Syllabus

International Doctoral Degree Program

（2015-Spring 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**	1～3
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering					

Objectives of class

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

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

Contents of class

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

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

Self Preparation and Review

Related subjects

Inquire this of your supervisor.

Inquire this of your supervisor.

Notes for textbook

Inquire this of your supervisor.

Inquire this of your supervisor.

Notes for reference

Goals to be achieved

To acquire the ability of each student to discuss his/her doctor thesis research topic and topics related to his/her research field with his/her supervisor and specialists in his/her field.

To acquire the ability to write English technical papers.

To acquire the ability of each student to discuss his/her doctor thesis research topic and topics related to his/her research field with his/her supervisor and specialists in his/her field.

To acquire the ability to write English technical papers.

Evaluation of achievement

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

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

Examination

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Inquire this of your supervisor.

Inquire this of your supervisor.

Reference URL

Office hours

Inquire this of your supervisor.

Inquire this of your supervisor.

Relations to attainment objectives of learning and education

Key words

(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**	2～3
Department Offered	Mechanical Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering					

Objectives of class

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

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

Contents of class

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

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

Self Preparation and Review

Related subjects

Inquire this of your supervisor.

Inquire this of your supervisor.

Notes for textbook

Inquire this of your supervisor.

Inquire this of your supervisor.

Notes for reference

Goals to be achieved

To acquire the ability of each student to discuss his/her doctor thesis research topic and topics related to his/her research field with his/her supervisor and specialists in his/her field.

To acquire the ability to write English technical papers.

To acquire the ability of each student to discuss his/her doctor thesis research topic and topics related to his/her research field with his/her supervisor and specialists in his/her field.

To acquire the ability to write English technical papers.

Evaluation of achievement

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

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

Examination

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Inquire this of your supervisor.

Inquire this of your supervisor.

Reference URL

Office hours

Inquire this of your supervisor.

Inquire this of your supervisor.

Relations to attainment objectives of learning and education
Key words

(D51030010)Advanced Mechanical Systems[Advanced Mechanical Systems]

Subject name[English]	Advanced Mechanical Systems[Advanced Mechanical Systems]				
Schedule number	D51030010	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Mon.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Mechanical Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	河村 庄造, 足立 忠晴, 竹市 嘉紀 KAWAMURA Shozo, ADACHI Tadaharu, TAKEICHI Yoshinori				
Numbering					

Objectives of class

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

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

Contents of class

Prof. S. Kawamura
From 01 to 05 week
Vibration engineering of machines and structures is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the vibration engineering, and must present them. Practical modeling and simulation of structural vibration are understood through discussion based on the presentations.
Topics: Vibration engineering, Modeling and simulation of dynamic phenomena and so on.

Prof. T. Adachi
From 06 to 10 week
Mechanics of solids and structures including materials science is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the mechanics, and must present them. Practical mechanics and design of engineering materials and mechanical structures are understood through discussion based on the presentations.
Topics: Mechanics of solids and structures, Mechanical properties of materials, Design of mechanical components and so on.

Prof. Y. Takeichi
From 11 to 15 week
Fundamentals of tribology including materials science are lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the tribology, and must present them. Practical lubrication engineering and design of sliding mechanical components are understood through discussion based on the presentations.
Topics: Tribology, Lubrication engineering, Surface properties, Wear of materials, Tribological coatings and so on.

Prof. S. Kawamura
From 01 to 05 week
Vibration engineering of machines and structures is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the vibration engineering, and must present them. Practical modeling and simulation of structural vibration are understood through discussion based on the presentations.
Topics: Vibration engineering, Modeling and simulation of dynamic phenomena and so on.

Prof. T. Adachi
From 06 to 10 week
Mechanics of solids and structures including materials science is lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the mechanics, and must present them. Practical mechanics and design of engineering materials and mechanical structures are understood through discussion based on the presentations.
Topics: Mechanics of solids and structures, Mechanical properties of materials, Design of mechanical components and so on.

Prof. Y. Takeichi
From 11 to 15 week
Fundamentals of tribology including materials science are lectured with current topics. Each student is assigned some examinations, and/or reviewing current papers related to the tribology, and must present them. Practical lubrication engineering and design of sliding mechanical components are understood through discussion based on the presentations.
Topics: Tribology, Lubrication engineering, Surface properties, Wear of materials, Tribological coatings and so on.

Self Preparation and Review

Related subjects

Fundamental knowledge on solid mechanics, vibration engineering or tribology.

Fundamental knowledge on solid mechanics, vibration engineering or tribology.

Notes for textbook

Handouts will be prepared

Handouts will be prepared

Notes for reference

Goals to be achieved

get advanced knowledge on solid mechanics, vibration engineering or tribology.

get advanced knowledge on solid mechanics, vibration engineering or tribology.

Evaluation of achievement

A comprehensive report(70%) and discussion(30%)

A comprehensive report(70%) and discussion(30%)

Examination

レポートで実施

By Report

Details of examination

Other information

Tadaharu Adachi: Room D-305, E-mail: adachi@me.tut.ac.jp
Shozo Kawamura: Room D-404, E-Mail: kawamura@me.tut.ac.jp
Yoshinori Takeichi: Room D-304, E-Mail: takeichi@tut.jp

Tadaharu Adachi: Room D-305, E-mail: adachi@me.tut.ac.jp
Shozo Kawamura: Room D-404, E-Mail: kawamura@me.tut.ac.jp
Yoshinori Takeichi: Room D-304, E-Mail: takeichi@tut.jp

Reference URL

Office hours

ask us by E-Mail

ask us by E-Mail

Relations to attainment objectives of learning and education

Key words

solid mechanics, vibration engineering, tribology

solid mechanics, vibration engineering, tribology

(D51030030)Advanced Manufacturing Processes[Advanced Manufacturing Processes]

Subject name[English]	Advanced Manufacturing Processes[Advanced Manufacturing Processes]				
Schedule number	D51030030	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Tue.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Mechanical Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	福本 昌宏, 安井 利明, 伊﨑 昌伸, 横山 誠二 FUKUMOTO Masahiro, YASUI Toshiaki, IZAKI Masanobu, YOKOYAMA Seiji				
Numbering					

Objectives of class

To understand fundamentals of advanced technology in materials joining, especially both with high performance coating formation by particles deposition and with non-melting diffusion bonding by Friction Stir Welding.
To understand fundamental science of physics and chemistry on inorganic thin film and the production, especially solution process.
To understand fundamentals of advanced technology in materials joining, especially both with high performance coating formation by particles deposition and with non-melting diffusion bonding by Friction Stir Welding.
To understand fundamental science of physics and chemistry on inorganic thin film and the production, especially solution process.

Contents of class

1. Fundamental of thermal spray process, Splat formation problem
2. Process control with Transition temperature & Transition pressure
3. Cold spray and Aero-sol deposition process
4. Fundamental of Friction Stir Welding, Joining between dissimillar materials by FSW
5. Friction spot welding, practical applications of FSW
6. Fundamentals of thin film deposition
7. Related technology for dry process, PVD, CVD
8. Advanced deposition process

Laboratory tour will be arranged to experience the actual process.

9. Thermodynamics and thermochemistry in solution processing
10.Fundamental solid state physics-electronic state
11.Fundamental solid state physics-crystal structure and symmetry
12.Soft-solution processing for the inorganic thin film production
13.Vapor pressure and activity.
14.Dissolution of gases in metals.Thermodynamics and kinetics.
15.Phase stability diagram in various solution.
16.Extraction of valuable substances and hazards from industrial wastes.

1. Fundamental of thermal spray process, Splat formation problem
2. Process control with Transition temperature & Transition pressure
3. Cold spray and Aero-sol deposition process
4. Fundamental of Friction Stir Welding, Joining between dissimillar materials by FSW
5. Friction spot welding, practical applications of FSW
6. Fundamentals of thin film deposition
7. Related technology for dry process, PVD, CVD
8. Advanced deposition process

Laboratory tour will be arranged to experience the actual process.

9. Thermodynamics and thermochemistry in solution processing
10.Fundamental solid state physics-electronic state
11.Fundamental solid state physics-crystal structure and symmetry
12.Soft-solution processing for the inorganic thin film production
13.Vapor pressure and activity.
14.Dissolution of gases in metals.Thermodynamics and kinetics.
15.Phase stability diagram in various solution.
16.Extraction of valuable substances and hazards from industrial wastes.

