Syllabus

International Master′s Degree Program

（2021-Fall Term）

(M40030030)Culture and Communication I[Culture and Communication I]

Subject name[English]	Culture and Communication I[Culture and Communication I]				
Schedule number	M40030030	**Subject area**	General courses	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.1～1	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	浅井　良策 ASAI Ryosaku				
Numbering	GEN_LIB51025				

Objectives of class

This course aims to see how our way of the understanding the world or our culture is reflected in the meaning of words, phrases, and grammatical constructions, though learning about the fundamental concepts of Cognitive Linguistics.

Contents of class

If there is any changes about a class schedule, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Week 1 Course Introduction　(on-demand)
Week 2 Encyclopedic meaning (1) (on-demand)
Week 3 Encyclopedic meaning (2) (on-demand)
Week 4 Categorization and Prototype (1) (on-demand)
Week 5 Categorization and Prototype (2) (on-demand)
Week 6 Figurative Expressions (1) (on-demand)
Week 7 Figurative Expressions (2) (on-demand)
Week 8 Polysemy (1) (on-demand)
Week 9 Polysemy (2) (on-demand)
Week 10 Polysemy (3) (on-demand)
Week 11 Idioms and Constructions (on-demand)
Week 12 Argument Structure Constructions (1) (on-demand)
Week 13 Argument Structure Constructions (2) (on-demand)
Week 14 Argument Structure Constructions (3) (on-demand)
Week 15 General Overview (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.

Self Preparation and Review

Review the learning contents of each lecture (90 minutes) and prepare for the next class (90 minutes).

Related subjects

特になし
N／A

Notes for textbook

The teacher will provide all materials for this course.

Notes for reference

N／A

Goals to be achieved

To develop the skill of conducting a cognitive-linguistic analysis of the collected data.
To become more aware of the relationship between the world knowledge (or culture) and language.

Evaluation of achievement

Evaluation:
Students will be evaluated according to the term paper (50%) and assignments (50%).

Evaluation based on the described comprehensively.
Evaluation standard:
Evaluation is based on the following principles with full attendance to a class.
S: More than 90 points (among 100) of the term paper, assignments, presentations with full achievements of the goal.
A: More than 80 points (among 100) of the term paper, assignments, presentations with 90% achievements of the goal.
B: More than 70 points (among 100) of the term paper, assignments, presentations with 80% achievements of the goal.
C: More than 60 points (among 100) of the term paper, assignments, presentations with 70% achievements of the goal.

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
Please contact me or make an appointment by e-mail.

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考える能力を身につけている。
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考える能力を身につけている。
情報・知能工学専攻
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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考える能力を身につけている。
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考える能力を身につけている。

Graduate Program of Mechanical Engineering for Master's 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
Graduate Program of Electrical and Electronic Information Engineering for Master's 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
Graduate Program of Computer Science and Engineering for Master's 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
Graduate Program of Applied Chemistry and Life Science for Master's Degree
(A) Personality and outlook with a broad perspective
Have a mindset to see human society from various angles with a global perspective; and the ability to consider the symbiosis between humans and nature as well as public welfare
Graduate Program of Architecture and Civil Engineering for Master's 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

Key words
Linguistics, way of understanding the world, culture

(M40030090)Principles of Japanese Grammar[Principles of Japanese Grammar]

Subject name[English]	Principles of Japanese Grammar[Principles of Japanese Grammar]				
Schedule number	M40030090	**Subject area**	General courses	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.1～1	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	吉村　弓子 YOSHIMURA Yumiko				
Numbering	GEN_LIB51425				

Objectives of class

This course aims to provide an opportunity to understand an overview of elementary Japanese grammar for the very beginners. In order to concentrate on grammar, students will not learn Japanese letters and conversation. The course will be taught in English, and progress rapidly.

Contents of class

Students will learn the following lessons in textbook on-demand so that students who are out of Japan will be able to access to the learning contents on Google Classroom without worrying the time differences from JST.

Week 01 Oct.07 (On-demand) Introduction to the course and general features of Japanese, L1: Copula, Particle "wa" [topic], and Declarative, negative, and interrogative sentence

Week 02 Oct.14 (On-demand) L2 and 3: Demonstratives and Particle "no" [possession]

Week 03 Oct.21 (On-demand) L4 and 5: Verbs, Tense (non-past and past), Particle "ni" [time], "kara [start], "made" [goal], "e" [direction], "de" [transportation], and "to" [cooperation]

Week 04 Oct.28 (On-demand) L6 and 7; Particle "o" [object], "de" [place][means], "ni" [goal][source]

Week 05 Nov.04 (On-demand) L8: Adjectives, L 9: Particle "ga"[object]

Week 06 Nov.11 (On-demand) L10: Existence, L11: Numerals and Counter suffixes

Week 07 Nov.18 (On-demand) L12: Past tense of adjectives, L13: Adjectives of Desire

Week 08 Dec.02 (On-demand) L14 and 15: Verb groups, "te"-form of verbs, and Sentences using "te"-form

Week 09 Dec.09 (On-demand) L16: Sentences using "te"-form, L17: "nai"-form of verbs

Week 10 Dec.16 (On-demand) L18: Dictionary form of verbs, L19: "ta"-form of verbs

Week 11 Jan.06 (On-demand) L20: Polite and plain style, L21: Indirect speech

Week 12 Jan.13 (On-demand) L22: Noun modification

Week 13 Jan.20 (On-demand) L23: Complex sentence using "toki"[when],

Week 14 Jan.27 (On-demand) L24: Give and receive things or benefits

Week 15 Feb.10 (On-demand) L25: Conditional mood

Week 16 Feb.17 (Remote simultaneous interactive/On-demand) Exam

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, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

Read the respective parts of the textbook for around 90 minutes each in advance.
Understand and memorize the sentences learned in every class for around 90 minutes to prepare for the quiz.

