Syllabus

International Doctoral Degree Program

（2021-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～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_DOC71015				

Objectives of class

Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.

Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.

Contents of class

Content of this class will be set in each laboratory.

Content of this class will be set in each laboratory.

Self Preparation and Review

Preparation for next class and a review after each class are carried out.

Preparation for next class and a review after each class are carried out.

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

N/A

N/A

Goals to be achieved

(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.
(2) Contents of literature are understood and presented accurately and briefly.
(3) Problem-setting is found by developing content of literature.

(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.
(2) Contents of literature are understood and presented accurately and briefly.
(3) Problem-setting is found by developing content of literature.

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

The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.
Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).

Examination

試験期間中には何も行わない

None during exam period

Details of examination

None during exam period

None during exam period

Other information

Inquire this of your supervisor.

Inquire this of your supervisor.

Reference URL

N/A

N/A

Office hours

Contact your supervisor.

Contact your supervisor.

Relations to attainment objectives of learning and education

機械工学専攻

（C）高度な知識を統合的・発展的に活用できる実践力・創造力

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

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

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

Graduate Program of Mechanical Engineering for Doctoral Degree

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

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

Key words

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

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

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

Subject name[English]	Advanced Seminar on Mechanical Engineering 2[Advanced Seminar on Mechanical Engineering 2]				
Schedule number	D51010020	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Mechanical Engineering			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_DOC71015				

Objectives of class

Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.

Knowledge from fundamental to advanced levels are acquired in each research field of mechanical engineering. Abilities for problem-solving, problem-questing, and judgement, and presentation skill are polished up at seminar of this class.

Contents of class

Content of this class will be set in each laboratory.

Content of this class will be set in each laboratory.

Self Preparation and Review

Preparation for next class and a review after each class are carried out.

Preparation for next class and a review after each class are carried out.

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

N/A

N/A

Goals to be achieved

(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.
(2) Contents of literature are understood and presented accurately and briefly.
(3) Problem-setting is found by developing content of literature.

(1) Knowledge from fundamental to advanced levels is acquired in each research field of mechanical engineering.to perform research.
(2) Contents of literature are understood and presented accurately and briefly.
(3) Problem-setting is found by developing content of literature.

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

The achivement is evaluated based on the results of paper introduction, understanding of papers, answers to questions, and on the contribution to discussion.
Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).

Examination

試験期間中には何も行わない

None during exam period

Details of examination

None during exam period

None during exam period

Other information

Inquire this of your supervisor.

Inquire this of your supervisor.

Reference URL

N/A
N/A

Office hours

Contact your supervisor.
Contact your supervisor.

Relations to attainment objectives of learning and education

機械工学専攻
（C）高度な知識を統合的・発展的に活用できる実践力・創造力
機械工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。
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Graduate Program of Mechanical Engineering for Doctoral Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated and progressive manner
Have advanced knowledge about mechanical engineering and related fields, and have ability to create and practice original techniquesfor problem solving by acquiring the research and development methodology that combines such knowledge in an extensive and organic manner

Key words

Mechanical engineering, Mechanical system design, Materials and manufacturing, System control and robotics, Environment and energy
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(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～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	伊﨑　昌伸, 横山　誠二, 安井　利明 IZAKI Masanobu, YOKOYAMA Seiji, YASUI Toshiaki				
Numbering	MEC_DOC74025				

Objectives of class

1. 材料の作製と機能（伊﨑）

本授業は固体物理学および化学熱力学に立脚して材料ならびにその薄膜の形成技術を取り扱うとともに、材料の組織・構造・エネルギー状態と材料の物理・化学的性質の関係を掘り下げ、機能向上のための技術と科学を学ぶ。

2. 接合プロセス

最先端の接合プロセス、および表面改質プロセスの原理および実用技術を学ぶ。本授業は、力学、固体物理学、化学熱力学および移動現象論を網羅している。

1. Manufacturing and function of materials(izaki)

This subject deals with the manufacturing process of materials and the thin films based on solid state physics and chemical thermodynamics, and the science and technology for enhancing the performance of materials and the thin films are learned by understanding the fundamental aspects of the characteristics.

2. Joining process

Students will learn principle and practical technology of advanced joining process and surface modification process. This subject incorporates the mechanics, solid state physics, chemical thermodynamics, and transport phenomena.

Contents of class

（オンデマンド）第 1 週：材料の製造と加工１－無機固体生産に関わる化学熱力学（伊崎）
（オンデマンド）第 2 週：材料の製造と加工２－化学熱力学を用いた生産プロセス設計（伊崎）
（対面）第 3 週：材料の製造と加工３－無機固体の固体物理学（電子論）（伊崎）
（オンデマンド）第 4 週：材料の製造と加工４－無機固体の固体物理学（結晶学）（伊崎）
（オンデマンド）第 5-6 週：材料の製造と加工５－無機固体の溶液プロセスによる製造と応用（伊崎）
（対面）第 7 週：材料の製造と加工６－高温度における物理化学（横山）
（オンデマンド）第 8 週：材料の製造と加工７－冶金反応における平衡（横山）
（オンデマンド）第 9 週：材料の製造と加工８－冶金反応における反応速度（横山）
（対面）第 10 週：材料の製造と加工９－鉄鋼製錬プロセス（横山）
（対面）第 11 週：材料の製造と加工 10－資源とリサイクル（横山）
（オンデマンド）第 12 週：接合加工と表面処理プロセス１－序論（安井）
（オンデマンド）第 13 週：接合加工プロセス２－バルク接合プロセス（安井）
（対面）第 14 週：接合加工プロセス３－粒子積層プロセス（安井）
（対面）第 15-16 週：接合加工プロセス４－気相蒸着プロセス（安井）
「本学の新型コロナウィルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。」
授業実施形態が変更になる場合は，GoogleClassroom または教務情報システムより通知します。
(On demand) 1st week: Production and manufacturing of materials1 – Chemical thermodynamics in manufacturing.(Izaki)
(On demand)2nd week: Production and manufacturing of materials 2 – Process design based on thermodynamic (izaki)
(Face-to-face) 3rd week: Production and manufacturing of materials 3 – Solid state physics of inorganic solid (energy state).(Izaki)
(On demand)4th week: Production and manufacturing of materials 4 – Solid state physics of inorganic solid (crystal).(Izaki)
(On demand)5-6th week: Production and manufacturing of materials 5 – Preparation and application of inorganic solid.(Izaki)
(Face-to-face) 7th week: Production and manufacturing of materials 6 – Physical chemistry at high temperature.(Yokoyama)
(On demand)8th week: Production and manufacturing of materials 7 – Equilibrium of metallurgcal reaction.(Yokoyama)
(On demand)9th week: Production and manufacturing of materials 8 – Reaction rate of metallurgcal reaction.(Yokoyama)
(Face-to-face) 10th week: Production and manufacturing of materials 9 – Process of iron- and steel-making.(Yokoyama)

(Face-to-face) 11th week: Production and manufacturing of materials 10 - Resource and recycling.(Yokoyama)
(On demand) 12th week: Joining process 1 - Introduction of joining process. (Yasui)
(On demand) 13th week: Joining process 2 - Bulk joining process. (Yasui)
(Face-to-face) 14th week: Joining process 3 - Particle deposition process. (Yasui)
(Face-to-face) 15-16th week: Joining process 4 - Vapor deposition process. (Yasui)
"As a result of the change in our activity standards for preventing the spread of new coronavirus infection at our university, the evaluation method of class contents and grades may change."
When the class form changes, we will notify you from Google Classroom or the Academic Affairs Information System.

Self Preparation and Review
授業後の復習、授業前の予習が重要.。各自，それぞれ予習・復習を90分づつ行うこと。
Review after every class, and read the text before next class　Students must provide 90 minutes for preparation and review of each class.

Related subjects
接合加工プロセス、表面加工学、材料科学、材料物理化学、材料解析
Joining process, surface process engineering, materials science, Physical chemistry of material, material analysis

Notes for textbook
資料を配布する。
Text will be distributed.

Reference1	**Book title**	Principles of Extractive Metallurgy			**ISBN**	0470115394
	Author	Rosenqvist	**Publisher**	Tapir Academic Press	**Publish year**	2006
Reference2	**Book title**	Growth and Transport in Nanostructured Materials: The Fundamentals of PVD, CVD and ALD			**ISBN**	3319246704
	Author	Angel Yanguas-Gil	**Publisher**	Springer	**Publish year**	2015
Reference3	**Book title**	Solid State Physics			**ISBN**	0123850304
	Author	Giuseppe Grosso, Giuseppe Pastori Parravicini	**Publisher**	Academic Press	**Publish year**	2013

Notes for reference
N/A

Goals to be achieved
1）結晶構造と電子状態を理解していること。
2）蒸気圧、活量、pH、電位を理解していること。
3）反応の平衡と速度論を理解していること。
4）都市鉱山、リサイクルを理解していること。
5）金属とセラミックスの接合に関する原理と力学を理解していること。
6）薄膜および厚膜の製造プロセスの原理、力学、特性を理解していること。
7）真空技術や平均自由行程の概念を理解していること。
8）プラズマの発生とその応用を理解していること。
1) To understand crystal structure and electron state.
2) To understand evaporation pressure, activity, pH, electron potential.
3) To comprehend equilibrium and kinetics of reaction.
4) To comprehend urban mine and recycling.
5) To understand principles and mechanics on joining of metals and ceramics.
6) To understand principles, mechanics and characteristics of preparation process of thin and thick coating.
7) To understand vacuum technology and concept of mean free path.
8) To understand plasma generation and its application.