Self Preparation and Review

Related subjects

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

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

Notes for textbook

Handouts will be prepared for participants.
(Reference)
Required readings will be taken from a variety of reference books and research papers.
Handouts will be prepared for participants.
(Reference)
Required readings will be taken from a variety of reference books and research papers.

Notes for reference

Goals to be achieved

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

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

Evaluation of achievement

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

Examination

レポートで実施
By Report

Details of examination

Other information

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

Reference URL

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

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

Office hours

Masahiro Fukumoto: Wednesday 18:00–18:30
Toshiaki Yasui: Monday 17:00–18:00
Masanobu Izaki: any time, but to contact me before visit
Seiji Yokoyama: Monday 17:00–18:00
Masahiro Fukumoto: Wednesday 18:00–18:30
Toshiaki Yasui: Monday 17:00–18:00
Masanobu Izaki: any time, but to contact me before visit
Seiji Yokoyama: Monday 17:00–18:00

Relations to attainment objectives of learning and education

Key words

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

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

Subject name[English]	Engineering of Intelligent Robotics[Engineering of Intelligent Robotics]				
Schedule number	D51030050	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Thu.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Mechanical Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	寺嶋 一彦, 鈴木 新一, 三好 孝典, 内山 直樹 TERASHIMA Kazuhiko, SUZUKI Shinichi, MIYOSHI Takanori, UCHIYAMA Naoki				
Numbering					

Objectives of class

Understand design, measurement and control methods for intelligent robots such as autonomous mobile robots with human-like ability.

Understand design, measurement and control methods for intelligent robots such as autonomous mobile robots with human-like ability.

Contents of class

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

1st week: Robotic structure
2nd week: Kinematics I
3rd week: Kinematics II
4th week: Environmental recognition I
5th week: Environmental recognition II
6th week: Localization and identification I
7th week: Localization and identification II
8th week: Motion planning I
9th week: Motion planning II
10th week: Motion control I
11th week: Motion control II
12th week: Force control I
13th week: Force control II
14th week: Visual servo I
15th week: Visual servo II
16th week: Report

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

1st week: Robotic structure
2nd week: Kinematics I
3rd week: Kinematics II
4th week: Environmental recognition I
5th week: Environmental recognition II
6th week: Localization and identification I
7th week: Localization and identification II
8th week: Motion planning I
9th week: Motion planning II
10th week: Motion control I
11th week: Motion control II
12th week: Force control I
13th week: Force control II
14th week: Visual servo I
15th week: Visual servo II
16th week: Report

Self Preparation and Review

Read the handouts before and after the lecture.

Read the handouts before and after the lecture.

Related subjects

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

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

Notes for textbook

Handouts will be prepared.

Handouts will be prepared.

Reference1	**Book title**	Introduction to Autonomous Mobile Robots (Intelligent Robotics and Autonomous Agents series)			**ISBN**	
	Author	Roland Siegwart and Illah R. Nourbakhsh	**Publisher**	MIT Press	**Publish year**	2004

Notes for reference

Goals to be achieved

(1) Understand the design methods of intelligent robots
(2) Understand the environmental recogintion and measurement methods for intelligent robots
(3) Understand the motion plannig methods for intelligent robots
(4) Understand the control methods for intelligent robots

(1) Understand the design methods of intelligent robots
(2) Understand the environmental recogintion and measurement methods for intelligent robots
(3) Understand the motion plannig methods for intelligent robots
(4) Understand the control methods for intelligent robots

Evaluation of achievement

Report (100 %)

A：Score of the report is 80 or higher.
B：Score of the report is 65 or higher.
C：Score of the report is 55 or higher.

Report (100 %)

A：Score of the report is 80 or higher.
B：Score of the report is 65 or higher.
C：Score of the report is 55 or higher.

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Basic knowledge on robotics and control are required.

Basic knowledge on robotics and control are required.

Office hours

Contact the professors by e-mail first.

Contact the professors by e-mail first.

Relations to attainment objectives of learning and education

(B)理論的・応用的知識の獲得と発展的活用能力 重要な学術・技術分野の理論・応用知識を自発的に獲得し，発展的に活用できる能力

Key words

Robot, Control, Sensor, Actuator, Mechanism, Mechanical system
Robot, Control, Sensor, Actuator, Mechanism, Mechanical system

(D51030070)Advanced Energy Engineering[Advanced Energy Engineering]

Subject name[English]	Advanced Energy Engineering[Advanced Energy Engineering]				
Schedule number	D51030070	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Fri.4～4	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Mechanical Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	北村 健三, 野田 進, 鈴木 孝司, 中村 祐二 KITAMURA Kenzo, NODA Susumu, SUZUKI Takashi, NAKAMURA Yuji				
Numbering					

Objectives of class

The aim of the present lecture is to obtain advanced knowledge on the transpot and effective utilization of thermal energy, on the combustion of gases and solids, and on the atomization of liquids.

The aim of the present lecture is to obtain advanced knowledge on the transpot and effective utilization of thermal energy, on the combustion of gases and solids, and on the atomization of liquids.

Contents of class

1st week Introduction
2nd week Introduction of combustion
3rd week Physics and chemistry of diffusion flame
4th week Physics and chemistry of premixed flame
5th week Analytical treatment of combustion
6th week Experimental techniques of combustion
7th week Introduction of heat transfer
8th week Heat transfer by conduction
9th week Heat transfer by convection (1)
10th week Heat transfer by convection (2)
11th week Heat transfer by radiation
12th week Introdution of atomization
13th week Physics of atomization
14th week Experimental techniques for atomization
15th week Analytical treatment of atomization
16th week Final examination

1st week Introduction
2nd week Introduction of combustion
3rd week Physics and chemistry of diffusion flame
4th week Physics and chemistry of premixed flame
5th week Analytical treatment of combustion
6th week Experimental techniques of combustion
7th week Introduction of heat transfer
8th week Heat transfer by conduction
9th week Heat transfer by convection (1)
10th week Heat transfer by convection (2)
11th week Heat transfer by radiation
12th week Introdution of atomization
13th week Physics of atomization
14th week Experimental techniques for atomization
15th week Analytical treatment of atomization
16th week Final examination

Self Preparation and Review

Related subjects

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

The knowledge on "Fluid dynamics", "Combustion engineering" and "Heat transfer" is neccesary. Otherwise, students will feel

difficulty to catch up with the lecture.

Notes for textbook

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

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

Notes for reference

Goals to be achieved

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

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

Evaluation of achievement

Evaluation will be based on the score of final examination.

Evaluation will be based on the score of final examination.

Examination

レポートで実施
By Report

Details of examination

Other information

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

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

Reference URL

Office hours

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

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

Relations to attainment objectives of learning and education

Key words

Combustion, Heat Transfer, Spray and Atomization

Combustion, Heat Transfer, Spray and Atomization

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

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**	1～3
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					

Objectives of class

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

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

Contents of class

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

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

Self Preparation and Review

Related subjects

Notes for textbook

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

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

Notes for reference

Goals to be achieved

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

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

Evaluation of achievement

Coursework, presentation and/or report.

Coursework, presentation and/or report.

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

(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**	2～3
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					

Objectives of class

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

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

Contents of class

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

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

Self Preparation and Review

Related subjects

Notes for textbook

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

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

Notes for reference

Goals to be achieved

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

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

Evaluation of achievement

Coursework, presentation and/or report.

Coursework, presentation and/or report.

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

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

Subject name[English]	Advanced Electronic Materials 1[Advanced Electronic Materials 1]				
Schedule number	D52030010	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Wed.4～4	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	福田 光男, 中村 雄一, 武藤 浩行 FUKUDA Mitsuo, NAKAMURA Yuichi, MUTO Hiroyuki				
Numbering					

Objectives of class

Objective of this subject is to learn about the forefront research and development on spin electronics and photonics in electronic materials, and electrochmical sensing, and powder processing.

Objective of this subject is to learn about the forefront research and development on spin electronics and photonics in electronic materials, and electrochmical sensing, and powder processing.

Contents of class

1. Spin electronics.
You will learn about advanced magnetic materials and area from fundamentals to applications of magnetics.
1) Magnetic materials, 2) Applications of magnetics and magnetic materials, 3) Correlations between spins and various physical quantities, 4) Micro-magnetic devices and systems, 5) Spintronics and spin photonics.

2. Photonics.
You will learn about optoelectronic materials and some typical device structures.
1) Light emitting device, 2) optical detector, 3) Optical modulator, 4)nanomaterial.