Related subjects

"Basic Grammar 1" of non-credit course "Basic Japanese" will cover Exercise A and B of the main textbook.

Textbook1	**Book title**	Minna no Nihongo (Elementary Japanese I, 2nd Edition) Translation & Grammar Notes-English, Romanized Version			**ISBN**	978-4-88319-629-6
	Author		**Publisher**	3A Corporation	**Publish year**	2013

Notes for textbook

Each lesson consists of 1)vocabulary, 2)translation of the main textbook, 3)useful words and information, and 4)grammar notes. 1)Vocabulary and 4)grammar notes only will be taught in the course.

Notes for reference

N/A

Goals to be achieved

At the end of this course students will be able
1) to know pronunciation of Japanese language.
2) to understand pronunciation and meaning of elementary Japanese vocabulary.
3) to grasp an overview of elementary Japanese grammar.

Evaluation of achievement

Grading Policy: Quizzes 40%, Final exam 60%

Evaluation Criteria: Students who meet required attendance will be evaluated as follows by the total points (out of 100 points) obtained from what shown above:

S: 90 or higher
A: between 80 and 89
B: between 70 and 79
C: between 60 and 69

Examination

定期試験を実施(オンライン)
Examination(On line)

Details of examination

N/A

Other information

When you contact by e-mail, write "[your name] of Principles of Japanese Grammar" at the subject.

Reference URL

N/A

Office hours

Office Hour
Friday 11:00-12:00
By appointment 08:30-12:00, 13:30-16:30 on weekday will be also available.

Relations to attainment objectives of learning and education

機械工学専攻
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人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち，人間と自然との共生，公共の福祉について考える能力を身につけている。
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Key words
elementary Japanese, grammar

(M40030100)Japanese Industrial Technologies and Innovations[Japanese Industrial Technologies and Innovations]

Subject name[English]	Japanese Industrial Technologies and Innovations[Japanese Industrial Technologies and Innovations]				
Schedule number	M40030100	**Subject area**	General courses	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	中内 茂樹, 作井 康司, 齊藤 大樹, 大和 真樹, 鈴木 幸太郎, 角田 正也, 小林 メイ, 高野 靖, 入山 恭彦, 和田 耕一, 小林 真一, 松本 雅行, 丹埜 段 NAKAUCHI Shigeki, SAKUI Koji, SAITOH Taiki, OHWA Masaki, SUZUKI Koutarou, KAKUTA Masaya, KOBAYASHI Mei, TAKANO Yasushi, IRIYAMA Takahiko, WADA Koichi, KOBAYASHI Shinichi, MATSUMOTO Masayuki, TANNO Dan				
Numbering	COM_MAS51025				

Objectives of class

In this series of lectures, the excellent experts of our university and Japanese leading companies from variety of fields in engineering impart to the engineering students knowledges of superior industry technologies in Japan. Students learn advantages and its contribution factors of Japanese industrial technologies.

* International students dispatched by JICA Students Program(JICA-DSP) including ABE, Innovative ASIA and PEACE in 2020should take this subject as a compulsory course.

Contents of class

1. SAKUI Koji: Flash Memory changing the world culture from iPhone to Google
2~4. SAITO Taiki: Earthquake and Tsunami Disaster Mitigation Techniques
5. OHWA Masaki(1st): Current Status and Hurdle of Pharmaceutical R&D in Japan
6. SUZUKI Koutarou: Information Security Technology and its Standardization
7. KAKUTA Masaya: Industry Technology from the design point of view
8. KOBAYASHI Mei: Landing a Job that Fits Your Lifestyle: tips for finding, applying and interviewing
9. TAKANO Yasushi: Environmental noise of Railways
10. OHWA Masaki(2nd): Innovation in Japanese Chemical Industry – Electronic Materials
11. IRIYAMA Takahiko: Recent developments of high-performance permanent magnets and their application
12. TANNO Dan: My life as an Interpreter –Bicultural Freedom–
13. WADA Koichi: Technologies and Innovations in Pharmaceutical Industries
14.KOBAYASHI Shinichi: Electric Power Generation and Distribution in Japan
15. MATSUMOTO Masayuki: Safe and stable transportation of the Shinkansen supported by Signaling system

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

N/A

Notes for reference

N/A

Goals to be achieved

1) To understand Japanese superior industrial technologies
2) To contributing factors of industrial technologies in Japan showing specific technologies covered by lectures
3) To analyze advantages of application of science and technology on production process in Japanese manufacturing

companies

Evaluation of achievement

Evaluation method scoring will be processed by sum of each report evaluation.

Evaluation criteria
Students who attend all classes will be evaluated as follows;
S: Achieved all goals and obtained total points of exam and reports, 90 or high (out of 100 points)
A: Achieved all goals and obtained total points of exam and reports, 80 or high (out of 100 points)
B: Achieved at least 65% of goals and obtained total points of exam and reports, 70 or high (out of 100 points)
C: Achieved at least 55% of goals and obtained total points of exam and reports, 60 or high (out of 100 points)

Examination

レポートで実施
By Report

Details of examination

None during exam period

Other information

N/A

Reference URL

N/A

Office hours

After each class

Relations to attainment objectives of learning and education

Key words

industrial technology, development technology, application technology

(M40030110)Japanese Communication Theory[Japanese Communication Theory]

Subject name[English]	Japanese Communication Theory[Japanese Communication Theory]				
Schedule number	M40030110	**Subject area**	General courses	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Mon.4～4	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～
Department Offered	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	石川　智嘉子 ISHIKAWA Chikako				
Numbering	GEN_LIB51412				

Objectives of class

初級日本語の文法と表現を習得し、日本人とコミュニケーションができるようになる。また日本語でプレゼンテーションができるようになる。

The purpose of this course is to learn new Japanese grammar/expression and how to use them to communicate with Japanese people in Japanese. After having successfully taken this course, the student can give a presentation in Japanese.