Evaluation of achievement
S：達成目標をすべて達成しており，かつレポートの合計点（100 点満点）が 90 点以上
A：達成目標を〇%達成しており，かつレポートの合計点（100 点満点）が 80 点以上
B：達成目標を〇%達成しており，かつレポートの合計点（100 点満点）が 70 点以上
C：達成目標を〇%達成しており，かつレポートの合計点（100 点満点）が 60 点以上
※ただし，過年度生が履修した場合には，従来（A～C）の評価基準が適用される。
Each instructor will give students assignments. Average score is used for evaluation.

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

A: Achieved all goals and obtained total points of reports, 80 or higher (out of 100 points).
B: Achieved 80 % of goals and obtained total points of reports, 70 or higher (out of 100 points).
C: Achieved 60 % of goals and obtained total points of reports, 60 or higher (out of 100 points).
(The cconventional evaluation standard of (A – C) is applied for a past fiscal year student.)

Examination

レポートで実施
By Report

Details of examination

N/A

Other information

伊﨑昌伸（部屋 D-505,内線 6694,e-mail:m-izaki@me.tut.ac.jp）
横山誠二（部屋 D-507,内線 6696,e-mail:yokoyama@me.tut.ac.jp）
安井利明（部屋 D-601,内線 6703,e-mail:yasui@tut.jp）
Masanobu Izaki (D-505,ext.6694, e-mail:m-izaki@me.tut.ac.jp)
Seiji Yokoyama (D-507, ext.6696, e-mail:yokoyama@me.tut.ac.jp)
Toshiaki Yasui (D-601, ext.6703,e-mail:yasui@tut.jp)

Reference URL

N/A

Office hours

いつでも可。ただし、事前にメールで連絡すること。
Any time, but inform us your visit by e-mail before your visit.

Relations to attainment objectives of learning and education

材料と加工法の技術開発する広範囲な実践力と能力を養う。

A broad range of expertise and the ability to carry out technological development in materials and manufacturing.

Key words

薄膜、コーティング、蒸発、活量、スプレイ加工、移動現象論、熱力学
thin solid film, coating, evaporation, activity, spray forming, transport phenomena, thermodynamics

(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～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	鈴木 孝司, 中村 祐二, 松岡 常吉, 土井 謙太郎 SUZUKI Takashi, NAKAMURA Yuji, MATSUOKA Tsuneyoshi, DOI Kentaro				
Numbering	MEC_DOC76025				

Objectives of class

The aim of the present lecture is to obtain advanced knowledge on the transport of thermal energy and the combustion of gases and solids.

Contents of class

1st week (Nakamura, face-to-face): Introduction of scaling law for thermo-fluid engineering
2nd week (Nakamura, face-to-face): Dimensional analysis / Buckingham pi-theorem
3rd week (Nakamura, face-to-face): Large-scale transport phenomena
4th week (Nakamura, face-to-face): Meno-scale transport phenomena
5th week (Doi, face-to-face): Introduction to microscale transport phenomena 1
6th week (Doi, face-to-face): Introduction to microscale transport phenomena 2
7th week (Doi, face-to-face): Fuel cells
8th week (Doi, face-to-face): Micro- and nanoscale thermofluid technologies
9th week (Suzuki, face-to-face): Fundamentals of atomization
10th week (Suzuki, face-to-face): Parameters and measuring method of atomization
11th week (Suzuki, face-to-face): Numerical simulation of atomization
12th week (Matsuoka, face-to-face): Combustion instability
13th week (Matsuoka, face-to-face): Diffusive-thermal instability
14th week (Matsuoka, face-to-face): Pattern formation of reaction-diffusion system

(*) If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.
(*) basically the class will be operated by face-to-face (in-person) style, however, it would be subjected to change to on-demand type based on the situation. Any change will be notified to students personally.

Self Preparation and Review

Students MUST be pre-studied the related area, especially for applied mathematics, fluid dynamics and thermodynamics (advance level is strongly preferred).

Related subjects

Applied mathematics, fluid dynamics, thermodynamics for advanced level.
Basic combustion (preferred)

Notes for textbook

Instructors will provide the materials, if necessary.

Reference1	**Book title**	The Molecular Theory of Gases and Liquids			**ISBN**	
	Author	J.O. Hirschfelder, C.F. Curtiss, R.B. Bird	**Publisher**	John Wiley and Sons	**Publish year**	1954
Reference2	**Book title**	Combustion Physics			**ISBN**	
	Author	C.K. Law	**Publisher**	Cambridge University Press	**Publish year**	2006
Reference3	**Book title**	Combustion Theory			**ISBN**	
	Author	F.A. Williams	**Publisher**	Addison-Wesley	**Publish year**	1985

Notes for reference

N.A.

Goals to be achieved

Understanding the scaling law for thermo-fluid problem
Understanding the microscale Transport Phenomena
Understanding the liquid atomization
Understanding the combustion instability

Evaluation of achievement

Assignments and discussion (several assignments are requested during the term): 100%
[Evaluation basis]
Students who attend all classes will be evaluated as follows:
S: Achieved all goals and obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Achieved 80 % goals and obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Achieved 70 % of goals and obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Achieved 60 % of goals and obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination

N/A

Other information

N/A

Reference URL

N/A

Office hours

Anytime when instructor is available: send mail to instructor to book your time for personal meeting

Relations to attainment objectives of learning and education

N/A

Key words

Thermo-fluid engineering, Scaling law, microscale transport phenomena, Liquid atomization, Combustion instability

(D51030110)Advanced Mechatronics[Advanced Mechatronics]

Subject name[English]	Advanced Mechatronics[Advanced Mechatronics]				
Schedule number	D51030110	**Subject area**	Advanced Mechanical 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～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	佐藤 海二, 佐野 滋則, 高木 賢太郎 SATO Kaiji, SANO Shigenori, TAKAGI Kentaro				
Numbering	MEC_DOC75025				

Objectives of class

本講義を履修することによって，知能ロボットの基礎となるメカニズム，アクチュエータ，計測制御技術の基礎知識を身につける.
Students will acquire the basic knowledge of mechanisms, actuators, measurement and control methods which are fundamental and useful for intelligent robots by taking this course.

Contents of class

以下を予定している.
第 1 週(回)～第 5 週(回):高木，第 6 週(回)～第 10 週(回):佐野，第 11 週(回)～第 15 週(回):佐藤
（対面）　第 1 週(回). . .　メカトロニクスシステムとモデル化手法（1）
（オンデマンド）第 2 週(回). . .　メカトロニクスシステムとモデル化手法（2）
（オンデマンド）第 3 週(回). . .　メカトロニクスシステムとモデル化手法（3）
（オンデマンド）第 4 週(回). . .　メカトロニクスシステムとモデル化手法（4）
（オンデマンド）第 5 週(回). . .　メカトロニクスシステムとモデル化手法（5）
（対面）　第 6 週(回). . .　システム同定・モデル検証（1）
（オンデマンド）第 7 週(回). . .　システム同定・モデル検証（2）
（オンデマンド）第 8 週(回). . .　システム同定・モデル検証（3）
（オンデマンド）第 9 週(回). . .　システム同定・モデル検証（4）
（オンデマンド）第 10 週(回). . .　システム同定・モデル検証（5）
（対面）　第 11 週(回). . .　精密運動システム（1）
（オンデマンド）第 12 週(回). . .　精密運動システム（2）
（オンデマンド）第 13 週(回). . .　精密運動システム（3）
（オンデマンド）第 14 週(回). . .　精密運動システム（4）

本学の新型コロナウィルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります.
授業実施形態が変更になる場合は、GoogleClassroom や教務情報システムより通知します.
The following contents are provided;
1st-5th: Prof.Takagi, 6th-10th: Prof.Sano, 11th-15th: Prof.Sato
(face to face) 1st week/time ... Mechatronics systems and modeling methods (1)
(on-demand)　2nd week/time ... Mechatronics systems and modeling methods (2)
(on-demand)　3rd week/time ... Mechatronics systems and modeling methods (3)
(on-demand)　4th week/time ... Mechatronics systems and modeling methods (4)
(on-demand)　5th week/time ... Mechatronics systems and modeling methods (5)
(face to face) 6th week/time ... System identification and Validation(1)
(on-demand)　7th week/time ... System identification and Validation(2)
(on-demand)　8th week/time ... System identification and Validation(3)
(on-demand)　9th week/time ... System identification and Validation(4)
(on-demand)　10th week/time ... System identification and Validation(5)
(face to face) 11th week/time ... Precision Motion System(1)
(on-demand)　12th week/time ... Precision Motion System(2)
(on-demand)　13th week/time ... Precision Motion System(3)
(on-demand)　14th week/time ... Precision Motion System(4)

If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.
If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

予習:事前配信された講義資料を事前に熟読し，関連事項について参考書などで理解を深めておくこと,(90 分)

復習：講義資料を読み返し，参考書などを参照して理解しておくこと。(90 分)
To carefully read the pre-delivered lecture materials in advance and understand related matters using reference books, etc..
To read back the lecture materials and understand them using reference books, etc..
To prepare for and review the lecture for around 90 minutes each.