3. Powder processing technologies
You will learn about powder processing techniques for electronic devices.
1) sintering, 2) micrstructute of ceramics and 3) nanocomposite

1. Spin electronics.
You will learn about advanced magnetic materials and area from fundamentals to applications of magnetics.
1) Magnetic materials, 2) Applications of magnetics and magnetic materials, 3) Correlations between spins and various physical quantities, 4) Micro-magnetic devices and systems, 5) Spintronics and spin photonics.

2. Photonics.
You will learn about optoelectronic materials and some typical device structures.
1) Light emitting device, 2) optical detector, 3) Optical modulator, 4)nanomaterial.

3. Powder processing technologies
You will learn about powder processing techniques for electronic devices.
1) sintering, 2) micrstructute of ceramics and 3) nanocomposite

Self Preparation and Review

Related subjects

Notes for textbook

Lecture materials will be distributed.

Lecture materials will be distributed.

Notes for reference

Goals to be achieved

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

in various fields.
It aims at acquiring the broad knowledge of research and development by learning about the recent research and development in various fields.

Evaluation of achievement

The reports or tests will be set in each categories.
The result is evaluated from the sum of those marks.
Grades: A:80-100, B:65-79, C:55-64.
The reports or tests will be set in each categories.
The result is evaluated from the sum of those marks.
Grades: A:80-100, B:65-79, C:55-64.

Examination

レポートで実施
By Report

Details of examination

Other information

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

Reference URL

Office hours

Please make an appointment via e-mail.
Please make an appointment via e-mail.

Relations to attainment objectives of learning and education

Key words

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

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

Subject name[English]	Advanced Electrical Systems 2[Advanced Electrical Systems 2]				
Schedule number	D52030040	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Wed.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	須田 善行, 稲田 亮史, 村上 義信 SUDA Yoshiyuki, INADA Ryoji, MURAKAMI Yoshinobu				
Numbering					

Objectives of class

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

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

Contents of class

Sub Course 1(Y. Suda)
1. Fundamental concept of electrical energy engineering
2. Three-phase systems
3. Power electronics

Sub Course 2(R. Inada)
1. Introduction of Electrochemical Energy Conversion Devices
2. Lithium-Ion Secondary Batteries
3. Recent Trend in Electrochemical Energy Conversion Devices

Sub Course 3(Yo. Murakami)
1. Introduction of Electric Energy Systems
2. High Voltage Engineering and Electrical Insulation
3. Fundamental Properties of Dielectrics and Electrical Insulating Materials.

Sub Course 1(Y. Suda)
1. Fundamental concept of electrical energy engineering
2. Three-phase systems
3. Power electronics

Sub Course 2(R. Inada)
1. Introduction of Electrochemical Energy Conversion Devices
2. Lithium-Ion Secondary Batteries
3. Recent Trend in Electrochemical Energy Conversion Devices

Sub Course 3(Yo. Murakami)
1. Introduction of Electric Energy Systems
2. High Voltage Engineering and Electrical Insulation
3. Fundamental Properties of Dielectrics and Electrical Insulating Materials.

Self Preparation and Review

Related subjects

Basic electrical power engineering course is prerequisite.

Basic electrical power engineering course is prerequisite.

Notes for textbook

Materials will be prepared by the lecturer.

Materials will be prepared by the lecturer.

Notes for reference

Goals to be achieved

Evaluation of achievement

Marks are based on examinations(100%).

Marks are based on examinations(100%).

Examination

定期試験を実施（対面）

Examination(Face to Face)

Details of examination

Other information

Reference URL

(1) J. Larminie and A. Dicks: Fuel Cell Systems Explained (Wiley)
(2) M. Yoshio, R.J. Brodd and A. Kozawa: Lithium Ion Batteries: Science and Technologies (Springer-Verlag)
(3) E. Kuffel, W. Zaengel and J. Kuffel: High Voltage Engineering (Newnes)

(1) J. Larminie and A. Dicks: Fuel Cell Systems Explained (Wiley)
(2) M. Yoshio, R.J. Brodd and A. Kozawa: Lithium Ion Batteries: Science and Technologies (Springer-Verlag)
(3) E. Kuffel, W. Zaengel and J. Kuffel: High Voltage Engineering (Newnes)

Office hours

Relations to attainment objectives of learning and education

Key words

(D52030050)Advanced Microelectronics 1[Advanced Microelectronics 1]

Subject name[English]	Advanced Microelectronics 1[Advanced Microelectronics 1]				
Schedule number	D52030050	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Mon.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	澤田　和明, 石田　誠, 村上　裕二, 関口　寛人, 高橋　一浩 SAWADA Kazuaki, ISHIDA Makoto, MURAKAMI Yuji, SEKIGUCHI Hiroto, TAKAHASHI Kazuhiro				
Numbering					

Objectives of class

From the viewpoint of deep understanding of advanced microelectronics, physics of semiconductors including material design and an example of latest device will be lectured.

From the viewpoint of deep understanding of advanced microelectronics, physics of semiconductors including material design and an example of latest device will be lectured.

Contents of class

a) Physics and Properties of Semiconductors
  Crystal growth and device processing
  Energy band engineering
    Alloy semiconductor
    Strain effect
    Superlattice
  Carrier transport phenomena
    Tummeling effect
b)Metal-Semiconductor Contacts
  Schottky barrier
  Current transport processes
  Ohmic contact

c) Integrated circuits
  device processing
  MEMS/NEMS
  Latest MOS FETs
  Current topics in IC/MEMS

a) Physics and Properties of Semiconductors
  Crystal growth and device processing
  Energy band engineering
    Alloy semiconductor
    Strain effect
    Superlattice
  Carrier transport phenomena
    Tummeling effect
b)Metal-Semiconductor Contacts
  Schottky barrier
  Current transport processes
  Ohmic contact

c) Integrated circuits
  device processing
  MEMS/NEMS
  Latest MOS FETs
  Current topics in IC/MEMS

Self Preparation and Review

Related subjects

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

Semiconductor Physics, Master course
The basic knowledge on the quantum mechanics, thermodynamics, and electronics are desirable.

Semiconductor Physics, Master course

Notes for textbook

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

Notes for reference

Goals to be achieved

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

Evaluation of achievement

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

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination

Other information

M.Ishida (C-606)
ishida@ee.tut.ac.jp
ext. 6740
K.Sawada (C-605)
sawada@ee.tut.ac.jp
ext. 6739
T.Kawano (C-603)
kawano@ee.tut.ac.jp
ext. 6738
Y.Murakami (C-607)
ymurakami@ee.tut.ac.jp
ext. 6741
M.Ishida (C-606)
ishida@ee.tut.ac.jp
ext. 6740
K.Sawada (C-605)
sawada@ee.tut.ac.jp
ext. 6739
T.Kawano (C-603)
kawano@ee.tut.ac.jp
ext. 6738
Y.Murakami (C-607)
ymurakami@ee.tut.ac.jp
ext. 6741

Reference URL

http://www.tut.ac.jp/english/introduction/02EE.pdf
(department)

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

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

(department)

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

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

Office hours

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

Relations to attainment objectives of learning and education

Key words

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

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

Objectives of class

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

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

Contents of class

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

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

Self Preparation and Review

Related subjects

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

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

Notes for textbook

Instruct in 1st class.

Instruct in 1st class.

Notes for reference

Goals to be achieved

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

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

Evaluation of achievement

Marks are based on reports and presentations.

Marks are based on reports and presentations.

Examination

試験期間中には何も行わない

None during exam period

Details of examination

Other information

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

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

Reference URL

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

Office hours

Appoint a time slot via email
Appoint a time slot via email

Relations to attainment objectives of learning and education

Key words

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

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

Subject name[English]	Seminar on 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**	1～3
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					

Objectives of class

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.
It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.
It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

Contents of class

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

Self Preparation and Review

Related subjects

Consult with your advisor.

Consult with your advisor.

Notes for textbook

Consult with your advisor.
Consult with your advisor.

Notes for reference

Goals to be achieved

To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.
To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

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

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**	Elective
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～3
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					

Objectives of class

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.
It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.
It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

Contents of class

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

Self Preparation and Review

Related subjects

Consult with your advisor.

Consult with your advisor.

Notes for textbook

Consult with your advisor.
Consult with your advisor.