Contents of class

初級レベルの日本語文法と表現を学習します。
講義の内容は以下の通りです。

第1回　イントロダクション
第2回　第 13 課　単語、文法
第3回　第 13 課　会話
第4回　第 14 課　単語、文法
第5回　第 14 課　会話
第6回　第 15 課　単語、文法
第7回　第 15 課　会話
第8回　プレゼンテーションとディカッション
第9回　第 16 課　単語、文法
第 10 回　第 16 課　会話
第 11 回　第 17 課　単語、文法
第 12 回　第 17 課　会話
第 13 回　第 18 課　文法、会話
第 14 回　第 19 課　文法、会話
第 15 回　第 20 課　文法、会話
第 16 回　定期試験（プレゼンテーションとディカッション）

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。
授業形式は「対面」または「Google Meet による同時双方向」で行う予定です。
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。
Level: Elementary
Students will learn the following lessons in textbook.

Week 1. Introduction
Week 2. Lesson 13 Vocabulary & Grammar
Week 3. Lesson 13 Conversation
Week 4. Lesson 14 Vocabulary & Grammar
Week 5. Lesson 14 Conversation
Week 6. Lesson 15 Vocabulary & Grammar
Week 7. Lesson 15 Conversation
Week 8. Presentation & Discussion
Week 9. Lesson 16 Vocabulary & Grammar
Week10. Lesson 16 Conversation
Week11. Lesson 17 Vocabulary & Grammar
Week12. Lesson 17 Conversation

Week13. Lesson 18 Grammar & Conversation
Week14. Lesson 19 Grammar & Conversation
Week15. Lesson 20 Grammar & Conversation
Week16. Exam(Presentation & Discussion)

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.
Classes are to be held in the style of regular face to face or on Google Meet; remote simultaneous interactive, so you can talk interactively with the lecturer over the Internet at a set time.
If there is any changes about a class schedule, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review
予習:新出単語を見ておくこと(60 分)
復習:毎回学習した内容を復習をしてください。毎回課題があるので、期限内に提出してください。(60 分)
Require to check new words beforehand and review after the lesson for around 60 minutes each.
Should work on homework for each lesson.

Related subjects
特になし
N/A

Textbook1	**Book title**	初級日本語げんきⅡ〔第3版〕/ Genki Ⅱ (Third Edition)			**ISBN**	978-4-7890-1732-9
	Author	坂野永理・池田庸子・大野裕・品川恭子・渡嘉敷恭子	**Publisher**	The Japan Times	**Publish year**	2020

Notes for textbook
特になし
N/A

Notes for reference
特になし
N/A

Goals to be achieved
1)初級レベルの日本語の文法および表現がわかる
2)初級レベルの日本語を使ってコミュニケーションができる
To understand Japanese grammar and expressions of elementary level to communicate with

Evaluation of achievement
評価方法:プレゼンテーション2回 50%、課題 30%、授業貢献度 20%　左記の割合で評価する。
評価基準:原則的にすべての講義に出席したものにつき、下記のように成績を評価する。
S: 90 点以上
A: 80～89 点
B: 70～79 点
C: 60～69 点

Grading Policy:
2 Presentations 50%, Homework 30%, Contribution to the classes 20%.
Students who attend all classes will be evaluated as follows:
S: The total score is 90 or more
A: The total score is 80-89
B: The total score is 70-79
C: The total score is 60-69

Examination
その他
Other

Details of examination
定期試験を実施:対面またはオンラインでプレゼンテーションを実施

Examination: Presentation (face to face or online)

Other information
特になし
N/A

Reference URL
特になし
N/A

Office hours
講義実施日の講義後
After the lecture

Relations to attainment objectives of learning and education

(D1)論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。
(D1) 論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。
(D1) 論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。
>>(D1) 論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。
(D1) 論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。

(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
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Key words
日本語、初級、文法、コミュニケーション
Japanese, elementary, grammar, communication

(M40110020)Ethics for Researchers[Ethics for Researchers]

Subject name[English]	Ethics for Researchers[Ethics for Researchers]				
Schedule number	M40110020	**Subject area**	General courses	**Required or elective**	Required
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.1～1	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	教務委員会副委員長, 田中　三郎 kyoumu iinkai fukuiintyou, TANAKA Saburo				
Numbering	COM_MAS51015				

Objectives of class

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

Contents of class

1st week (October 6, 2021):
Introduction, 1st module in e-learning
2nd – 6th week (October 13 – November 17):
2nd – 7th modules in e-learning
Submit the e-learning Certificate to the Educational Affairs Division
7th week: (November 24 – November 30)
Discussion with supervisor
8th week:
Report (December 1, 2021)

e-learning
1st module: Research Misconduct
2nd module: Ethical Issues in the Management of Data in Engineering Research
3rd module: Responsible Authorship
4th module: Ethical Issues in the Peer Review and Publication of Engineering Research
5th module: Collaborative Research in Engineering Fields
6th module: Whistleblowing and the Obligation to Protect the Public
7th module: Managing Public Research Funds

Self Preparation and Review

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

Related subjects

Philosophy of Science and Technology, Ethics for Engineers

Notes for textbook

Reference1	**Book title**	For the sound development of science : the attitude of a conscientious scientist			**ISBN**	978-4-621-08938-5
	Author	edited by Japan Society for the Promotion of Science Editing Committee "For the Sound Development of Science"	**Publisher**	Maruzen	**Publish year**	2015

Notes for reference
特になし
PDF→
https://www.jsps.go.jp/j-kousei/data/rinri.pdf

Goals to be achieved
To prevent misconduct and promote fair research activities, this course provides knowledge and techniques regarding research ethics in accordance with characteristics of each graduate student' research specialties.