Related subjects
線形代数，微分方程式，機構学，計測工学，制御理論，ロボティクス
Fundamentals of linear algebra, differential equation, mechanics, measurement and control theory, and robotics.

Notes for textbook
資料を配布する
Handouts will be prepared.

Notes for reference
特になし
N/A

Goals to be achieved
(1) 精密運動機構における構成要素の特性と効果的な利用方法を理解する
(2) ロボットのシステム同定の基礎を理解する
(3) メカトロニクスシステムを中心に動的システムのモデル化手法の基礎を理解する
(1) Understand characteristics of components and their effective use in precision motion mechanisms
(2) Understand the basic of system identification
(3) Understand methods for modeling dynamical systems including mechatronics systems

Evaluation of achievement
レポートによって 100%評価する

A：80 点以上
B：65 点以上
C：55 点以上
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
特になし
N/A

Other information
高木賢太郎, D-509, 6698, takagi.kentaro.op@tut.jp
佐野滋則, D-407, 6677, sano@me.tut.ac.jp
佐藤海二, D-408, 6676, sato@me.tut.ac.jp

Shigenori Sano, D-407, 6677, sano@me.tut.ac.jp
Kentaro Takagi, D-509, 6698, takagi.kentaro.op@tut.jp
Kaiji Sato, D-408, 6676, sato@me.tut.ac.jp

Reference URL
特になし
N/A

Office hours
質問は随時 Google Classroom のコメント機能を用いて受け付ける．質問への回答は，講義時間の前後に，まとめて回答する予定である．個人的な内容や急ぎの場合には教員に直接メール送付すること．
Write comment on Google Classroom if you have questions. The questions will be answered around the lecture time. In case you have personal or urgent questions, send email directly to the lecturers.

Relations to attainment objectives of learning and education

(C)高度な知識を統合的・発展的に活用できる実践力・創造力
機械工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得す

ることで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。

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

Key words
ロボット，制御，センサ，アクチュエータ，機構学，機械システム
Robot, Control, Sensor, Actuator, Mechanism, Mechanical system

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

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

Objectives of class

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

Contents of class

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

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

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

Notes for reference

N/A

Goals to be achieved

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

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

電気・電子情報工学専攻
(C)高度な知識を統合的・発展的に活用できる実践力・創造力
電気・電子情報工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。
(D)グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で，自らの考えや成果を効果的に表現・発信するコミュニケーション力と，リーダーとしてチームの目標達成に寄与できる高い能力を能力を身につけている。
（E）最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化の本質を探求し，生涯にわたって自発的に計画し学習する能力を身につけている。
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
(E) Inquisitive mind and continuous learning skill for changes in the state-of-the-art technology and in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

Graduate Progaram of Engineering of Electrical and ElectronicInformation Engineering for Doctoral Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills toutilize such knowledge for problem solving in an integrated manner
(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
(E) Inquisitive mind and continuous learning skill for changes in the state-of-the-art technology and in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society,environment and technology

Key words

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

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

Objectives of class

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

Contents of class

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

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

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

Notes for reference

N/A

Goals to be achieved

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

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

電気・電子情報工学専攻
(C)高度な知識を統合的・発展的に活用できる実践力・創造力
電気・電子情報工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。
(D)グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で，自らの考えや成果を効果的に表現・発信するコミュニケーション力と，リーダーとしてチームの目標達成に寄与できる高い能力を能力を身につけている。
（E）最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化の本質を探求し，生涯にわたって自発的に計画し学習する能力を身につけている。
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
(E) Inquisitive mind and continuous learning skill for changes in the state-of-the-art technology and in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

Graduate Progaram of Engineering of Electrical and ElectronicInformation Engineering for Doctoral Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills toutilize such knowledge for problem solving in an integrated manner
(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
(E) Inquisitive mind and continuous learning skill for changes in the state-of-the-art technology and in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society,environment and technology

Key words

(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～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	内田　裕久，八井　崇，中村　雄一，河村　剛 UCHIDA Hironaga, YATSUI Takashi, NAKAMURA Yuichi, KAWAMURA Go				
Numbering	ELC_DOC72025				

Objectives of class

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

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. Caloritronics
You will learn about materials processing and thermoelectric conversion.
1) thermodynamics, 2) processing and 3) thermoelectrics

3. Nanophotonics
You will learn about nanophotonic materials and devices.
1) nanophotonic matreials and 2) nanophotonic devices.

4. Plasmonic photocatalysis
You will learn about materials for plasmonic photocatalysis.
1) mechanisms, 2) materials and 3) applications

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

Self Preparation and Review

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

Related subjects

Notes for textbook

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.

Evaluation of achievement

The reports or tests will be set in each categories.
The result is evaluated from the sum of those marks.
Grades: S: 89-100, A:80-90, B:70-79, C:60-69.

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information
Reference URL
Office hours Please make an appointment via e-mail.
Relations to attainment objectives of learning and education
Key words spin electronics, processing, thermoelectrics, plasmonics, photocatalysis, nanophotonics

(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～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	稲田 亮史, 村上 義信 INADA Ryoji, MURAKAMI Yoshinobu				
Numbering	ELC_DOC73025				

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 subcourses 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 subcourses to choose from.

Contents of class

Subcourse 1 (R. Inada, all lecture will be done face to face)
1. Introduction of Electrochemical Energy Conversion Devices (1 week)
2. Fundamentals of Electrochemical Energy Conversion Devices (2 week)
3. Lithium-Ion Secondary Batteries (2 weeks)
4. Recent Trend in Electrochemical Energy Conversion Devices (1 week)
5. Subcource Examination (1 week)

Subcourse 2 (Y. Murakami, all lecture will be done face to face)
1. Introduction of Electric Energy Systems (2 week)
2. High Voltage Engineering and Electrical Insulation (2 weeks)
3. Fundamental Properties of Dielectrics and Electrical Insulating Materials(2 weeks)
4. Subcource examination (1 week)

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

Subcourse 1 (R. Inada, all lecture will be done face to face)
1. Introduction of Electrochemical Energy Conversion Devices (1 week)
2. Fundamentals of Electrochemical Energy Conversion Devices (2 week)
3. Lithium-Ion Secondary Batteries (2 weeks)
4. Recent Trend in Electrochemical Energy Conversion Devices (1 week)
5. Subcource Examination (1 week)

Subcourse 2 (Y. Murakami, all lecture will be done face to face)
1. Introduction of Electric Energy Systems (2 week)
2. High Voltage Engineering and Electrical Insulation (2 weeks)
3. Fundamental Properties of Dielectrics and Electrical Insulating Materials(2 weeks)
4. Subcource examination (1 week)

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

Self Preparation and Review

Materials to be used in the lecture will be distributed from the lecturer before starting each subcourse. The lecturers will give a

lecture on the premise that all the students have prepared this material before the lecture begins. It may not be possible to attend a lecture if you do not prepare materials.
Materials to be used in the lecture will be distributed from the lecturer before starting each subcourse. The lecturers will give a lecture on the premise that all the students have prepared this material before the lecture begins. It may not be possible to attend a lecture if you do not prepare materials.

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.

Reference1	**Book title**	Fuel Cell Systems Explained			**ISBN**	
	Author	J. Larminie and A. Dicks	**Publisher**	Wiley	**Publish year**	
Reference2	**Book title**	Lithium Ion Batteries: Science and Technologies			**ISBN**	
	Author	M. Yoshio, R.J. Brodd and A. Kozawa	**Publisher**	Springer-Verlag	**Publish year**	
Reference3	**Book title**	High Voltage Engineering			**ISBN**	
	Author	E. Kuffel, W. Zaengel and J. Kuffel	**Publisher**	Newnes	**Publish year**	

Notes for reference

特になし
N/A

Goals to be achieved

1. Understand the basics and recent trend for electrochemical energy storage/conversion devices.
2. Understand the basics and recent trend for high-voltage engineering and electrical insulation.
1. Understand the basics and recent trend for electrochemical energy storage/conversion devices.
2. Understand the basics and recent trend for high-voltage engineering and electrical insulation.

Evaluation of achievement

In final exams we will ask questions on the contents of all subcourses. We evaluate the results only based on the final exam scores. The result is evaluated in the following five stages.
S: If the score of the final exam is 90 points or more
A: If the score of the final exam is 80 points or more
B: If the score of the final exam is 70 points or more
C: If the score of the final exam is 60 points or more
D: If the score of the final exam is less than 60 points
In final exams we will ask questions on the contents of all subcourses. We evaluate the results only based on the final exam scores. The result is evaluated in the following five stages.
S: If the score of the final exam is 90 points or more
A: If the score of the final exam is 80 points or more
B: If the score of the final exam is 70 points or more
C: If the score of the final exam is 60 points or more
D: If the score of the final exam is less than 60 points

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination

In order to obtain good results in final exams, we will also conduct a small test at any time while each subcourse is offered. Therefore, it is desirable to prepare lecture materials beforehand and attend all the lectures.
In order to obtain good results in final exams, we will also conduct a small test at any time while each subcourse is offered. Therefore, it is desirable to prepare lecture materials beforehand and attend all the lectures.