Notes for reference

Goals to be achieved

To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.
To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

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

Subject name[English]	Speech and Language Processing[Speech and Language Processing]				
Schedule number	D53030020	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Thu.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Computer Science and Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	秋葉 友良, 山本 一公 AKIBA Tomoyoshi, YAMAMOTO Kazumasa				
Numbering					

Objectives of class

Important topics on spoken / natural language processing will be discussed.

Important topics on spoken / natural language processing will be discussed.

Contents of class

Either (I) or (II) should be selected.

(I) Basic of natural language processing / Modeling characters / Modeling words / Modeling sentences / Modeling documents/Modeling cross-language dependencies

(II) Basic of spoken language processing / Basic of speech recognition / Algorithm for continuous speech recognition / Hidden Markov Model / Language model and decoder / Speech recognition using neural networks / Language processing / Spoken dialog systems, Multimodal dialog systems / Language identification, Speaker identification, Spoken document retrieval, Spoken document summarization, Computer aided language learning system

Either (I) or (II) should be selected.

(I) Basic of natural language processing / Modeling characters / Modeling words / Modeling sentences / Modeling documents/Modeling cross-language dependencies

(II) Basic of spoken language processing / Basic of speech recognition / Algorithm for continuous speech recognition / Hidden Markov Model / Language model and decoder / Speech recognition using neural networks / Language processing / Spoken dialog systems, Multimodal dialog systems / Language identification, Speaker identification, Spoken document retrieval, Spoken document summarization, Computer aided language learning system

Self Preparation and Review

Related subjects

Information theory, Formal language theory

Information theory, Formal language theory

Notes for textbook

Materials will be prepared by lecturers.

Materials will be prepared by lecturers.

Notes for reference

Goals to be achieved

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

(II)

Basics: Understand the role of spoken language as an human interface / Understand hierarchical structure of spoken language / Understand the basic speech analysing methods.
Speech Recognition: Understand the relation between speech recognition and information theory / Understand the algorithm for speech recognition using DP matching / Understand the Hidden Markov Model.
Natural Language Processing: Understand the role of language model / Understand the parser for context free language.
Applications: Understand the dictation system and the spoken dialog system / Understand the applications of speech technology including computer aided language learning system.

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

(II)
Basics: Understand the role of spoken language as an human interface / Understand hierarchical structure of spoken language / Understand the basic speech analysing methods.
Speech Recognition: Understand the relation between speech recognition and information theory / Understand the algorithm for speech recognition using DP matching / Understand the Hidden Markov Model.
Natural Language Processing: Understand the role of language model / Understand the parser for context free language.
Applications: Understand the dictation system and the spoken dialog system / Understand the applications of speech technology including computer aided language learning system.

Evaluation of achievement

Marks are based on reports (100%).

Marks are based on reports (100%).

Examination

レポートで実施
By Report

Details of examination

Other information

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

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

Reference URL

Office hours

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

Relations to attainment objectives of learning and education

Key words

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

(D53030090)Molecular Simulation[Molecular Simulation]

Subject name[English]	Molecular Simulation[Molecular Simulation]				
Schedule number	D53030090	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Wed.1～1	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Computer Science and Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	関野 秀男, 後藤 仁志, 栗田 典之 SEKINO Hideo, GOTO Hitoshi, KURITA Noriyuki				
Numbering					

Objectives of class

Understanding of theories for molecular science and simulation technology based upon it
Understanding of theories for molecular science and simulation technology based upon it

Contents of class

1)Basic Quantum Mechanics (1st-3rd week)
2)Molecular Quantum Mechanics (Advanced) (4th-8th week)
3)Mathematical Foundation for basic Quantum Mechanical problems (9th-10th week)
4)Quantum Signal Processing (11th-15th week)
1)Basic Quantum Mechanics (1st-3rd week)
2)Molecular Quantum Mechanics (Advanced) (4th-8th week)
3)Mathematical Foundation for basic Quantum Mechanical problems (9th-10th week)
4)Quantum Signal Processing (11th-15th week)

Self Preparation and Review

Related subjects

Molecular Design Engineering

Molecular Design Engineering

Notes for textbook

1)Quantum Chemistry
Eyring/Walter/Kimball

2)Modern Quantum Chemistry
Introduction to Advanced Electron Structure Theory
A.Szabo and N.S.Ostlund
1)Quantum Chemistry
Eyring/Walter/Kimball

2)Modern Quantum Chemistry
Introduction to Advanced Electron Structure Theory
A.Szabo and N.S.Ostlund

Notes for reference

Goals to be achieved

To understand quantum mechanics, its numerical representation on computer.
To understand quantum mechanics, its numerical representation on computer.

Evaluation of achievement

Presentation in the class and reports, small tests as well as creation of simulation programs.
Presentation in the class and reports, small tests as well as creation of simulation programs.

Examination

その他
Other

Details of examination

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

Other information

F-305
0532-44-6880
F-305
0532-44-6880

Reference URL

Office hours

Wed. 13:00 to 14:30
Wed. 13:00 to 14:30

Relations to attainment objectives of learning and education

Key words

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

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

Subject name[English]	Advanced Molecular Information Engineering[Advanced Molecular Information Engineering]				
Schedule number	D53030100	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Mon.5～5	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Computer Science and Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	高橋 由雅, 加藤 博明 TAKAHASHI Yoshimasa, KATO Hiroaki				
Numbering					

Objectives of class

The purpose of this course is to introduce and explain practical and applied approaches to data analysis (or mining) and knowledge discovery with illustrative examples in chemistry and molecular biology. The course is helpful for the students who are interested in not only pursuing careers in chemo-informatics but also taking general data science.

The purpose of this course is to introduce and explain practical and applied approaches to data analysis (or mining) and knowledge discovery with illustrative examples in chemistry and molecular biology. The course is helpful for the students who are interested in not only pursuing careers in chemo-informatics but also taking general data science.

Contents of class

Topics to be covered:

1.Structure and information of biomacromolecules
2.Transmission and expression of the genetic information
3.Molecular biology database
4.Sequence allignment by DP matching
5.Homology searching and multuiple allignment
6.Sequence motif and knowledge base
7.Tertiary structure classification and function prediction
8.Exam.
9.Chemical data space and multivariate data analysis
10.Quantitative structure-activity relationships and knowledge aquisition
11.Visualization of higher dimensional data of molecules
12.Evaluation of structural similarity and its application
13.Fundamentals of machine learning
14.Artificial neural network and chemical application
15.Support vector machine and chemical application
16.Exam.

Topics to be covered:

1.Structure and information of biomacromolecules
2.Transmission and expression of the genetic information
3.Molecular biology database
4.Sequence allignment by DP matching
5.Homology searching and multuiple allignment
6.Sequence motif and knowledge base
7.Tertiary structure classification and function prediction
8.Exam.
9.Chemical data space and multivariate data analysis
10.Quantitative structure-activity relationships and knowledge aquisition
11.Visualization of higher dimensional data of molecules
12.Evaluation of structural similarity and its application
13.Fundamentals of machine learning
14.Artificial neural network and chemical application
15.Support vector machine and chemical application
16.Exam.

Self Preparation and Review

Related subjects

Molecular Informatics, Linear Algebra, Elementary Analytics

Molecular Informatics, Linear Algebra, Elementary Analytics

Notes for textbook

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

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

Notes for reference

Goals to be achieved

First half term (by Kato)
/They understand structure and information of biomacromolecules.
/They learn the basic concept of molecular biology database and acquire the abilities of database retrieval.
/They understand knowledge discovery techniques from databases such as sequence alignment and motif searching.

Second half term (by Takahashi)
/They understand regression analysis technique based on linear least squares method and the application to chemical data fitting.
/They learn fundamentals of quantitative structure–activity relationships (QSAR)
/They learn mathematical basis of principal component analysis and visualization of multivariate chemical data space.
/They understanad usefulness and importance of structural similarity in intelligent molecular information processing.
/They learn mathematical basis of machine learning.
/Artificial neural network (ANN) and applicaton in chemistry.
/Support vector machine (SVM) and application in drug design and development.
They acquire the abilities how they can apply the methods to chemical data analysis, data classification and prediction.

First half term (by Kato)
/They understand structure and information of biomacromolecules.
/They learn the basic concept of molecular biology database and acquire the abilities of database retrieval.
/They understand knowledge discovery techniques from databases such as sequence alignment and motif searching.