Evaluation of achievement
[Evaluation method] Report(100%)
[Evaluation basis]
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination
レポートで実施
By Report

Details of examination
N/A

Other information
Instructor contact information:
Saburo Tanaka(Chief) : G605/tanakas@tut.jp

Reference URL
N/A

Office hours
Anytime through email

Relations to attainment objectives of learning and education

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

(M41610010)Seminar on Mechanical Engineering I[Seminar on Mechanical Engineering I]

Subject name[English]	Seminar on Mechanical Engineering I[Seminar on Mechanical Engineering I]				
Schedule number	M41610010	**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 Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS51015				

Objectives of class

The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.

The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.

Contents of class

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

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

Self Preparation and Review

Different in each laboratory

Different in each laboratory

Related subjects

Different in each laboratory

Different in each laboratory

Notes for textbook

Different in each laboratory

Different in each laboratory

Notes for reference

N/A

N/A

Goals to be achieved

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.

Evaluation of achievement

Holding meetings to report tasks for each laboratory and comprehensively evaluating the results including contents, materials and attitudes.

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

Holding meetings to report tasks for each laboratory and comprehensively evaluating the results including contents, materials and attitudes.

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

N/A

N/A

Other information

N/A

N/A

Reference URL

Different in each laboratory
Different in each laboratory

Office hours

Different in each laboratory
Different in each laboratory

Relations to attainment objectives of learning and education

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

(M41610020)Seminar on Mechanical Engineering II[Seminar on Mechanical Engineering II]

Subject name[English]	Seminar on Mechanical Engineering II[Seminar on Mechanical Engineering II]				
Schedule number	M41610020	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS61015				

Objectives of class

The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.

The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.

Contents of class

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

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

Self Preparation and Review

Given by supervisors.

Given by supervisors.

Related subjects

N/A

N/A

Notes for textbook

Given by supervisors.

Given by supervisors.

Notes for reference

N/A

N/A

Goals to be achieved

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.

Evaluation of achievement

Evaluated comprehensively by content, reports, considerations, etc. of presentation in each laboratory.

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

Evaluated comprehensively by content, reports, considerations, etc. of presentation in each laboratory.

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

N/A

N/A

Other information

For any questions, contact your supervisor.

For any questions, contact your supervisor.

Reference URL N/A N/A
Office hours Contact your supervisor. Contact your supervisor.
Relations to attainment objectives of learning and education
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

(M41610030)Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]

Subject name[English]	Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]				
Schedule number	M41610030	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Mechanical Engineering			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S1系教務委員, 1系各教員 1kei kyomu Iin-S, 1kei kakukyouin				
Numbering	MEC_MAS61015				

Objectives of class

A research work of an unresolved engineering problem must be carried out in addition to class to become a leading engineer having creative and applied abilities that is education philosophy of department of mechanical engineering. Through carrying out the supervised research, active studying and researching are developed. By actively studying and researching, the research is developed furthermore. Finally, abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's in the process of the research work.

A research work of an unresolved engineering problem must be carried out in addition to class to become a leading engineer having creative and applied abilities that is education philosophy of department of mechanical engineering. Through carrying out the supervised research, active studying and researching are developed. By actively studying and researching, the research is developed furthermore. Finally, abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's in the process of the research work.

Contents of class

Follow instruction of supervisors.

Follow instruction of supervisors.

Self Preparation and Review

Follow instruction of supervisors.

Follow instruction of supervisors.

Related subjects

The work is related to every classes which has been studied in graduate and undergraduate schools.

The work is related to every classes which has been studied in graduate and undergraduate schools.

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's ones in the process of the research work.

Abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's ones in the process of the research work.

Evaluation of achievement

Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.

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

Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.

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

For any questions, contact your supervisor.
For any questions, contact 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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
(C2)機械工学およびその関連分野の広範囲の知識の連携により，研究開発に対する方法論を体得して，研究開発の計画を立案および実践し，課題解決のための新たな技術を創造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するコミュニケーション力を身につけている。
(D1)論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。
(D2)チーム内の個々の要員の価値観を互いに尊重するとともに，協調して，チームとしての目標達成に寄与できる高い能力を身につけている。
(E)最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化に対応して，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 Mechanical Engineering for Master's Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about mechanical engineering and related fields; to make plans for research and development and put them intopractice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high skills to mutually respect the values of individual team members; and to contribute to the team's achievements through working cooperatively with other team members
(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 voluntarily make plans and learn throughout one's life in response to changesin society, environment and technology

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

(M41610030)Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]

Subject name[English]	Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]				
Schedule number	M41610030	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Mechanical Engineering			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S1系教務委員, 1系各教員 1kei kyomu Iin-S, 1kei kakukyouin				
Numbering	MEC_MAS61015				

Objectives of class

A research work of an unresolved engineering problem must be carried out in addition to class to become a leading engineer having creative and applied abilities that is education philosophy of department of mechanical engineering. Through carrying out the supervised research, active studying and researching are developed. By actively studying and researching, the research is developed furthermore. Finally, abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's in the process of the research work.

A research work of an unresolved engineering problem must be carried out in addition to class to become a leading engineer having creative and applied abilities that is education philosophy of department of mechanical engineering. Through carrying out the supervised research, active studying and researching are developed. By actively studying and researching, the research is developed furthermore. Finally, abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's in the process of the research work.

Contents of class

Follow instruction of supervisors.

Follow instruction of supervisors.

Self Preparation and Review

Follow instruction of supervisors.

Follow instruction of supervisors.