Other information

特になし
N/A

Reference URL

特になし
N/A

Office hours

We do not have an office hour, so contact first by e-mail.

We do not have an office hour, so contact first by e-mail.

Relations to attainment objectives of learning and education

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

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

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**	Wed.1～1	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	澤田　和明, 石川　靖彦, 関口　寛人, 野田　俊彦 SAWADA Kazuaki, ISHIKAWA Yasuhiko, SEKIGUCHI Hiroto, NODA Toshihiko				
Numbering	ELC_DOC74025				

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.

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

Self Preparation and Review

毎回の講義内容を復習するとともに，次週の内容についてテキスト等を参考に予習してくること
Review each lecture and prepare for the next class with reference to the textbook.

Related subjects

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

Notes for reference

特になし
N/A

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.

Evaluation of achievement

Reports (100%)
Reports (100%)

Examination

レポートで実施
By Report

Details of examination

Other information

K. Sawada (C-605)
sawada@ee.tut.ac.jp
Y. Ishikawa (C-607)
ishikawa@ee.tut.ac.jp
H. Sekiguchi (C-610)
sekiguchi@ee.tut.ac.jp
ext. 6744
T. Noda (C-611)
noda-t@eiiris.tut.ac.jp
ext. 6745

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)

Office hours

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

Relations to attainment objectives of learning and education

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

電気・電子情報工学専攻
(C)高度な知識を統合的・発展的に活用できる実践力・創造力
電気・電子情報工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and
creative skills toutilize such knowledge for problem solving in an integrated manner

Graduate Progaram of Engineering of Electrical and ElectronicInformation Engineering for Doctoral Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about electrical and electronic information engineering as well as related fields; have the practical and creative skills toutilize such knowledge for problem solving in an integrated manner

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.4～4	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	上原 秀幸, 竹内 啓悟 UEHARA Hideyuki, TAKEUCHI Keigo				
Numbering	ELC_DOC75025				

Objectives of class

Students select one course from the following two courses:
A first course is intended for learning mainly medium access control, multi-hop communications and other topics related to wireless networks. Students are required to give solutions of the problems which cause performance degradation.
The other course is intended for learning point-to-point communication systems, multiuser communication systems, and multiple-input multiple-output (MIMO) systems in the physical layer of wireless communications. Students challenge a unified understanding of existing advanced schemes in wireless communications.

Contents of class

Course 1 provided by Prof. Uehara:
1. Medium access control protocols
2. Multi-hop communications
3. Ad hoc and sensor networks

Course 2 provided by Prof. Takeuchi:
1. Point-to-point communication systems
2. Multiuser communication systems
3. MIMO systems

If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for
Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.
If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

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

Related subjects

The students who register for this lecture must have studied the Information and Communication Technology 1 and 2 (Uehara, & Takeuchi) in master course program, or its equivalent. All courses taken at other universities must be approved by the professors before registering for this course.

Prerequisite of Course 1:
Sufficient knowledge about the following; wireless digital modulation and demodulation, radio propagation characteristic, signal processing, probability, random variables and stochastic process.

Prerequisite of Course 2:
Deep understanding on modulation/demodulation, signal processing, probability theory, and information theory is prerequisite. In particular, sufficient knowledge about probability theory is required.

Notes for textbook

Instruct in 1st class.

Notes for reference

N/A

Goals to be achieved

Course 1:
- Understand the mechanism of medium access control and multi-hop communications
- Understand the characteristics of ad hoc and sensor networks

- Present a solution or a new application for the above

Course 2:
- Understand the concept of detection, diversity, and channel uncertainty in point-to-point communication systems.
- Understand resource allocation and interference management in multiuser communication systems.
- Understand statistical channel models and basic multiuser detection schemes in MIMO systems.

Evaluation of achievement

Course 1: Marks are based on reports and presentations.

Course 2: Marks are based on reports and tests.

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination

N/A

Other information

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

Reference URL

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

Office hours

Appoint a time slot via email

Relations to attainment objectives of learning and education

(C)

Key words

wireless networks, medium access control, multi-hop, wireless communications, modulation/demodulation, MIMO

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

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

Objectives of class

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

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.

It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

Contents of class

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

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

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

Self Preparation and Review

教員が指定する内容に関し、予習・復習を行う。

Consult with your advisor.

Related subjects

指導教員に問い合わせること。

Consult with your advisor.

Notes for textbook

指導教員に問い合わせること。

Consult with your advisor.

Notes for reference

Goals to be achieved

(1)最先端の専門分野の英文が理解でき、わかりやすく説明できる。

(2)技術的な情報を扱う英文が解釈でき、作文できる。

(3)論文の標準的な構成ができる。

(4)発表というスタイルでの情報提供ができる。

(5)情報の不足を質問という形式で指摘できる。

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

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

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

(4) To provide information by oral presentation.

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

Evaluation of achievement

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

The score is assigned by the supervisor considering autonomy for the discovery and understanding of technical information, the method of the description, the answer to the question determines, and the participation to the discussion.

S: more than or equal to 90, A: more than or equal to 80, B: more than or equal to 60, C: more than or equal to 60.

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

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

Other information

Reference URL

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

Relations to attainment objectives of learning and education

(C)高度な知識を統合的・発展的に活用できる実践力・創造力
情報・知能工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，身につけている。
(E)最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化の本質を探求し，生涯にわたって自発的に計画し学習する能力を身につけている。

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize suchknowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.
(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology
Have the skills to research the essence of changes in society,environment, and technology.Have the skills to voluntarily make plans andlearn throughout one's life in response to changes in society, environment and technology

Key words

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

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

Objectives of class

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

The course is intended for students to study basic materials in depth, related to his/her research subjects in computer science and engineering.

It is also aimed for students to acquire various skills, required in general research work, such as those for oral presentation, and technical discussion and writing.

Contents of class

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

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

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

Self Preparation and Review

教員が指定する内容に関し、予習・復習を行う。

Consult with your advisor.

Related subjects

指導教員に問い合わせること。

Consult with your advisor.

Notes for textbook

指導教員に問い合わせること。

Consult with your advisor.

Notes for reference

Goals to be achieved

(1)最先端の専門分野の英文が理解でき、わかりやすく説明できる。

(2)技術的な情報を扱う英文が解釈でき、作文できる。

(3)論文の標準的な構成ができる。

(4)発表というスタイルでの情報提供ができる。

(5)情報の不足を質問という形式で指摘できる。

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

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

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

(4) To provide information by oral presentation.

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

Evaluation of achievement

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

The score is assigned by the supervisor considering autonomy for the discovery and understanding of technical information, the method of the description, the answer to the question determines, and the participation to the discussion.

S:more than or equal to 90, A:more than or equal to 80, B:more than or equal to 70, C:more than or equal to 60

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

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

Other information

Reference URL

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

Relations to attainment objectives of learning and education

(C)高度な知識を統合的・発展的に活用できる実践力・創造力
情報・知能工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，身につけている。
(E)最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化の本質を探求し，生涯にわたって自発的に計画し学習する能力を身につけている。

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize suchknowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.
(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology
Have the skills to research the essence of changes in society,environment, and technology.Have the skills to voluntarily make plans andlearn throughout one's life in response to changes in society, environment and technology

Key words

(D53030330)Information Security, Advanced[Information Security, Advanced]

Subject name[English]	Information Security, Advanced[Information Security, Advanced]				
Schedule number	D53030330	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring2 term	**Day of the week,period**	Wed.4～4	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	鈴木　幸太郎 SUZUKI Koutarou				
Numbering	CMP_DOC72025				

Objectives of class

情報セキュリティとくに暗号理論について基本的な内容を理解すること。
企業の研究所で情報セキュリティに関する研究開発に携わっていた教員が、その経験を生かして講義を行う。
To understand basic topics of information security especially cryptology.

Contents of class

(対面) 1 週. 情報セキュリティと暗号理論の概要
(対面) 2 週. 初等整数論の基礎
(対面) 3 週. 公開鍵暗号 1
(対面) 4 週. 公開鍵暗号 2
(対面) 5 週. 電子署名
(対面) 6 週. 楕円曲線暗号系
(対面) 7 週. より進んだ話題

本学の新型コロナウィルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。
(face to face) week 1. overview of information security and cryptology
(face to face) week 2. basics of elementary number theory
(face to face) week 3. public key cryptography 1
(face to face) week 4. public key cryptography 2
(face to face) week 5. digital signature
(face to face) week 6. elliptic curve cryptosystem
(face to face) week 7. advanced topics

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

Self Preparation and Review

本講義のオンラインコンテンツ等により予習、復習うことが推奨されます。
予習 90 分、復習 90 分程度が目安となります。
To enhance a learning effect, students are encouraged to refer to online contents of this lecture etc.
To prepare for and review the lecture for around 90 minutes each.

Related subjects

N／A
N／A

Notes for textbook

N／A
N／A

Notes for reference

・現代暗号への招待、黒澤、サイエンス社、暗号理論について読みやすく書かれている。
・公開鍵暗号の数理、森山ほか、共立出版、公開鍵暗号系について詳しく書かれている。
・クラウドを支えるこれからの暗号技術、光成、秀和システム、暗号に必要な数学について詳しく書かれている。
下記に公開版がある。
https://herumi.github.io/ango/
The followings are open textbooks of cryptology.
https://www.cs.umd.edu/~waa/414-F11/IntroToCrypto.pdf
https://crypto.stanford.edu/~dabo/cryptobook/

Goals to be achieved

情報セキュリティとくに暗号理論について基本的な内容を理解すること。

To understand basic topics of information security especially cryptology.

