工学専攻

(A) 幅広い人間性と考え方

人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について俯瞰的にとらえる能力を身につけている。

(D) グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Applied Chemistry and Life Science for Doctoral Degree

(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 teammates as well as leadership ability to contribute to the team's achievements

Key words

(S55010080)Japanese Industrial Internship Program[Japanese Industrial Internship Program]

Subject name[English]	Japanese Industrial Internship Program[Japanese Industrial Internship Program]				
Schedule number	S55010080	Subject area	Advanced Architecture and Civil Engineering	Required or elective	Required
Time of starting a course	Fall term	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]	柴田 隆行 SHIBATA Takayuki				
Numbering	COM_DOC79015				
Objectives of class					
<p>博士後期課程2年次に、日本企業(地域の中堅・中小企業等)での1か月間程度の長期インターンシップを実施し、日本企業のものづくりの理念と方法論を体験的に学習することで、母国の企業と日本企業との橋渡し人材を育成することを目的とする。</p> <p>In the second year of the doctoral program, the long-term internship for about one month is conducted at a Japanese industrial company (e.g., small and medium-sized enterprises in the neighboring areas). The aim is to develop human resources that can bridge between Japanese companies and their home country through hands-on learning of the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Contents of class					
<p>企業や研究機関などでの実践的な問題解決能力と技術を養うために、指導教員および企業指導責任者との密接なコミュニケーションを通じて、各専門分野での解決すべき研究開発課題を提供する。</p> <p>In order to cultivate the practical problem-solving ability and techniques in industries or research institutions, academic and company/institutional supervisors will provide practical problems in a specialized field through close communication.</p>					
Self Preparation and Review					
<p>インターンシップ開始前に実施内容について指導教員と十分に話し合うこと。</p> <p>Students are expected to discuss a preferable internship topic with academic supervisors before the starting internship.</p>					
Related subjects					
<p>特になし N/A</p>					
Notes for textbook					
<p>実務訓練先の担当者の指示に従うこと。 Follow instructions provided by your company/institutional supervisors.</p>					
Notes for reference					
<p>特になし N/A</p>					
Goals to be achieved					
<p>特に企業・研究機関等で実務に従事することによって、実践的な問題解決能力・計画力・創造力等を体得するとともに、日本企業のものづくりの理念と方法論の基礎知識を修得する。</p> <p>While engaging practical activities in an industrial company or research institution, students are expected to improve the practical problem-solving ability, planning ability, and creativity, as well as gaining basic knowledge about the manufacturing philosophy and methodology of Japanese industrial companies.</p>					
Evaluation of achievement					
<p>実務訓練担当者の評価書および/若しくは学生の最終成果報告書(レポート)によって総合的に評価する。 評価S:90点以上, 評価A:80点以上, 評価B:70点以上, 評価C:60点以上</p> <p>Comprehensive evaluation based on evaluation sheets by company/institutional supervisors and/or students' final reports. Grade levels are C (60% - less than 70%), B (70%- less than 80%), A (80% - less than 90 %) and S (90% or over).</p>					
Examination					
<p>試験期間中には何も行わない None during exam period</p>					
Details of examination					
<p>特になし N/A</p>					
Other information					
<p>詳細については指導教員に問い合わせること。 For any questions, contact your supervisor.</p>					

Reference URL

特になし

N/A

Office hours

特になし

N/A

Relations to attainment objectives of learning and education**Key words**

インターンシップ

Internship

(S55010090)Teaching Practice on Global Education[Teaching Practice on Global Education]

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S55010090	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	1~
Department Offered	Architecture and Civil Engineering			Beggining grade	D1
Charge teacher name[Roman alphabet mark]	池松 峰男 IKEMATSU Mineo				
Numbering	COM_DOC71015				
Objectives of class					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
As a result of this course, students will develop:					
-English presentation skills relating to course topics					
-STEM education skills applying design thinking					
-Intercultural communication skills to give lectures for multi-cultural students					
Contents of class					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
- Class preparation (orientation, lecture about the presentation, etc.)					
- Students will provide active learning lectures for TUT students and local high school students.					
Self Preparation and Review					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.					
Related subjects					
N/A					
N/A					
Notes for textbook					
N/A					
N/A					
Notes for reference					
N/A					
N/A					
Goals to be achieved					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Students will be able to:					
-provide lectures using English presentation slide					
-give lectures to develop students' STEM skills applying design thinking					
-understand intercultural communication to accomplish these lectures					
Evaluation of achievement					
Report (30%), Contribution (participation, presentation, etc.) (70%)					
S: ≥90					

A: ≥ 80

B: ≥ 70

C: ≥ 60

Report (30%), Contribution (participation, presentation, etc.) (70%)

S: ≥ 90

A: ≥ 80

B: ≥ 70

C: ≥ 60

Examination

試験期間中には何も行わない

None during exam period

Details of examination

N/A

N/A

Other information

N/A

N/A

Reference URL

N/A

N/A

Office hours

Drop-in basis.

Drop-in basis.

Relations to attainment objectives of learning and education

建築・都市システム学専攻

(A) 幅広い人間性と考え方

人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について俯瞰的にとらえる能力を身につけている。

(D) グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現・発信するコミュニケーション力と、リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Architecture and Civil Engineering for Doctoral Degree

(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 with a wide view.

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

Key words