Second half term (by Takahashi)
/They understand regression analysis technique based on linear least squares method and the application to chemical data fitting.
/They learn fundamentals of quantitative structure–activity relationships (QSAR)
/They learn mathematical basis of principal component analysis and visualization of multivariate chemical data space.
/They understanad usefulness and importance of structural similarity in intelligent molecular information processing.
/They learn mathematical basis of machine learning.
/Artificial neural network (ANN) and applicaton in chemistry.
/Support vector machine (SVM) and application in drug design and development.
They acquire the abilities how they can apply the methods to chemical data analysis, data classification and prediction.

Evaluation of achievement

Reports and classroom performance 20%
Written examination 80%

Reports and classroom performance 20%
Written examination 80%

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination

Other information

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

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

Reference URL

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

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

Office hours

Friday 15:00-16:30 (Kato)
Friday 13:00-14:30 (Takahashi)

Friday 15:00-16:30 (Kato)
Friday 13:00-14:30 (Takahashi)

Relations to attainment objectives of learning and education

Key words

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

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

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

Subject name[English]	Web Data Engineering, Advanced 1[Web Data Engineering, Advanced 1]				
Schedule number	D53030150	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring1 term	**Day of the week,period**	Thu.1～1	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Computer Science and Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	青野 雅樹 AONO Masaki				
Numbering					

Objectives of class

Data engineering technologies for the data (primarily on the Web) will be discussed.
Main emphasis is on the information retrieval and data mining technologies.
Data Mining technologies include principal component analysis, supervised learning such as classification, unsupervised learning such as clustering, and Web mining technologies.
Multimedia data processing will also be discussed.
Data engineering technologies for the data (primarily on the Web) will be discussed.
Main emphasis is on the information retrieval and data mining technologies.
Data Mining technologies include principal component analysis, supervised learning such as classification, unsupervised learning such as clustering, and Web mining technologies.
Multimedia data processing will also be discussed.

Contents of class

Classes will be held (theoretically) 7.5 times. The last time will be kept for the exam.

1. Information Retrieval
Fundamental techniques to construct a search system, including how to build indices, how to tokenize texts, and how to extract features from texts and images, will be considered.
2. Data and Web Mining
Fundamental methods for data mining as well as Web mining are discussed.

We plan to do one or two assignments for data mining techniques inside.

Please note that if this lecture is held at the same time with Japanese course, the lecture might be in Japanese.
Classes will be held (theoretically) 7.5 times. The last time will be kept for the exam.

1. Information Retrieval
Fundamental techniques to construct a search system, including how to build indices, how to tokenize texts, and how to extract features from texts and images, will be considered.
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Fundamental methods for data mining as well as Web mining are discussed.

We plan to do one or two assignments for data mining techniques inside.

Please note that if this lecture is held at the same time with Japanese course, the lecture might be in Japanese.

Self Preparation and Review

It is desirable to self-study as well as review fundamental data mining techniques such as clustering, classification, principal component analysis, and regression. It is recommended installing R/Python language (sometimes with Java/C++) into your computer, because some of the lecture materials are written in R/Python language. (R is favorable for simple visualization.)
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Related subjects

Notes for textbook

Reference1	**Book title**	Information Retrieval, Implementing and Evaluating Search Engines			**ISBN**	978-0-262-02651-2
	Author	Charles L.A. Clarke, Gordon V. Cormack	**Publisher**	MIT Press	**Publish year**	2010
Reference2	**Book title**	Data Mining: Concepts and Techniques, Third Edition			**ISBN**	978-0-123-81479-1
	Author	Jiawei Han, Micheline Kamber, and Jian Pei	**Publisher**	Morgan Kaufmann	**Publish year**	2011
Reference3	**Book title**	Data Mining Practical Machine Learning Tools and Techniques, Third Edition			**ISBN**	978-0-12-374856-0
	Author	Ian H. Witten, Eibe Frank, and Mark A. Hall	**Publisher**	Morgan Kaufmann	**Publish year**	2011

Notes for reference

Reference #4
Title:「Modern Information Retrieval, the concepts and technology behind search, Second Edition」
Authors:Ricardo Baeza-Yates, Bertier Ribeiro-Neto
Publisher：Addison Wesley
ISBN：978-0-321-41691-9
Year：2011
Reference #5
Title:「Google's PageRank and Beyond」
Authors：Amy N. Langville, Carl D. Meyer
Publisher：Princeton University Press
ISBN：978-0-691-12202-1
Year：2006
Reference #4
Title:「Modern Information Retrieval, the concepts and technology behind search, Second Edition」
Authors:Ricardo Baeza-Yates, Bertier Ribeiro-Neto
Publisher：Addison Wesley
ISBN：978-0-321-41691-9
Year：2011
Reference #5
Title:「Google's PageRank and Beyond」
Authors：Amy N. Langville, Carl D. Meyer
Publisher：Princeton University Press
ISBN：978-0-691-12202-1
Year：2006

Goals to be achieved

To acquire the following knowledge that can make you
1. Implement fundamental data mining technologies.
2. Understand advanced technologies for information retrieval, including dimensional reduction.
3. Design, analyze, and evaluate the information retrieval and data mining technologies.
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1. Implement fundamental data mining technologies.
2. Understand advanced technologies for information retrieval, including dimensional reduction.
3. Design, analyze, and evaluate the information retrieval and data mining technologies.

Evaluation of achievement

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

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

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

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

Examination

定期試験を実施（対面）

Examination(Face to Face)

Details of examination

Other information

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

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

Reference URL

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

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

Office hours

Anytime, but a priori email appointment is definitely preferable.

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Relations to attainment objectives of learning and education

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

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Key words

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

Subject name[English]	Seminar on Environmental & Life Sciences 1[Seminar on Environmental & Life Sciences 1]				
Schedule number	D54010010	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Environmental and Life Sciences			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering					

Objectives of class

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

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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.

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Self Preparation and Review

Related subjects

Seminar on Environmental & Life Sciences 2
All other relevant subjects in Advanced Environmental and Life Sciences

Seminar on Environmental & Life Sciences 2
All other relevant subjects in Advanced Environmental and Life Sciences

Notes for textbook

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

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

Notes for reference

Goals to be achieved

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

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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.

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Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information Supervisor(s) Supervisor(s)
Reference URL http://ens.tut.ac.jp/en/ http://ens.tut.ac.jp/en/
Office hours Students are encouraged visiting by appointment. Students are encouraged visiting by appointment.
Relations to attainment objectives of learning and education
Key words Environmental science and technology, life science, materials science and engineering, applied chemistry Environmental science and technology, life science, materials science and engineering, applied chemistry

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

Subject name[English]	Seminar on Environmental & Life Sciences 2[Seminar on Environmental & Life Sciences 2]				
Schedule number	D54010020	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～3
Department Offered	Environmental and Life Sciences			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering					

Objectives of class

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

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

Contents of class

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Self Preparation and Review

Related subjects

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

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All other relevant subjects in Advanced Environmental and Life Sciences

Notes for textbook

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Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Supervisor(s)

Supervisor(s)

Reference URL

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

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

Office hours

Students are encouraged visiting by appointment.

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

Key words

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

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

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

Subject name[English]	Advanced Environmental Technology 1[Advanced Environmental Technology 1]				
Schedule number	D54030010	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Mon.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Environmental and Life Sciences			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	水野 彰, 田中 三郎, 髙島 和則 MIZUNO Akira, TANAKA Saburo, TAKASHIMA Kazunori				
Numbering					

Objectives of class

静電気力やレーザを用いる DNA 分子や細胞の計測、操作が生命現象の解明に有用な手段であり、またラジカルを使う細胞やウイルスの制御は感染予防、さらには医療への応用が期待されている。このような学際的な 領域での技術開発を進めるには電気工学の基礎に加え細胞や分子の取り扱いなどの知識が必要であり、それらをこの講 義を通じて学ぶ。

Bio-manipulation of cells and genes is an important tool for life sciences. Control of microbes and viruses using radicals produced by plasma reduces infection of diseases and will possibly be applied in medical treatment. For these interdisciplinary developments, knowledge of cells and genes is required in addition to the basics of electrical engineering. These points are studied in this lecture.