Evaluation of achievement

レポート 100%に基づき評価する。

評価基準は下記のとおり。

S: 達成目標を 90%達成しており、かつレポートと定期試験の合計点（100 点満点）が 90 点以上

A: 達成目標を 80%達成しており、かつレポートと定期試験の合計点（100 点満点）が 80 点以上

B: 達成目標を 70%達成しており、かつレポートと定期試験の合計点（100 点満点）が 70 点以上

C: 達成目標を 60%達成しており、かつレポートと定期試験の合計点（100 点満点）が 60 点以上

Evaluation is based on reports 100%.

Evaluation criteria is as follows.

S: Achieved at least 90% of goals, and obtained total points of reports and examination 90 or high (out of 100 points)

A: Achieved at least 80% of goals, and obtained total points of reports and examination 80 or high (out of 100 points)

B: Achieved at least 70% of goals, and obtained total points of reports and examination 70 or high (out of 100 points)

C: Achieved at least 60% of goals, and obtained total points of reports and examination 60 or high (out of 100 points)

Examination

試験期間中には何も行わない

None during exam period

Details of examination

N／A

N／A

Other information

N／A

N／A

Reference URL

N／A

N／A

Office hours

授業終了後。

After each class.

Relations to attainment objectives of learning and education

（C）高度な知識を統合的・発展的に活用できる実践力・創造力

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

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

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

Key words

情報セキュリティ, 実務経験

information security, business experience

(D53030340)Advanced Auditory System and Sound Perception[Advanced Auditory System and Sound Perception]

Subject name[English]	Advanced Auditory System and Sound Perception[Advanced Auditory System and Sound Perception]				
Schedule number	D53030340	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring2 term	**Day of the week,period**	Tue.4～4	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	松井　淑恵 MATSUI Toshie				
Numbering	CMP_DOC73025				

Objectives of class

聴覚系のしくみとその特性を学びます。また、聴覚系を理解するための知覚実験と、その結果を用いた計算モデルについて概観します。

This course provides an introduction to the human auditory system. It also outlines various psychological experiments for understanding our auditory system, and computational models from the data.

Contents of class

1. 音の物理と聴覚のしくみ（対面）
2. 聴覚の生理学（オンデマンド）
3. 音の大きさ（オンデマンド）
4. 音の高さ （対面）
5. 音の音色　楽器と音声（対面）
6. 発声のしくみと音声の知覚（対面）
7. 聴覚の計算モデル化とその応用とまとめ（オンデマンド）

本学の新型コロナウィルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。
授業実施形態が変更になる場合は，GoogleClassroom または教務情報システムより通知します。

Week 1. Physics of sounds and the auditory system (face-to-face)
Week 2. Physiology of the auditory system (on-demand)
Week 3. Loudness (on-demand)
Week 4. Pitch (face-to-face)
Week 5. Timber, instrumental sounds, and vocal sounds (face-to-face)
Week 6. Vocalization mechanism and perception of speech sounds (face-to-face)
Week 7. Computational models of the auditory system and its application, and other latest topics (on-demand)

If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for
Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.
If there are any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

講義資料を事前に Google Classroom にて公開します。講義当日までにダウンロードしてください。
予習：講義資料に目を通し、知らない用語があれば調べておくこと（90 分）
復習：講義資料を見直し、前回までの講義内容と関連づけて整理する。講義中に示された参考資料に目を通す（90 分）
Lecture materials are disclosed to Google Classroom. Download them by the day of the lecture.
To prepare a lecture, read the lecture materials in advance and look up any terms you do not know (90 min required).
After a lecture, review the lecture materials and organize the contents of the previous lectures. Read the reference materials provided during the lecture (90 min required).

Related subjects

Visual Perception and Cognition, Speech and Natural Language Processing
Visual Perception and Cognition, Speech and Natural Language Processing

Notes for textbook

講義資料を事前に Google Classroom にて公開します。講義当日までにダウンロードしてください。
Lecture materials are disclosed to Google Classroom. Download them by the day of the lecture.
To prepare a lecture, read the lecture materials in advance and look up any terms you do not know.

After a lecture, review the lecture materials and organize the contents of the previous lectures. Read the reference materials provided during the lecture.

Reference1	**Book title**	The Sense of Hearing, 3rd edition.			**ISBN**	978-1138632
	Author	Christopher J. Plack	**Publisher**	Routledge	**Publish year**	2018
Reference2	**Book title**	An Introduction to the Psychology of Hearing, 6th edition.			**ISBN**	978-9004252424
	Author	Brian C. J. Moore	**Publisher**	Brill Academic Pub	**Publish year**	2013

Notes for reference
特になし
N/A

Goals to be achieved
1. 聴覚の生理学的メカニズムとその機能の関連を理解する
2. 聴覚を理解するための知覚実験と計算論的アプローチ手法を学ぶ
1. Understand the relationship between physiological mechanism of the auditory system and its function
2. Learning the perceptual experiment techniques and computational approach to reveal the auditory system

Evaluation of achievement
成績の評価法: 最終レポートで評価します。
評価基準: 原則的にすべての講義に出席したものにつき、下記のように成績を評価します。

S: 達成目標をすべて達成しており、かつレポートの合計点(100 点満点)が 90 点以上
A: 達成目標を 90%達成しており、かつレポートの合計点(100 点満点)が 80 点以上
B: 達成目標を 80%達成しており、かつレポートの合計点(100 点満点)が 70 点以上
C: 達成目標を 70%達成しており、かつレポートの合計点(100 点満点)が 60 点以上
The evaluation is based primarily on a final report (100 points).
Students who attend all classes will be evaluated as follows:
S: Achieved all goals and obtained point of final report, 90 or higher (out of 100 points).
A: Achieved 90 % of goals and obtained point of final report, 80 or higher (out of 100 points).
B: Achieved 80 % of goals and obtained point of final report, 70 or higher (out of 100 points).
C: Achieved 70 % of goals and obtained point of final report, 60 or higher (out of 100 points).

Examination
レポートで実施
By Report

Details of examination
特になし
N/A

Other information
特になし
N/A

Reference URL
特になし
N/A

Office hours
随時対応します。メールなどで事前に連絡を取ってください。
On a necessary basis. Please contact me by e-mail in advance.

Relations to attainment objectives of learning and education
(C)高度な知識を統合的・発展的に活用できる実践力・創造力
情報・知能工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，
課題解決のための独創的な技術を創造し，実践できる能力を身につけている。

(C)高度な知識を統合的・発展的に活用できる実践力・創造力
情報・知能工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize suchknowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.

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

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

Key words
聴覚システム、聴知覚、音楽、音声、計算モデル
auditory system, sound perception, music, speech, computational model

(D53030350)Advanced Computer Architecture and Systems[Advanced Computer Architecture and Systems]

Subject name[English]	Advanced Computer Architecture and Systems[Advanced Computer Architecture and Systems]				
Schedule number	D53030350	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring2 term	**Day of the week,period**	Thu.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	佐藤　幸紀 SATO Yukinori				
Numbering	CMP_DOC72125				

Objectives of class

The goal is to obtain the knowledge on the advanced computer architecture seen in the state-of-the-art computing systems.

Contents of class

(face to face) Week 1 Introduction
(face to face) Week 2 Fundamentals of quantitative design and analysis (1)
(on-demand) Week 3 Fundamentals of quantitative design and analysis (2)
(on-demand) Week 4 Fundamentals of quantitative design and analysis (3)
(on-demand) Week 5 Fundamentals of quantitative design and analysis (4)
(face to face) Week 6 Memory Hierarchy design
(face to face) Week 7 Advanced Topics
(face to face) Week 8 Summary and discussion (45 minutes)

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

If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

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

Related subjects

N/A

Notes for textbook

Materials will be provided, which are based on a text book:
Computer Architecture, Sixth Edition: A Quantitative Approach
John Hennessy
David Patterson

Reference1	**Book title**	Computer architecture : a quantitative approach			**ISBN**	978-0128119051
	Author	John L. Hennessy, David A. Patterson ; with contributions by Krste Asanović ... [et al.]	**Publisher**	Morgan Kaufmann	**Publish year**	2018

Notes for reference

N/A

Goals to be achieved

At the end of the course, students will:
1: be able to understand the advanced design concepts of modern computing systems
2: be able to explain trade-off among performance and efficiency with consideration for power consumption,

programabilitty, and hardware costs

Evaluation of achievement
Evaluations are done by reports (100%)/
S: 90% or more out of 100 points, S:90%, A: 80% or more, B: 70% or more C: 60% or more

Examination
レポートで実施
By Report

Details of examination
N/A

Other information
N/A

Reference URL
N/A

Office hours
Before/after the class

Relations to attainment objectives of learning and education

Key words

(D53030420)Advanced Information Visualization[Advanced Information Visualization]

Subject name[English]	Advanced Information Visualization[Advanced Information Visualization]				
Schedule number	D53030420	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring1 term	**Day of the week,period**	Mon.4～4	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	栗山 繁 KURIYAMA Shigeru				
Numbering	CMP_DOC72425				

Objectives of class

本講義では、大規模または多次元のデータを効率的かつ効果的に表示する可視化の設計手法を講述し、目的に応じた視覚的なデータ分析のワークフローを設計する制作実習によって、実践的な応用開発力を習得する。

This class teaches the design methodology of developing data exploration tools by efficiently and effectively visualizing huge size or dimension of dataset. Practical skill of developing the workflow of visual data analytics is learned through the exercises.