Related subjects

The work is related to every classes which has been studied in graduate and undergraduate schools.

The work is related to every classes which has been studied in graduate and undergraduate schools.

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's ones in the process of the research work.

Abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's ones in the process of the research work.

Evaluation of achievement

Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.

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

Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.

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

For any questions, contact your supervisor.
For any questions, contact your supervisor.

Reference URL

N/A
N/A

Office hours

Contact your supervisor.
Contact your supervisor.

Relations to attainment objectives of learning and education

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

(M4161003T)Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]

Subject name[English]	Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]				
Schedule number	M4161003T	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S1系教務委員, 1系各教員 1kei kyomu Iin-S, 1kei kakukyouin				
Numbering	MEC_MAS61015				

Objectives of class

A research work of an unresolved engineering problem must be carried out in addition to class to become a leading engineer having creative and applied abilities that is education philosophy of department of mechanical engineering. Through carrying out the supervised research, active studying and researching are developed. By actively studying and researching, the research is developed furthermore. Finally, abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's in the process of the research work.

A research work of an unresolved engineering problem must be carried out in addition to class to become a leading engineer having creative and applied abilities that is education philosophy of department of mechanical engineering. Through carrying out the supervised research, active studying and researching are developed. By actively studying and researching, the research is developed furthermore. Finally, abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's in the process of the research work.

Contents of class

Follow instruction of supervisors.

Follow instruction of supervisors.

Self Preparation and Review

Follow instruction of supervisors.

Follow instruction of supervisors.

Related subjects

The work is related to every classes which has been studied in graduate and undergraduate schools.

The work is related to every classes which has been studied in graduate and undergraduate schools.

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

Abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's ones in the process of the research work.

Abilities of problem-consciousness, problem-solving, problem-questing, planning, creativity, judgement, responsibility, toughness, cooperativeness, presentation, and ethics are polished up at a higher level than undergraduate's ones in the process of the research work.

Evaluation of achievement

Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.

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

Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.

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

For any questions, contact your supervisor.
For any questions, contact your supervisor.

Reference URL

N/A
N/A

Office hours

Contact your supervisor.
Contact your supervisor.

Relations to attainment objectives of learning and education

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

(M41610040)Seminar on Mechanical Engineering[Seminar on Mechanical Engineering]

Subject name[English]	Seminar on Mechanical Engineering[Seminar on Mechanical Engineering]				
Schedule number	M41610040	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS51015				

Objectives of class

The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.

The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.

Contents of class

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

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

Self Preparation and Review

Given by supervisors.

Given by supervisors.

Related subjects

N/A

N/A

Notes for textbook

Given by supervisors.

Given by supervisors.

Notes for reference

N/A

N/A

Goals to be achieved

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.

Evaluation of achievement

Evaluated comprehensively by content, reports, considerations, etc. of presentation in each laboratory.

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

Evaluated comprehensively by content, reports, considerations, etc. of presentation in each laboratory.

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

N/A

N/A

Other information

For any questions, contact your supervisor.

For any questions, contact your supervisor.

Reference URL N/A N/A
Office hours Contact your supervisor. Contact your supervisor.
Relations to attainment objectives of learning and education
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

(M41610050)Internship[Internship]

Subject name[English]	Internship[Internship]				
Schedule number	M41610050	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Required
Time of starting a course	Year	**Day of the week,period**	Intensive	**Credit(s)**	0
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS51015				

Objectives of class

Students are expected to address problems in a specialized field in a company or research institute. The objectives of this subject are to experience practical research and development and to cultivate the practical problem-solving ability, planning ability, and creativity.

Students are expected to address problems in a specialized field in a company or research institute. The objectives of this subject are to experience practical research and development and to cultivate the practical problem-solving ability, planning ability, and creativity.

Contents of class

In order to cultivate the practical problem-solving ability, academic and company/institutional supervisors will provide practical problems in a specialized field through close communication.

In order to cultivate the practical problem-solving ability, academic and company/institutional supervisors will provide practical problems in a specialized field through close communication.

Self Preparation and Review

Students are expected to discuss a preferable internship topic with supervisors before starting it.

Students are expected to discuss a preferable internship topic with supervisors before starting it.

Related subjects

N/A

N/A

Notes for textbook

Follow instructions provided by company/institutional supervisors.

Follow instructions provided by company/institutional supervisors.

Notes for reference

N/A

N/A

Goals to be achieved

While engaging practical activities in a company or research institution for several months, students are expected to improve the practical problem-solving ability, planning ability, and creativity as well as an international way of thinking.

While engaging practical activities in a company or research institution for several months, students are expected to improve the practical problem-solving ability, planning ability, and creativity as well as an international way of thinking.

Evaluation of achievement

Comprehensive evaluation based on students' reports and evaluation sheets by academic and company/institutional supervisors.

A: 80 or higher (out of 100 points), B: 65 or higher (out of 100 points) C: 55 or higher (out of 100 points)

Comprehensive evaluation based on students' reports and evaluation sheets by academic and company/institutional supervisors.

A: 80 or higher (out of 100 points), B: 65 or higher (out of 100 points) C: 55 or higher (out of 100 points)

Examination

試験期間中には何も行わない

None during exam period

Details of examination

N/A

N/A

Other information

N/A

N/A

Reference URL

N/A
N/A

Office hours
N/A
N/A

Relations to attainment objectives of learning and education

Key words
Internship
Internship

(M41630040)Micromachining Engineering[Micromachining Engineering]

Subject name[English]	Micromachining Engineering[Micromachining Engineering]				
Schedule number	M41630040	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Tue.1～1	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	柴田　隆行 SHIBATA Takayuki				
Numbering	MEC_MAS53025				

Objectives of class

"Micro Electro Mechanical Systems", the so-called MEMS, can be defined as miniaturized systems that consist of micromachined sensors, actuators, passive components, and integrated circuits (IC) for applications in micromechanics, nanoscience, photonics, bio-electrochemical systems, and so on. The MEMS field has been one of the most exciting technologies during the past decade. The objective of this course is to introduce fundamentals of micromachining technologies (microfabrication technologies), and their application in the development of MEMS devices.