静電気力やレーザを用いる DNA 分子や細胞の計測、操作が生命現象の解明に有用な手段であり、またラジカルを使う細胞やウイルスの制御は感染予防、さらには医療への応用が期待されている。このような学際的な 領域での技術開発を進めるには電気工学の基礎に加え細胞や分子の取り扱いなどの知識が必要であり、それらをこの講 義を通じて学ぶ。

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Contents of class

1. 序論 (Introduction)

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

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

・健康な環境の維持 (To maintain healthy environment)

・静電気力とプラズマによる微生物制御 (Bio-molecule manipulation by electrostatic force and plasma)

・新しい計測技術の開発 (Novel analytical method)

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

1.2 電気を使う細胞や生体高分子制御の概要紹介 (Electrostatic method for manipulation of cells and molecules)

静電気力を使う細胞・分子操作の実例を学ぶ。 (Electrostatic manipulation of cells and molecules should be understood through several examples)

・電気泳動によるDNA配列解析 (Electrophoresis)

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

・レーザと電界による・細胞・DNA一分子操作 (Manipulation of individual cells and DNA molecules)

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

2. 復習:静電気工学の基礎 (Basic of Electrostatics)

微小物体ならびに液体に働く静電気力と、それによる運動 に関する理論の理解を深める。特に制御対象物体の誘電分 極特性により力の方向が変わることなど、グレーディエント力の性質の理解を深める。 (Importance of electrical engineering and its application in bio-manipulation should be understood through several examples.)

2.1 静電気による力学現象 (Electrostatic force)

・クーロン力、影像力、グレーディエント力 重力、粘性力、磁気力との比較 (Coulomb force, image force, gradient force, comparison with gravity, drag, magnetic force)

2.2 電気流体力学 (Electro Fluid dynamics)

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

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

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

3.1 細胞の観察 (Observation of cells)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.1 プラズマ殺菌 (Sterilization by plasma)

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

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

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

7. 展望 (Perspective)

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

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

1. 序論 (Introduction)

1.1 バイオ制御の目的 (Aim of Bio-molecule manipulation)
電気工学が細胞・遺伝子操作や計測にどのような役割を果たしているかを具体例をもとに理解する。 (Importance of electrical engineering and its application in bio-manipulation should be understood through several examples.)
・健康な環境の維持 (To maintain healthy environment)
・静電気力とプラズマによる微生物制御 (Bio-molecule manipulation by electrostatic force and plasma)
・新しい計測技術の開発 (Novel analytical method)
・ポストゲノム時代の遺伝子等の解析の重要性 (Importance of gene- sequencing in Post-Genome Era.)

1.2 電気を使う細胞や生体高分子制御の概要紹介 (Electrostatic method for manipulation of cells and molecules)
静電気力を使う細胞・分子操作の実例を学ぶ。 (Electrostatic manipulation of cells and molecules should be understood through several examples)
・電気泳動によるDNA配列解析 (Electrophoresis)
・静電微粒化によるセルソータ (Electro-spray and cell sorter)
・レーザと電界による・細胞・DNA一分子操作 (Manipulation of individual cells and DNA molecules)
・低温プラズマによる細胞・ウイルスの除去と破壊 (Destruction of microbes and viruses by non-thermal plasma)

2. 復習：静電気工学の基礎 (Basic of Electrostatics)
微小物体ならびに液体に働く静電気力と、それによる運動 に関する理論の理解を深める。特に制御対象物体の誘電分 極特性により力の方向が変わることなど、グレーディエント力の性質の理解を深める。 (Importance of electrical engineering and its application in bio-manipulation should be understood through several examples.)

2.1 静電気による力学現象 (Electrostatic force)
・クーロン力、影像力、グレーディエントカ 重力、粘性力、磁気力との比較 (Coulomb force, image force, gradient force, comparison with gravity, drag, magnetic force)

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

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

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

3.1 細胞の観察 (Observation of cells)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.1 プラズマ殺菌 (Sterilization by plasma)

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

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

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

7. 展望 (Perspective)

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

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

Self Preparation and Review

Related subjects

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

Notes for reference

Goals to be achieved

Evaluation of achievement
レポートにより評価する
Evaluated by reports.

レポートにより評価する
Evaluated by reports.

Examination
レポートで実施
By Report

Details of examination

Other information
連絡先:

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高島和則　Email: takashima@ens.tut.ac.jp, G 棟 310 号室, 内線 6921
連絡先:

水野彰　Email: mizuno@ens.tut.ac.jp, G 棟 607 号室, 内線 6904
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高島和則　Email: takashima@ens.tut.ac.jp, G 棟 310 号室, 内線 6921

Reference URL
http://ens.tut.ac.jp/electrostatics/
http://ens.tut.ac.jp/electrostatics/

Office hours

Relations to attainment objectives of learning and education

Key words

(D54030030)Advanced Ecological Engineering[Advanced Ecological Engineering]

Subject name[English]	Advanced Ecological Engineering[Advanced Ecological Engineering]				
Schedule number	D54030030	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Thu.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Environmental and Life Sciences			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	角田 範義, 後藤 尚弘, 大門 裕之, 中野 裕美, 東海林 孝幸 KAKUTA Noriyoshi, GOTOH Naohiro, DAIMON Hiroyuki, NAKANO Hiromi, TOKAIRIN Takayuki				
Numbering					

Objectives of class

The course provides students with the opportunity to improve their level in the skills(reading, writing, presentation) through reading current research articles.

The course provides students with the opportunity to improve their level in the skills(reading, writing, presentation) through reading current research articles.

Contents of class

1. Students have to select at least three articles in the field of one of professors.
2. Students prepare both reports and present slides.
3. The key words will be given at the first class.

1. Students have to select at least three articles in the field of one of professors.
2. Students prepare both reports and present slides.
3. The key words will be given at the first class.

Self Preparation and Review

Related subjects

Knowledge of environmental chemistry, chemical engineering and materials science is desirable.

Knowledge of environmental chemistry, chemical engineering and materials science is desirable.

Notes for textbook

No textbook will be used.

No textbook will be used.

Notes for reference

Goals to be achieved

To improve presentation skills(writing of reports and preparing of slides).

To improve presentation skills(writing of reports and preparing of slides).

Evaluation of achievement

30% Report, 70% Presentation(30-45 min)

30% Report, 70% Presentation(30-45 min)

Examination

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Room # B-302, E-mail: kakuta@ens.tut.ac.jp
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Room # CRFC-Center 208, E-mail: hiromi@crfc.tut.ac.jp
Room # G-602, E-mail: daimon@ens.tut.ac.jp

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

Reference URL

Office hours

Anytime, but reservation is desirable.

Anytime, but reservation is desirable.

Relations to attainment objectives of learning and education

Key words

environmental chemistry, chemical engineering, materials science, sustainable engineering

environmental chemistry, chemical engineering, materials science, sustainable engineering

(D54030040)Advanced Biotechnology 1[Advanced Biotechnology 1]

Subject name[English]	Advanced Biotechnology 1[Advanced Biotechnology 1]				
Schedule number	D54030040	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Fri.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Environmental and Life Sciences			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	浴　俊彦, 平石　明, 田中　照通, 中鉢　淳, 佐久間　邦弘 EKI Toshihiko, HIRAISHI Akira, TANAKA Terumichi, NAKABACHI Atsushi, SAKUMA Kunihiro				
Numbering					

Objectives of class

This course will provide the students with the opportunity to study on advanced life sciences (e.g., genomics, molecular genetics, microbiology, and biotechnology).

This course will provide the students with the opportunity to study on advanced life sciences (e.g., genomics, molecular genetics, microbiology, and biotechnology).

Contents of class

In this course, the students will be expected to read several papers on the current progress in advanced life science (e.g., genomics, molecular genetics, microbiology, and biotechnology) to understand the frontier of these scientific fields. This course will be given by five instructors as described below (Eki, Hiraishi, Tanaka, Nakabachi and Sakuma).

1st~3rd week: Genome and gene sciences (Dr. T. Eki)
4th~6th week: (Dr. A. Hiraishi)
7th~9th week: (Dr. T. Tanaka)
10th~12th week: Molecular biology of skeletal muscle (Dr. K. Sakuma)
13th~15th week: Animal-microbe symbioses (Dr. A. Nakabachi)

In this course, the students will be expected to read several papers on the current progress in advanced life science (e.g., genomics, molecular genetics, microbiology, and biotechnology) to understand the frontier of these scientific fields. This course will be given by five instructors as described below (Eki, Hiraishi, Tanaka, Nakabachi and Sakuma).

1st~3rd week: Genome and gene sciences (Dr. T. Eki)
4th~6th week: (Dr. A. Hiraishi)
7th~9th week: (Dr. T. Tanaka)
10th~12th week: Molecular biology of skeletal muscle (Dr. K. Sakuma)
13th~15th week: Animal-microbe symbioses (Dr. A. Nakabachi)

Self Preparation and Review

Related subjects

The knowledge of basic molecular biology and biochemistry is absolutely essential.