Contents of class

（オンデマンド）第１週：情報可視化の導入と概要説明
（オンデマンド）第２週：相関の可視化１（多変量データ）
（オンデマンド）第３週：構造の可視化（木構造・ネットワーク）
（オンデマンド）第４週：相関の可視化２（Glyph 表示）
（オンデマンド）第５週：テキスト・変動の可視化と対話操作
（オンデマンド）第６週：課題の説明と制作
（対面）第７週目：制作課題発表
本学の新型コロナウィルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。

(On demand) Week 1. Introduction and overview of information visualization
(On demand) Week 2. Correlation visualization of multivariate data
(On demand) Week 3. Relation visualization with tree and network representation
(On demand) Week 4. Visualization of correlation using glyph
(On demand) Week 5. Visualization of textual information and time-variation, and interactions
(On demand) Week 6. Exercise of developing a visualization tool
(Face to face) Week7: Presentation of exercise
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.

Self Preparation and Review

予習：Google Classroom 上に公開される電子テキストを事前に熟読すること。（40 分）
復習；Google Classroom 上に公開される解答例を参照すること。（20 分）
To enhance a learning effect, students are encouraged to read a textbook supplied in Google Classroom for around 40 minutes. Students are encouraged to refer to answer samples supplied in Google Classroom for around 20 minutes..

Related subjects

数値解析，多変量解析，データマイニング特論
Numerical analysis, Multivariate analysis, Advanced Data Mining

Notes for textbook

e-ラーニングシステム（Google Classroom）に公開する電子テキストを使用する.
Digital textbook is supplied on an E-learning system of Google Classroom.

Notes for reference

特になし
N/A

Goals to be achieved

大規模、多次元のデータを効率的かつ効果的に可視化するデザイン手法を理解し、データの性質を考慮して最適な可視化ワークフローを設計できる技能を習得する
The goal of this class is to teach design methodology for efficiently and effectively visualizing huge size of multi-dimensional

dataset, and to obtain the skill of designing the workflow of visual data analytics by considering the property of the data.

Evaluation of achievement

レポート課題の合計 100 点で採点する。
S:達成目標をすべて達成しており，かつ中間レポート，出席，および制作課題の合計点(100 点満点)が 90 点以上
A:達成目標を 90%達成しており，かつ中間レポート，出席，および制作課題の合計点(100 点満点)が 80 点以上
B:達成目標を 75%達成しており，かつ中間レポート，出席，および制作課題の合計点(100 点満点)が 70 点以上
C:達成目標を 60%達成しており，かつ中間レポート，出席，および制作課題の合計点(100 点満点)が 60 点以上
The score is calculated by the Report(Exercise) of the total of 100 points
S: 90 or more, A: 80 or more, B: 70 or more, C: 60 or more

Examination

レポートで実施
By Report

Details of examination

制作課題の発表会を講義の最終回で実施する.
Presentation of final exercise is carried out at the final lecture.

Other information

特になし
N/A

Reference URL

特になし
N/A

Office hours

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

Relations to attainment objectives of learning and education

情報・知能工学専攻
(C)高度な知識を統合的・発展的に活用できる実践力・創造力
情報・知能工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。

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

Key words

情報検索、情報可視化、ビジュアル情報処理
Information visualization, Visual data analytics, Visual information processing

(D53030450)Advanced Computational Intelligence in Brain System[Advanced Computational Intelligence in Brain System]

Subject name[English]	Advanced Computational Intelligence in Brain System[Advanced Computational Intelligence in Brain System]				
Schedule number	D53030450	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Spring1 term	**Day of the week,period**	Wed.3～3	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	村越 一支 MURAKOSHI Kazushi				
Numbering	CMP_DOC73125				

Objectives of class

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

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

Contents of class

- Introduction on computational intelligent brain systems
- Information Processing by computational intelligent brain systems
- Computer simulation and information processing

(face to face) 1st-3rd weeks. explanation
(on-demand) 4th-7th weeks. tasks

Self Preparation and Review

Review each lecture (90 minutes) and prepare for the next class with reference to the textbook (90 minutes).

Related subjects

You must take the credits of "Computational Intelligence in Brain System" in master course in advance.

Notes for textbook

No textbook.

Notes for reference

N/A

Goals to be achieved

Understand and imolement modeling / analysys in complex dynamical systems

Evaluation of achievement

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

Examination

その他
Other

Details of examination

N/A

Other information

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

Reference URL

N/A

Office hours

After this class or
post question or consultation to the google classroom.

Relations to attainment objectives of learning and education

(C)高度な知識を統合的・発展的に活用できる実践力・創造力

情報・知能工学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

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

Key words
N/A

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

Subject name[English]	Seminar on Applied Chemistry and Life Science 1[Seminar on Applied Chemistry and Life Science 1]				
Schedule number	D54010080	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_DOC75015				

Objectives of class

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

Contents of class

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

Self Preparation and Review

Related subjects

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

Notes for textbook

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

Notes for reference

Goals to be achieved

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

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Supervisor(s)

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

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

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

Subject name[English]	Seminar on Applied Chemistry and Life Science 2[Seminar on Applied Chemistry and Life Science 2]				
Schedule number	D54010090	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D2
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_DOC75015				

Objectives of class

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

Contents of class

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

Self Preparation and Review

Related subjects

Seminar on Applied Chemistry and Life Sciences 1
All other relevant subjects in Applied Chemistry and Life Science

Notes for textbook

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

Notes for reference

Goals to be achieved

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

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

Other information

Supervisor(s)

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

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

(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～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	大門 裕之, 中野 裕美 DAIMON Hiroyuki, NAKANO Hiromi				
Numbering	CHE_DOC74225				

Objectives of class

The course provides for the opportunity to improve your level in the presentation skills through reading current research articles. The research area are Environmental Chemical Engineering, Environmental Biotechnology and Inorganic Chemistry.

Contents of class

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

Week1 (Face to face) : Lectures on environmental microorganisms and environmental biotechnology and provision of subject to students (Yamada)
Week2 (Remote simultaneous interactive) : Presentation and discussion on cutting-edge research in environmental biotechnology (1)(Yamada)
Week3 (Remote simultaneous interactive) : Presentation and discussion on cutting-edge research in environmental biotechnology (2)(Yamada)
Week4 (Remote simultaneous interactive) : Presentation and discussion on cutting-edge research in environmental biotechnology (3)(Yamada)
Week5 (Remote simultaneous interactive) : Presentation for the papers on frontier researches by student and discussion on it (Yamada)
Week6 (Face to face) : Environmental Problem and Science (Preparation) (Daimon)
Week7 (Remote simultaneous interactive) : Environmental Problem and Science (Explanation) (Daimon)
Week8 (Remote simultaneous interactive) : Environmental Problem and Science (Question) (Daimon)
Week9 (Remote simultaneous interactive) : Environmental Problem and Science (Discussion I)(Daimon)
Week10 (Remote simultaneous interactive) : Environmental Problem and Science (Discussion I)(Daimon)
Week11 Technics of material processing base on the nature science (Nakano)
Week12 Technics of characterization using a transmission electron microscope (Nakano)
Week13 Discussions for papers of frontier researches I (Nakano)
Week14 Discussions and evolutions for researches (Nakano)

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

Self Preparation and Review

毎回講義内容を復習するとともに，次週の内容についてテキスト等を参考に予習してくること。

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

Related subjects

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

Notes for textbook

特になし
Papers(resume)will be distributed

Notes for reference

特になし

N/A

Goals to be achieved

特になし

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

Evaluation of achievement

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

S: 90 or higher (out of 100 points)
A: 80 or higher (out of 100 points)
B: 70 or higher (out of 100 points)
C: 60 or higher (out of 100 points)

Examination

試験期間中には何も行わない

None during exam period

Details of examination

特になし

N/A

Other information

特になし

N/A

Reference URL

特になし

N/A

Office hours

Anytime, but reservation is desirable.

Relations to attainment objectives of learning and education

Key words

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.2～2	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	浴 俊彦, 田中 照通, 中鉢 淳 EKI Toshihiko, TANAKA Terumichi, NAKABACHI Atsushi				
Numbering	CHE_DOC73225				

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).

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 three instructors as described below (Eki, Tanaka, and Nakabachi).

1st~5th week (on-demand): Genome and gene sciences (Dr. T. Eki)
6th~10th week: (on-demand): Genetic and Protein engineering (Dr. T. Tanaka)
11th~14th week (on-demand): Animal-microbe symbioses (Dr. A. Nakabachi)

If there are any changes regarding 'Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus', the course content and evaluation of achievement can be changed.
(If there is any change about a class schedule, we will inform you on Google Classroom or KYOMU JOHO SYSTEM.)

Self Preparation and Review

N/A

Related subjects

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.