Contents of class

1st week: Introduction of Micro Electro Mechanical System (MEMS)
2nd week: Photolithography
3rd week: Wet etching and Dry etching
4th week: Physical vapor deposition (PVD)
5th week: Chemical vapor deposition (CVD)
6th week: Plating and Electroforming
7th week: Bonding processes
8th week: Presentation and discussion

Note:
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, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

Students are required to prepare and review each lesson.
Useful information on MEMS technologies can be obtained from the following website; http://www.memsnet.org/mems/

Related subjects

A fundamental knowledge of physics and chemistry is required.

Notes for textbook

No textbook is required for this class. Handouts will be prepared.
Useful information on MEMS technologies can be obtained from the following website; http://www.memsnet.org/mems/

Reference1	**Book title**	Fundamentals of Microfabrication (2nd ed.): The Science of Miniaturization			**ISBN**	9780849308260
	Author	Marc J. Madou	**Publisher**	CRC Press	**Publish year**	2002
Reference2	**Book title**	Introduction to Microfabrication			**ISBN**	9780470851067
	Author	Sami Franssila	**Publisher**	John Wiley & Sons	**Publish year**	2004
Reference3	**Book title**	The MEMS Handbook (2nd ed.)			**ISBN**	9780849321061
	Author	Mohamed Gad-el-Hak	**Publisher**	CRC Press	**Publish year**	2006

Notes for reference

N/A

Goals to be achieved

To gain an understanding of the fundamentals of micromachining technologies for MEMS.
(1) To understand the principle and characteristics of photolithography.
(2) To understand the principle and characteristics of etching processes.
(3) To understand the principle and characteristics of deposition processes.
(4) To understand the principle and characteristics of bonding processes.
(5) To apply knowledge of micromachining technologies to the design and manufacturing of microdevices.

Evaluation of achievement

Students will be evaluated by presentation (70%) and classroom performance (30%). An oral presentation on micromachining technologies for the fabrication of MEMS devices will be imposed during the course of class.

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

Examination

授業を実施
Regular Class

Details of examination

Note: Regular Class (Presentation and discussion)

Other information

N/A

Reference URL

N/A

Office hours

Anytime during regular working hours. Contact me by email before coming if possible.

Relations to attainment objectives of learning and education

機械工学専攻
(C)高度な知識を統合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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
(C2)機械工学およびその関連分野の広範囲の知識の連携により，研究開発に対する方法論を体得して，研究開発の計画を立案および実践し，課題解決のための新たな技術を創造できる能力を身につけている。

Graduate Program of Mechanical Engineering for Master's Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about mechanical engineering and related fields; to make plans for research and development and put them intopractice; and to create new technologies to solve problems

Key words

MEMS, Micromachining, Microfabrication, Photolithography, Wet etching, Dry etching, Physical vapor deposition (PVD), Chemical vapor deposition (CVD), Plating, Bonding processes

(M41630210)Advanced Mechanical Systems Design I[Advanced Mechanical Systems Design I]

Subject name[English]	Advanced Mechanical Systems Design I[Advanced Mechanical Systems Design I]				
Schedule number	M41630210	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.4～4	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS53025				

Objectives of class

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

Contents of class

Follow instruction of supervisors.

Follow instruction of supervisors.

Self Preparation and Review

Follow instruction of supervisors.

Follow instruction of supervisors.

Related subjects

Follow instruction of supervisors.

Follow instruction of supervisors.

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

To acquire fundamental knowledge of individual research fields.
To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

To acquire fundamental knowledge of individual research fields.
To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

Evaluation of achievement

Coursework, presentation and/or report.
Grade levels are C(60% – less than 70%), B(70– less than 80%), A(80% – less than 90 %) and S(90% or over).

Coursework, presentation and/or report.
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

N/A

N/A

Other information

For any questions, contact your supervisor.

For any questions, contact your supervisor.

Reference URL

N/A

N/A

Office hours

Contact your supervisor.

Contact your supervisor.

Relations to attainment objectives of learning and education

Key words

Mechanical Systems Design

Mechanical Systems Design

(M41630230)Advanced Materials and Manufacturing Process I[Advanced Materials and Manufacturing Process I]

Subject name[English]	Advanced Materials and Manufacturing Process I[Advanced Materials and Manufacturing Process I]				
Schedule number	M41630230	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.4～4	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS54025				

Objectives of class

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

Contents of class

Follow instruction of supervisors.

Follow instruction of supervisors.

Self Preparation and Review

Follow instruction of supervisors.

Follow instruction of supervisors.

Related subjects

Follow instruction of supervisors.

Follow instruction of supervisors.

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

Evaluation of achievement

Coursework, presentation and/or report.

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

Coursework, presentation and/or report.

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

N/A

N/A

Other information

For any questions, contact your supervisor.

For any questions, contact your supervisor.

Reference URL

N/A

N/A

Office hours

Contact your supervisor.
Contact your supervisor.

Relations to attainment objectives of learning and education

Key words

Materials, Manufacturing Process
Materials, Manufacturing Process

(M41630250)Advanced System, Control and Robotics I[Advanced System, Control and Robotics I]

Subject name[English]	Advanced System, Control and Robotics I[Advanced System, Control and Robotics I]				
Schedule number	M41630250	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Wed.4～4	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS55025				

Objectives of class

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

Contents of class

Follow instruction of supervisors.

Follow instruction of supervisors.