The knowledge of basic molecular biology and biochemistry is absolutely essential.

Notes for textbook

Papers and references will be given by each instructor in the course.

Papers and references will be given by each instructor in the course.

Notes for reference

Goals to be achieved

Understanding, summarizing, and making presentations and/or reports on the current status in advanced life sciences including genomics, molecular genetics, microbiology and biotechnology.

Understanding, summarizing, and making presentations and/or reports on the current status in advanced life sciences including genomics, molecular genetics, microbiology and biotechnology.

Evaluation of achievement

Grades for the course will be based on the average of the subject scores (by Eki, Hiraishi, Tanaka, Sakuma and Nakabachi).

Grades for the course will be based on the average of the subject scores (by Eki, Hiraishi, Tanaka, Sakuma and Nakabachi).

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Dr. Toshihiko Eki: Room: G-505, Phone: 6907, E-mail: eki@ens.tut.ac.jp
Dr. Akira Hiraishi: Room: G-503, Phone: 6913, E-mail: hiraishi@ens.tut.ac.jp
Dr. Terumichi Tanaka: Room: G-506. Phone: 6920, E-mail: terumichi-tanaka@tut.jp
Dr. Kunihiro Sakuma: Room; Health Science Center, Phone: 6630, E-mail: ksakuma@las.tut.ac.jp
Dr. Atsushi Nakabachi: Room: G-502, Phone: 6901, E-mail: nakabachi@eiiris.tut.ac.jp
Dr. Toshihiko Eki: Room: G-505, Phone: 6907, E-mail: eki@ens.tut.ac.jp
Dr. Akira Hiraishi: Room: G-503, Phone: 6913, E-mail: hiraishi@ens.tut.ac.jp
Dr. Terumichi Tanaka: Room: G-506. Phone: 6920, E-mail: terumichi-tanaka@tut.jp
Dr. Kunihiro Sakuma: Room; Health Science Center, Phone: 6630, E-mail: ksakuma@las.tut.ac.jp
Dr. Atsushi Nakabachi: Room: G-502, Phone: 6901, E-mail: nakabachi@eiiris.tut.ac.jp

Reference URL

Office hours

Please make an appointment.
Please make an appointment.

Relations to attainment objectives of learning and education

Key words

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

Subject name[English]	Advanced Molecular Function Chemistry 1[Advanced Molecular Function Chemistry 1]				
Schedule number	D54030060	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Tue.1～1	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Environmental and Life Sciences			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	岩佐　精二, 伊津野　真一, 柴富　一孝, 原口　直樹 IWASA Seiji, ITSUNO Shinichi, SHIBATOMI Kazutaka, HARAGUCHI Naoki				
Numbering					

Objectives of class

This course focuses on state-of-the-art technology of functional polymers.
Synthesis and various applications of the functional polymers will be discussed.
This course focuses on state-of-the-art technology of functional polymers.
Synthesis and various applications of the functional polymers will be discussed.

Contents of class

(1) General aspects of functional polymers (Itsuno, Haraguchi)
(2) Precise molecular design of functional polymers(Itsuno, Haraguchi)
(3) Preparation of highly functionalized polymers(Itsuno, Haraguchi)
(4) Reactive polymer synthesis(Itsuno, Haraguchi)
(5) Optically active polymers(Itsuno, Haraguchi)
(6) Asymmetric synthesis and polymerization(Itsuno, Haraguchi)
(7) Synthesis and structure-function relationship of biobased and biodegradable polymers(Itsuno, Haraguchi)
(8) Bioactive natural products (Iwasa)
(9) Total synthesis of natural products (Iwasa)
(10) Transition metal complexes and 18 electron rule (Iwasa)
(11) Chiral catalysts and their applications (S. Iwasa)
(12) Advanced Lewis acid catalysis. (Shibatomi)
(13) Advanced organocatalysis. (Shibatomi)
(14) Asymmetric synthesis of halogenated compounds and their synthetic applications. (Shibatomi)
(15) Advanced organofluorine chemistry (Shibatomi)
(1) General aspects of functional polymers (Itsuno, Haraguchi)
(2) Precise molecular design of functional polymers(Itsuno, Haraguchi)
(3) Preparation of highly functionalized polymers(Itsuno, Haraguchi)
(4) Reactive polymer synthesis(Itsuno, Haraguchi)
(5) Optically active polymers(Itsuno, Haraguchi)
(6) Asymmetric synthesis and polymerization(Itsuno, Haraguchi)
(7) Synthesis and structure-function relationship of biobased and biodegradable polymers(Itsuno, Haraguchi)
(8) Bioactive natural products (Iwasa)
(9) Total synthesis of natural products (Iwasa)
(10) Transition metal complexes and 18 electron rule (Iwasa)
(11) Chiral catalysts and their applications (S. Iwasa)
(12) Advanced Lewis acid catalysis. (Shibatomi)
(13) Advanced organocatalysis. (Shibatomi)
(14) Asymmetric synthesis of halogenated compounds and their synthetic applications. (Shibatomi)
(15) Advanced organofluorine chemistry (Shibatomi)

Self Preparation and Review

Related subjects

Notes for textbook

No textbooks are required.
No textbooks are required.

Notes for reference

Goals to be achieved

To understand the latest trend of the research on functional polymers.
To understand the latest trend of the research on total synthesis of natural products and their synthetic methods.
To understand the latest trend of the research on functional polymers.
To understand the latest trend of the research on total synthesis of natural products and their synthetic methods.

Evaluation of achievement

Presentation (50%) and discussion (50%)
Presentation (50%) and discussion (50%)

Examination

レポートで実施
By Report

Details of examination

Other information

S. Itsuno: itsuno@ens.tut.ac.jp 6813
S. Iwasa: office:B-506, tel: 6817, email: iwasa@ens.tut.ac.jp
K. Shibatomi: shiba@ens.tut.ac.jp (room: B-507)
S. Itsuno: itsuno@ens.tut.ac.jp 6813
S. Iwasa: office:B-506, tel: 6817, email: iwasa@ens.tut.ac.jp
K. Shibatomi: shiba@ens.tut.ac.jp (room: B-507)

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

functional polymer, asymmetric catalyst, transition metal, organocatalyst, Lewis acid, fluorine
functional polymer, asymmetric catalyst, transition metal, organocatalyst, Lewis acid, fluorine

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

Subject name[English]	Seminar on Architecture and Civil Engineering 1[Seminar on Architecture and Civil Engineering 1]				
Schedule number	D55010010	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering					

Objectives of class

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

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

Contents of class

In each seminar, students pursue several research topics and/or undertake projects collectively and solely under the instruction of the faculty members of the department and/or those of other departments.

In each seminar, students pursue several research topics and/or undertake projects collectively and solely under the instruction of the faculty members of the department and/or those of other departments.

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

レポート

レポート

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

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

Subject name[English]	Seminar on Architecture and Civil Engineering 2[Seminar on Architecture and Civil Engineering 2]				
Schedule number	D55010020	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～3
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering					

Objectives of class

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

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

Contents of class

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

レポート

レポート

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

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

Subject name[English]	Advanced Building Environmental Engineering and Building Services[Advanced Building Environmental Engineering and Building Services]				
Schedule number	D55030030	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Mon.5～5	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Architecture and Civil Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	松本　博 MATSUMOTO Hiroshi				
Numbering					

Objectives of class

The goal of this course is to help professionals update related to the recent research and development on life cycle assessment (LCA) for buildings, environmental symbiotic technologies, climatic building design and urban energy management.
The goal of this course is to help professionals update related to the recent research and development on life cycle assessment (LCA) for buildings, environmental symbiotic technologies, climatic building design and urban energy management.