Notes for reference

N/A

Goals to be achieved

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

Evaluation of achievement

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

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

Dr. Toshihiko Eki: Room: G-505, Phone: 6907, E-mail: eki@chem.tut.ac.jp
Dr. Terumichi Tanaka: Room: G-506. Phone: 6920, E-mail: terumichi-tanaka@tut.jp
Dr. Atsushi Nakabachi: Room: G-502, Phone: 6901, E-mail: nakabachi@eiiris.tut.ac.jp

Reference URL N/A
Office hours 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～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	岩佐 精二, 柴富 一孝, 原口 直樹 IWASA Seiji, SHIBATOMI Kazutaka, HARAGUCHI Naoki				
Numbering	CHE_DOC72225				

Objectives of class

This course focuses on state-of-the-art technology of functional polymers and synthesis as for bioactive organic compounds. Synthesis and various applications of the functional polymers and bioactive organic compounds will be discussed.

Contents of class

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

Self Preparation and Review

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

Related subjects

D34030060 Advanced Molecular Function Chemistry 1
M44630100 Special Topics in Applied Organic Chemistry
M24630460 応用有機化学特論

Notes for textbook

No textbooks are required.

Notes for reference

N/A

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.

Evaluation of achievement

Presentation (50%) and discussion (50%)
Evaluation basis] Students who attend all classes will be evaluated as follows:
S: Achieved all goals and obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Achieved 80 % goals and obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Achieved 70 % of goals and obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Achieved 60 % of goals and obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination

N/A

Other information

N. Haraguchi: haraguchi@chem.tut.ac.jp 6812 (office: B-403)
S. Iwasa: office: G-403, tel: 6918, email: iwasa@chem.tut.ac.jp
K. Shibatomi: shiba@chem.tut.ac.jp (room: B-507)

Reference URL

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

Office hours

anytime

Relations to attainment objectives of learning and education

C

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

(C) Practical and creative skills to utilize advanced knowledge in an integrated and constructive manner
Have the ability to create imaginative technology to solve problems and put them into practice through learning, by experience,methodologies for research and development on the basis of the integration of extensive knowledge about applied chemistry, life science and their related fields

Key words

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～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_DOC71015				

Objectives of class

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

Contents of class

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

Report

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

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

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

(D) Communication skills for global success

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

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

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

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

Key words

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

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

Objectives of class

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

Contents of class

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

Report

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

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

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

(D) Communication skills for global success

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

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

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

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

Key words

(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～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	島﨑　康弘 SHIMAZAKI Yasuhiro				
Numbering	ARC_DOC74125				

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.

Contents of class

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

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

Self Preparation and Review

The course materials such book chapter or academic paper related to this course will be appeared or provided at the first class or orientation.

Related subjects

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

Notes for textbook

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

N/A

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.

Evaluation of achievement

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

N/A

Other information

Kazuyo Tsuzuki: D-712, Phone: 0532-44-6840, Fax: 0532-44-6831, E-mail: ktsuzuki@ace.tut.ac.jp

Reference URL

N/A

Office hours

Y. SHIMAZAKI: Anytime upon request. Please contact by e-mail in advance.

Relations to attainment objectives of learning and education

Key words

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～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	渋澤 博幸, 杉木 直, 松尾 幸二郎 SHIBUSAWA Hiroyuki, SUGIKI Nao, MATSUO Kojiro				
Numbering	ARC_DOC73325				

Objectives of class

To obtain the advanced knowledge of theories and methods for policies and planning for cities, regions,transportation, and the environment.
To obtain the advanced knowledge of theories and methods for policies and planning for cities, regions,transportation and the environment.

Contents of class

By using books, reports and papers on cities, regions, infrastructure and the environment, students learn the advanced transportation systems and transportation economics. Discussion between the lecturer and students shall be performed in the lecture time.

If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for
Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.
If there is any changes about a class schedule, I will inform you by e-mail or on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

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

Related subjects

Transportation systems
Spatial economic system analysis

Notes for textbook

Textbooks and scientific papers will be announced at the start of the class.

Notes for reference

N/A

Goals to be achieved

1.To understand the necessity and significance of policy and planning for cities, regions, infrastructure and the environment.
2.To understand the concept of policy and planning for the above mentioned fields.
3.To understand methodologies in the above mentioned fields.

Evaluation of achievement

Home work assignments shall be required. Final reports or examination shall be conducted.

D1,D2
S: Total points obtained from exams and/or reports, etc., 90 or higher (out of 100 points).
A: Total points obtained from exams and/or reports, etc., 80 or higher (out of 100 points).

B: Total points obtained from exams and/or reports, etc., 70 or higher (out of 100 points).
C: Total points obtained from exams and/or reports, etc., 60 or higher (out of 100 points).

D3
A: Total points obtained from exams and/or reports, etc., 80 or higher (out of 100 points).
B: Total points obtained from exams and/or reports, etc., 65 or higher (out of 100 points).
C: Total points obtained from exams and/or reports, etc., 55 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination

N/A

Other information

Shibusawa: room(D-709), hiro-shibu@tut.jp, phone: 0532-44-6955
Sugiki: room(D-705), sugiki@ace.tut.ac.jp, phone: 0532-44-6833
Matsuo:

Reference URL

Shibusawa: http://www.pm.ace.tut.ac.jp
Sugiki: https://sites.google.com/site/trlabotut/home-en

Office hours

Hiroyuki Shibusawa: At any time. Please contact Shibusawa by e-mail in advance.
Nao Sugiki: At any time. Please contact Sugiki by e-mail in advance.
Kojiro Matsuo:

Relations to attainment objectives of learning and education

建築・都市システム学専攻
(C)高度な知識を統合的・発展的に活用できる実践力・創造力
建築・都市システム学およびその関連分野に関する高度な知識を修得し，それらを広範囲に有機的に連携させた研究開発方法論を体得することで，課題解決のための独創的な技術を創造し，実践できる能力を身につけている。
(E)最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化の本質を探求し，生涯にわたって自発的に計画し学習する能力を身につけている。

Graduate Program of Architecture and Civil Engineering for Doctoral Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated and developed manner
Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skillsto utilize such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically.
E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment
Have the skills to investigate the essence of changes in society, environment and technology.Have the skills to voluntarily make plans and learn throughout one's life.

Key words

planning process, social & economic evaluation method, forecasting models, 実務訓練
planning process, social & economic evaluation method, forecasting models

(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～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	相京　邦宏 AIKYO Kunihiro				
Numbering	ARC_DOC74325				

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

If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.
(If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.

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）(face to face)
2. Purpose of the Series(on-demand)
3. Science in Antiquity? (on-demand)
4. Modern Science 1 (on-demand)
5. Modern Science 2 (on-demand)
6. History and Philosophy (on-demand)
7. Building Histories 1 (face to face)
8. Building Histories 2 (on-demand)
9. Building Histories 3 (on-demand)
10. Intellectual Paternities 1 (on-demand)
11. Intellectual Paternities 2 (face to face)
12. Selective Survival of Texts (on-demand)

13. Resources for History （on-demand）
14. Summery of the lecture(on-demand)

If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.
(If there is any changes about a class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review
Preparation & review of text
Preparation & review of text

Related subjects
「特になし」
N/A

Notes for textbook
特になし
N/A

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

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
特になし
N/A

Other information
特になし
N/A

Reference URL
特になし
N/A

Office hours
pm. 1-4(Wednesday)

pm. 1-4(Wednesday)

Relations to attainment objectives of learning and education

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

(D55030150)Advanced Environmental Control in Biology[Advanced Environmental Control in Biology]

Subject name[English]	Advanced Environmental Control in Biology[Advanced Environmental Control in Biology]				
Schedule number	D55030150	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Spring term	**Day of the week,period**	Tue.3～3	**Credit(s)**	2
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	髙山　弘太郎, 東海林　孝幸 TAKAYAMA Kotaro, TOKAIRIN Takayuki				
Numbering	ARC_DOC74025				

Objectives of class

太陽光型植物工場や人工光型植物工場などの環境制御型農業生産施設における環境制御と植物環境応答について高度な知識を身に付ける。

Advanced Environmental Control in Biology [Advanced Environmental Control in Biology]

Contents of class

（オンデマンドまたは対面）第1回：太陽光植物工場と人工光植物工場
（オンデマンドまたは対面）第2回：クロロフィル蛍光と光合成の基礎，クロロフィル蛍光計測Ⅰ –インダクション法–
（オンデマンドまたは対面）第3回：クロロフィル蛍光計測Ⅱ –飽和パルス法，PAM，画像計測法–
（オンデマンドまたは対面）第4回：匂い成分計測技術Ⅰ –ガスクロマトグラフィの基礎–
（オンデマンドまたは対面）第5回：匂い成分計測技術Ⅱ –植物診断技術としての匂い成分計測–
（オンデマンドまたは対面）第6回：光合成と蒸散のガス収支の基礎
（オンデマンドまたは対面）第7回：開放型光合成蒸散測定の計算
第8回：環境制御の概論
第9回：太陽光植物工場の環境制御
第10回：人工光植物工場の環境制御
第11回：大気環境学1　大気の流れ
第12回：大気環境学2　大気の流れの数式化
第13回：大気環境学3　シミュレーション–1
第14回：大気環境学4　シミュレーション–2・総括

(on-demand or face to face)1. Intelligent greenhouse and plant factory of artificial lighting
(on-demand or face to face)2. Chlorophyll fluorescence measurement for plant diagnosis-1: Induction method
(on-demand or face to face)3. Chlorophyll fluorescence measurement for plant diagnosis-2: Saturation pulse method, PAM and imaging
(on-demand or face to face)4. Volatile organic compound measurement-1: Gas chromatography -1: Basics
(on-demand or face to face)5. Volatile organic compound measurement-1: Gas chromatography -1: For plant diagnosis
(on-demand or face to face)6. Photosynthesis and transpiration as gas exchanges between atmosphere and plant
(on-demand or face to face)7. Open chamber method for photosynthesis measurement
(on-demand or face to face)8. Outline of environmental control in biology
(on-demand or face to face)9. Environmental control in intelligent greenhouse
10. Environmental control in plant factory of artificial lighting
11. Atmospheric environment-1: Dynamics of air in atmosphere
12. Atmospheric environment-2: Formulation of air dynamics
13. Atmospheric environment-3: Simulation/modeling of atmosphere-1
14. Atmospheric environment-4: Simulation/modeling of atmosphere-2・Discussion for the prospect

Self Preparation and Review

担当教員が執筆した研究論文を参考に学習を行う。

Referring the research papers published by the teachers in charge.