Self Preparation and Review

Follow instruction of supervisors.

Follow instruction of supervisors.

Related subjects

Follow instruction of supervisors.

Follow instruction of supervisors.

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

To acquire fundamental knowledge of individual research fields.
To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

To acquire fundamental knowledge of individual research fields.
To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

Evaluation of achievement

Coursework, presentation and/or report.
Grade levels are C(60% – less than 70%), B(70– less than 80%), A(80% – less than 90 %) and S(90% or over).

Coursework, presentation and/or report.
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

N/A

N/A

Other information

For any questions, contact your supervisor.

For any questions, contact your supervisor.

Reference URL

N/A

N/A

Office hours

Contact your supervisor.

Contact your supervisor.

Relations to attainment objectives of learning and education

Key words

System, Control, Robotics

System, Control, Robotics

(M41630270)Advanced Energy and Environmental Engineering I[Advanced Energy and Environmental Engineering I]

Subject name[English]	Advanced Energy and Environmental Engineering I[Advanced Energy and Environmental Engineering I]				
Schedule number	M41630270	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Fri.1～1	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S1系教務委員 1kei kyomu Iin-S				
Numbering	MEC_MAS56025				

Objectives of class

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.

Contents of class

Follow instruction of supervisors.

Follow instruction of supervisors.

Self Preparation and Review

Follow instruction of supervisors.

Follow instruction of supervisors.

Related subjects

Follow instruction of supervisors.

Follow instruction of supervisors.

Notes for textbook

N/A

N/A

Notes for reference

N/A

N/A

Goals to be achieved

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

To acquire fundamental knowledge of individual research fields.

To acquire the ability to find problems, the ability to solve the problems and the presentation skill.

Evaluation of achievement

Coursework, presentation and/or report.

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

Coursework, presentation and/or report.

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

N/A

N/A

Other information

For any questions, contact your supervisor.

For any questions, contact your supervisor.

Reference URL

N/A

N/A

Office hours

Contact your supervisor.
Contact your supervisor.

Relations to attainment objectives of learning and education

Key words

Energy, Environment
Energy, Environment

(M41630330)Advances in Mechanical Design[Advances in Mechanical Design]

Subject name[English]	Advances in Mechanical Design[Advances in Mechanical Design]				
Schedule number	M41630330	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall2+Spring1	**Day of the week,period**	Tue.1～1	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	河村 庄造, 柴田 隆行 KAWAMURA Shozo, SHIBATA Takayuki				
Numbering	MEC_MAS53025				

Objectives of class

Fall 2 : Micromachining Engineering (Shibata)
"Micro Electro Mechanical Systems", the so-called MEMS, can be defined as miniaturized systems that consist of micromachined sensors, actuators, passive components, and integrated circuits (IC) for applications in micromechanics, nanoscience, photonics, bio-electrochemical systems, and so on. The MEMS field has been one of the most exciting technologies during the past decade. The objective of this course is to introduce fundamentals of micromachining technologies (microfabrication technologies), and their application in the development of MEMS devices.

Spring 1 : Vibration Engineering (Kawamura)
This lecture will provide the knowledge of modal analysis method and component mode synthesis method to treat a huge degree of freedom system.

Contents of class

Fall 2 : Micromachining Engineering (Shibata)
1st week: Introduction of Micro Electro Mechanical System (MEMS)
2nd week: Photolithography
3rd week: Wet etching and Dry etching
4th week: Physical vapor deposition (PVD)
5th week: Chemical vapor deposition (CVD)
6th week: Plating and Electroforming
7th week: Bonding processes
8th week: Presentation and discussion

Spring 1 : Vibration Engineering (Kawamura)
Modal analysis for multi degree of freedom system
1: Introduction of modal analysis, undamped system
2: A system with proportional viscous damping (1)
3: A system with proportional viscous damping (2)
4: Compensate of higher vibration modes

Component mode synthesis method
5: Formulation of sub-systems
6: Modal synthesis using constraint modes (1)
7: Modal synthesis using constraint modes (2)
8: Modal synthesis using non-constraint modes

Note:
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, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

Fall 2 : Micromachining Engineering (Shibata)
Students are required to prepare and review each lesson.
Useful information on MEMS technologies can be obtained from the following website; http://www.memsnet.org/mems/

Spring 1 : Vibration Engineering (Kawamura)
Self-preparation and review are necessary.

Related subjects

Fall 2 : Micromachining Engineering (Shibata)

A fundamental knowledge of physics and chemistry is required.

Spring 1 : Vibration Engineering (Kawamura)

Dynamics, Vibration engineering, Mechanical vibration

Notes for textbook

Fall 2 : Micromachining Engineering (Shibata)

No textbook is required for this class. Handouts will be prepared.

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

Spring 1 : Vibration Engineering (Kawamura)

Handouts will be prepared

Notes for reference

Fall 2 : Micromachining Engineering (Shibata)

1) Fundamentals of Microfabrication (2nd ed.): The Science of Miniaturization

Marc J. Madou, CRC Press, 2002, ISBN: 9780849308260

2) Introduction to Microfabrication

Sami Franssila, John Wiley & Sons, 2004, ISBN: 9780470851067

3) The MEMS Handbook (2nd ed.)

Mohamed Gad-el-Hak, CRC Press, 2006, ISBN: 9780849321061

Goals to be achieved

Fall 2 : Micromachining Engineering (Shibata)

To gain an understanding of the fundamentals of micromachining technologies for MEMS.

(1) To understand the principle and characteristics of photolithography.

(2) To understand the principle and characteristics of etching processes.

(3) To understand the principle and characteristics of deposition processes.

(4) To understand the principle and characteristics of bonding processes.

(5) To apply knowledge of micromachining technologies to the design and manufacturing of microdevices.