Contents of class

The course consists of the following topics.
1. Buildings and its Impact on the Global Environment
2. Impact Assessment indices for Buildings
3. Life Cycle Inventory for Buildings
4. Overview of CASBEE
5. Environmental Symbiotic Technologies (1)
6. Environmental Symbiotic Technologies (2)
7. Ecological Building Design (1)
8. Ecological Building Design (2)
9. Climatic Building Design (1)
10. Climatic Building Design (2)
11. Sustainable Building Design (1)
12. Sustainable Building Design (2)
13. Energy and Buildings (1)
14. Energy and Buildings (2)
15. Compact city –urban energy management–

The course consists of the following topics.
1. Buildings and its Impact on the Global Environment
2. Impact Assessment indices for Buildings
3. Life Cycle Inventory for Buildings
4. Overview of CASBEE
5. Environmental Symbiotic Technologies (1)
6. Environmental Symbiotic Technologies (2)
7. Ecological Building Design (1)
8. Ecological Building Design (2)
9. Climatic Building Design (1)
10. Climatic Building Design (2)
11. Sustainable Building Design (1)
12. Sustainable Building Design (2)
13. Energy and Buildings (1)
14. Energy and Buildings (2)
15. Compact city –urban energy management–

Self Preparation and Review

Related subjects

Building science: Indoor Air Quality and Ventilation, Building and Urban Thermal Environment
Building science: Indoor Air Quality and Ventilation, Building and Urban Thermal Environment

Notes for textbook

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

Reference1	**Book title**	Architecture for a Sustainable Future –All about the Holistic Approach in Japan–			**ISBN**	
	Author	Architectural Institute of Japan	**Publisher**	Institute for Building Environment and Energy Conservation	**Publish year**	2002

Notes for reference

Goals to be achieved

Achievement level of this course is to understand the background of building's impact on the global environment, the practical strategies for sustainable building design, urban energy management and so on.
Achievement level of this course is to understand the background of building's impact on the global environment, the practical strategies for sustainable building design, urban energy management and so on.

Evaluation of achievement

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

Examination

レポートで実施
By Report

Details of examination

Other information

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Hiroshi Matsumoto: D-710, Phone: 0532-44-6838, Fax: 0532-44-6831, E-mail: matsu@ace.tut.ac.jp

Reference URL

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

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

Office hours

Hiroshi Matsumoto: Monday 15:00-17:30

Hiroshi Matsumoto: Monday 15:00-17:30

Relations to attainment objectives of learning and education

Key words

climatic building design, sustainable building design, building energy management, energy saving
climatic building design, sustainable building design, building energy management, energy saving

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

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

Objectives of class

To undestand the analysis of regional economic activities.
To understand the interaction between the natural environment and the regional economy.
To undestand the analysis of regional economic activities.
To understand the interaction between the natural environment and the regional economy.

Contents of class

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

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

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

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

Self Preparation and Review

Related subjects

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

Notes for textbook

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

Notes for reference

Goals to be achieved

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

Evaluation of achievement

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

Examination

レポートで実施

By Report

Details of examination

Other information

room # : B411
phone : 0532-44-6955
e-mail address : miyata@ace.tut.ac.jp
room # : B411
phone : 0532-44-6955
e-mail address : miyata@ace.tut.ac.jp

Reference URL

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

Office hours

16:00 to 17:00 on every Tuesday
16:00 to 17:00 on every Tuesday

Relations to attainment objectives of learning and education

Key words

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

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

Subject name[English]	Advanced Management of Technology[Advanced Management of Technology]				
Schedule number	D55030110	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Wed.4～4	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Architecture and Civil Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	藤原 孝男, 渋澤 博幸 FUJIWARA Takao, SHIBUSAWA Hiroyuki				
Numbering					

Objectives of class

The main objective is to understand the function of technological entrepreneurship for commercialization of basic research results from a perspective of financial engineering.
Especially the decision-making model is examined for irreversible investment under uncertainty(Fujiwara).

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

The main objective is to understand the function of technological entrepreneurship for commercialization of basic research results from a perspective of financial engineering.
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In this course, students learn the regional and urban economic modeling techniques and the urban and regional policy evaluation methodology(Shibusawa).

Contents of class

Fujiwara
From a view point regarding the technological development as risky but competitive investment, this class has following topics:
1)Technological Entrepreneurship,
2)Technological Management Decision,
3)Investment Science,
4)Real Options, &
5)Game Theory.

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

Shibusawa
1-2:Urban and Regional Policy and Evaluation
3-5:Modeling of the Urban and Regional Economic Systems
6-8:Policies and the Evaluation Methodology
9-11:Evaluation Techniques and Tools
12-13:Case Studies of the urban and regional policy
14-15:Evaluating Case Studies
Fujiwara
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1)Technological Entrepreneurship,
2)Technological Management Decision,
3)Investment Science,
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Shibusawa
1-2:Urban and Regional Policy and Evaluation
3-5:Modeling of the Urban and Regional Economic Systems
6-8:Policies and the Evaluation Methodology
9-11:Evaluation Techniques and Tools
12-13:Case Studies of the urban and regional policy
14-15:Evaluating Case Studies

Self Preparation and Review

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

Shibusawa
Economics, Policy, Simulation
Fujiwara
Management Science (English), Operations Management (Japanese), & Social Infrastructure Management (Japanese).

Shibusawa
Economics, Policy, Simulation

Notes for textbook
Fujiwara
Educational materials will be introduced at first class.

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

Shibusawa
Papers will be distributed.

Notes for reference

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

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

Shibusawa
Advanced Urban and Regional Economics
Advanced Economic Simulation Model
Policy Evaluation Methodology

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

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

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

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

Examination
レポートで実施
By Report

Details of examination

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

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

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

Reference URL

Office hours
Fujiwara
After4:00 PM during Weekdays

Shibusawa
Tuesday 10:00-12:00

Fujiwara
After4:00 PM during Weekdays

Shibusawa
Tuesday 10:00-12:00

Relations to attainment objectives of learning and education

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

(D55030130)Advanced Western Culture[Advanced Western Culture]

Subject name[English]	Advanced Western Culture[Advanced Western Culture]				
Schedule number	D55030130	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Fri.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～3
Department Offered	Architecture and Civil Engineering			**Beggining grade**	
Charge teacher name[Roman alphabet mark]	相京　邦宏 AIKYO Kunihiro				
Numbering					

Objectives of class

Research on a history of scientific ideas in the ancient world.
Research on a history of scientific ideas in the ancient world.

Contents of class

Lecture on a view of nature and science in the ancient world.
Modern scinece and ancient 'science'. What are similarities or differneces between the two?

Program of lecture

1. Orientation(outline of the lecture)
2. Purpose of the Series
3. Science in Antiquity?
4. Modern Science 1
5. Modern Science 2
6. History and Philosophy
7. Building Histories 1
8. Building Histories 2
9. Building Histories 3
10. Intellectual Paternities 1
11. Intellectual Paternities 2
12. Selective Survival of Texts
13. Resources for History 1
14. Resources for History 2
15. Summery of the lecture

Lecture on a view of nature and science in the ancient world.
Modern scinece and ancient 'science'. What are similarities or differneces between the two?

Program of lecture

1. Orientation(outline of the lecture)
2. Purpose of the Series
3. Science in Antiquity?
4. Modern Science 1
5. Modern Science 2
6. History and Philosophy
7. Building Histories 1
8. Building Histories 2
9. Building Histories 3
10. Intellectual Paternities 1
11. Intellectual Paternities 2
12. Selective Survival of Texts
13. Resources for History 1
14. Resources for History 2
15. Summery of the lecture

Self Preparation and Review

Preparation & review of text
Preparation & review of text

Related subjects

Notes for textbook
Roger French, Ancient Natural History. Routledge, 1994.
Roger French, Ancient Natural History. Routledge, 1994.

Notes for reference

Goals to be achieved
(1)A correct perception of a history of science.
(2)A conprehensive grasp of the origin of scientific ideas in Western Europe.
(3)Understanding of basic terms on a history of scinece.
(4)A correct understanding of a relation between modern science and pre-modern scinece.
(5)A total appreciation of a transition of scientific ideas.
(6)A correct understanding of literature on a history of science.

(1)A correct perception of a history of science.
(2)A conprehensive grasp of the origin of scientific ideas in Western Europe.
(3)Understanding of basic terms on a history of scinece.
(4)A correct understanding of a relation between modern science and pre-modern scinece.
(5)A total appreciation of a transition of scientific ideas.
(6)A correct understanding of literature on a history of science.

Evaluation of achievement
Holding the end-of-term exams.
Holding the end-of-term exams.

Examination
レポートで実施
By Report

Details of examination

Other information

Reference URL

Office hours
pm. 2-5(Tuesday)
pm. 1-4(Wednesday)

pm. 2-5(Tuesday)
pm. 1-4(Wednesday)

Relations to attainment objectives of learning and education

Key words
ancient, science, history
ancient, science, history