Related subjects

特になし

N/A

Notes for textbook

特になし

N/A

Reference1	**Book title**	Plants and microclimate : a quantitative approach to environmental plant physiology			**ISBN**	0521425247
	Author	Hamlyn G. Jones	**Publisher**	Cambridge University Press	**Publish year**	1992

Notes for reference
特になし
N/A

Goals to be achieved
1. 環境制御型農業生産に求められる環境制御技術を理解すること
2. 植物環境応答の高度な知識と理解
3. 大気環境の高度な知識と理解
1. Advanced knowledge and understanding of environmental control in horticulture
2. Advanced knowledge and understanding of plant environmental responses and plant diagnosis
3. Advanced knowledge and understanding of Atmospheric environment

Evaluation of achievement
レポート 50%　授業中の口頭試問 50%　　左記の割合で、総合的に評価する。
50% on reports, 50% on oral examination in the lectures.

Examination
レポートで実施
By Report

Details of examination
特になし
N/A

Other information
特になし
N/A

Reference URL
特になし
N/A

Office hours
火曜日１１～１３時
Tuesday 11am-1pm

Relations to attainment objectives of learning and education

Key words
環境制御, 大気, 大気環境, モデル, シミュレーション, 植物, 作物, 農業, 施設園芸, 環境応答, 植物診断
Environmental control, atmosphere, atmospheric environment, modeling, simulation, plant, crop, agriculture, horticulture, environmental response, plant diagnosis,

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

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S51010090	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	1.5Years	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Mechanical Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	池松　峰男 IKEMATSU Mineo				
Numbering	COM_DOC71015				

Objectives of class

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

Contents of class

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

Self Preparation and Review

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Related subjects

N/A

N/A

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Evaluation of achievement

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

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A
N/A

Other information

N/A
N/A

Reference URL

N/A
N/A

Office hours

Drop-in basis.
Drop-in basis.

Relations to attainment objectives of learning and education

機械工学専攻
(A)幅広い人間性と考え方
人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち，人間と自然との共生，公共の福祉について俯瞰的にとらえる能力を身につけている。
(D)グローバルに活躍できるコミュニケーション力
グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で，自らの考えや成果を効果的に表現・発信するコミュニケーション力と，リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Mechanical Engineering for Doctoral Degree
(A) Personality and outlook with a broad perspective
Have an international mindset to see human society from various angles with a global perspective; and the ability to comprehensively grasp the symbiosis between humans and nature aswell as public welfare
(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members, and thehigh ability to contribute to the goals of the team as a leader

Key words

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

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S52010090	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Required
Time of starting a course	1.5Years	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	池松　峰男 IKEMATSU Mineo				
Numbering	COM_DOC71015				

Objectives of class

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

Contents of class

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

Self Preparation and Review

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Related subjects

N/A

N/A

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Evaluation of achievement

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

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A
N/A

Other information

N/A
N/A

Reference URL

N/A
N/A

Office hours

Drop-in basis.
Drop-in basis.

Relations to attainment objectives of learning and education

電気・電子情報工学専攻
(A)幅広い人間性と考え方
人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち，人間と自然との共生，公共の福祉について俯瞰的にとらえる能力を身につけている。
(D)グローバルに活躍できるコミュニケーション力
グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で，自らの考えや成果を効果的に表現・発信するコミュニケーション力と，リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Progaram of Engineering of Electrical and ElectronicInformation Engineering for Doctoral Degree
(A) Personality and outlook with a broad perspective
Have an international mindset to see human society from various angles with a global perspective; the ability to consider the symbiosis between humans and nature as well as publicwelfare
(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members

Key words

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

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S53010090	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	1.5Years	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Computer Science and Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	池松　峰男 IKEMATSU Mineo				
Numbering	COM_DOC71015				

Objectives of class

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

Contents of class

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

Self Preparation and Review

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Related subjects

N/A

N/A

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Evaluation of achievement

Report (30%), Contribution (participation, presentation, etc.) (70%)
S: ≧90

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A
N/A

Other information

N/A
N/A

Reference URL

N/A
N/A

Office hours

Drop-in basis.
Drop-in basis.

Relations to attainment objectives of learning and education

情報・知能工学専攻
(A)幅広い人間性と考え方
人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち，人間と自然との共生，公共の福祉について俯瞰的にとらえる能力を身につけている。
(D)グローバルに活躍できるコミュニケーション力
グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で，自らの考えや成果を効果的に表現・発信するコミュニケーション力と，リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Computer Science and Engineering for Doctoral Degree
(A) Personality and outlook with a broad perspective
Have an international mindset to see human society from various angles with a global perspective; and the ability to consider the symbiosis between humans and nature as well as publicwelfare
(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members.Havesophisticated ability as a leader to contribute for the achievement the goal of team.

Key words

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

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S54010110	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	1.5Years	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	池松　峰男 IKEMATSU Mineo				
Numbering	COM_DOC71015				

Objectives of class

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

Contents of class

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

Self Preparation and Review

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Related subjects

N/A

N/A

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Evaluation of achievement

Report (30%), Contribution (participation, presentation, etc.) (70%)
S: ≧90

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A
N/A

Other information

N/A
N/A

Reference URL

N/A
N/A

Office hours

Drop-in basis.
Drop-in basis.

Relations to attainment objectives of learning and education

応用化学・生命工学専攻
(A)幅広い人間性と考え方
人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち，人間と自然との共生，公共の福祉について俯瞰的にとらえる能力を身につけている。
(D)グローバルに活躍できるコミュニケーション力
グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で，自らの考えや成果を効果的に表現・発信するコミュニケーション力と，リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Applied Chemistry and Life Science for Doctoral Degree
(A) Personality and outlook with a broad perspective
Have an international mindset to see human society from various angles with a global perspective; and the ability to consider the symbiosis between humans and nature as well as publicwelfare
(D) Communication skills for global success
Have the communication skills to effectively express and disseminate one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other teammembers as well as leadership ability to contribute to the team's achievements

Key words

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

Subject name[English]	Teaching Practice on Global Education[Teaching Practice on Global Education]				
Schedule number	S55010090	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	1.5Years	**Day of the week,period**	Intensive	**Credit(s)**	1
Faculty	Graduate Program for Doctoral Degree			**Subject grade**	2～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	D1
Charge teacher name[Roman alphabet mark]	池松 峰男 IKEMATSU Mineo				
Numbering	COM_DOC71015				

Objectives of class

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

As a result of this course, students will develop:
-English presentation skills relating to course topics
-STEM education skills applying design thinking
-Intercultural communication skills to give lectures for multi-cultural students

Contents of class

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

- Class preparation (orientation, lecture about the presentation, etc.)
- Students will provide active learning lectures for TUT students and local high school students.

Self Preparation and Review

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Students are required to facilitate communication by group members for discussion and preparation of presentation materials in English.

Related subjects

N/A

N/A

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Students will be able to:
-provide lectures using English presentation slide
-give lectures to develop students' STEM skills applying design thinking
-understand intercultural communication to accomplish these lectures

Evaluation of achievement

Report (30%), Contribution (participation, presentation, etc.) (70%)
S: ≧90

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A
N/A

Other information

N/A
N/A

Reference URL

N/A
N/A

Office hours

Drop-in basis.
Drop-in basis.

Relations to attainment objectives of learning and education

建築・都市システム学専攻
(A)幅広い人間性と考え方
人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち，人間と自然との共生，公共の福祉について俯瞰的にとらえる能力を身につけている。
(D)グローバルに活躍できるコミュニケーション力
グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で，自らの考えや成果を効果的に表現・発信するコミュニケーション力と，リーダーとしてチームの目標達成に寄与できる高い能力を身につけている。

Graduate Program of Architecture and Civil Engineering for Doctoral Degree
(A) Personality and outlook with a broad perspective
Have an international mindset to see human society from various angles with a global perspective; and the ability to consider the symbiosis between humans and nature as well as publicwelfare with a wide view.
(D) Communication skills for global success
Have the communication skills to effectively express and transmit one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other teammembers.Have sophisticated ability as a leader to contribute for the achievement the goal of team.

Key words