Spring 1 : Vibration Engineering (Kawamura)

(1) Understand the modal analysis for multi degree of freedom system

(2) Understand the component mode synthesis method

Evaluation of achievement

Fall 2 : Micromachining Engineering (Shibata)

Students will be evaluated by presentation (70%) and classroom performance (30%). An oral presentation on micromachining technologies for the fabrication of MEMS devices will be imposed during the course of class.

[Evaluation basis] Students who attend all classes will be evaluated as follows:

S: Achieved all goals and obtained total points of the report, 90 or higher (out of 100 points).

A: Achieved all goals and obtained total points of the report, 80 or higher (out of 100 points).

B: Achieved 80 % of goals and obtained total points of the report, 70 or higher (out of 100 points).

C: Achieved 60 % of goals and obtained total points of the report, 60 or higher (out of 100 points).

Spring 1 : Vibration Engineering (Kawamura)

Method: report (full score 100).

Level: achievement in the case upper 60 points.

Level S: upper 90 points, Level A: upper 80 points, Level B: upper 70 points, Level C: upper 60 points

Examination

その他

Other

Details of examination

Fall 2 : Micromachining Engineering (Shibata)

Regular Class (Presentation and discussion)

Spring 1 : Vibration Engineering (Kawamura)

Report

Other information

Fall 2 : Micromachining Engineering (Shibata)

Contact person: Prof. Takayuki Shibata, E-Mail: shibata@me.tut.ac.jp

Spring 1 : Vibration Engineering (Kawamura)

Contact person: Prof. Shozo Kawamura E-Mail:kawamura@me.tut.ac.jp

Reference URL

N/A

Office hours

Fall 2 : Micromachining Engineering (Shibata)
Anytime during regular working hours. Contact me by email before coming if possible.

Spring 1 : Vibration Engineering (Kawamura)
Ask by E-mail.

Relations to attainment objectives of learning and education

機械工学専攻
（C）高度な知識を統合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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
(C2)機械工学およびその関連分野の広範囲の知識の連携により，研究開発に対する方法論を体得して，研究開発の計画を立案および実践し，課題解決のための新たな技術を創造できる能力を身につけている。

Graduate Program of Mechanical Engineering for Master's Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about mechanical engineering and related fields; to make plans for research and development and put them intopractice; and to create new technologies to solve problems

Key words

Modal analysis, Component mode synthesis method, MEMS, Micromachining, Microfabrication, Photolithography, Wet etching, Dry etching, Physical vapor deposition (PVD), Chemical vapor deposition (CVD), Plating, Bonding processes
Modal analysis, Component mode synthesis method, MEMS, Micromachining, Microfabrication, Photolithography, Wet etching, Dry etching, Physical vapor deposition (PVD), Chemical vapor deposition (CVD), Plating, Bonding processes

(M41630350)Advances in Thermal and Fluid Mechanics[Advances in Thermal and Fluid Mechanics]

Subject name[English]	Advances in Thermal and Fluid Mechanics[Advances in Thermal and Fluid Mechanics]				
Schedule number	M41630350	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.1～1	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	柳田　秀記, 中村　祐二 YANADA Hideki, NAKAMURA Yuji				
Numbering	MEC_MAS56025				

Objectives of class

Fluid power systems utilize pressurized fluid (oil, air, water) to transfer power and output mechanical power through fluid power actuators. Thermal power systems utilize thermal energy obtained by chemical reaction to transfer mechanical power through the energy conversion devices.
In this class, students acquire knowledge of structures and theories of fluid and thermal power components and systems as well as dynamics of fluid in pipelines. In addition, students acquire information on recent topics of fluid and thermal power engineering.

Contents of class

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.

1st week(on demand): Introduction to fluid power systems
2nd week(on demand): Structures and theories of fluid power components
3rd week(on demand): Power loss and efficiencies of fluid power systems
4th week(on demand): Dynamics of fluid in pipeline (derivation of one-dimensional wave equation)
5th week(on demand): Dynamics of fluid in pipeline (solution of wave equation, water/oil hammer)
6th week(on demand): Dynamics of fluid in pipeline (unsteady laminar flow, frequency response)
7th week(on demand): Recent topics of fluid power systems
8th week(on demand or face to face): Recent topics of fluid power systems (45 min) and examination (45 min)

9th week(face-to-face): Introduction to combustion phenomena
10th week(face-to-face): Governing equations and non-dimensionalization
11th week(face-to-face): chemical reaction
12th week(face-to-face): Ignition
13th week(face-to-face): One-dimensional flame theory
14th week(face-to-face): Scale modeling in reactive systems (1)
15th week(face-to-face): Scale modeling in reactive systems (2)
16th week(face-to-face): Recent topics of thermo-reactive systems (45 min) and examination (45 min)

Self Preparation and Review

Students are requested to review each class and prepare the next class by reading the teaching material.
Students are expected to complete their homework (if any) and exercise/training on a voluntarily basis to gain deep understanding what was taught in the coursework.
To enhance a learning effect, students are encouraged to refer to their reference materials. To prepare for and review the lecture for around 90 minutes each.

Related subjects

Fluid mechanics, Mathematics (complex variables, Laplace transform), Thermodynamics, Chemical reaction, Heat transfer

Notes for textbook

No Textbook is required

Reference1	**Book title**	Fluid Transients in Systems			**ISBN**	
	Author	Wylie, Streeter,	**Publisher**	McGraw-Hill	**Publish year**	

		Lisheng				
Reference2	**Book title**	Fundamental Aspects of Combustion			**ISBN**	0-19-507626-5
	Author	A. Linan and F.A. Williams	**Publisher**	Oxford Press	**Publish year**	1993

Notes for reference
N/A

Goals to be achieved
To understand structures and characteristics of fluid power components
To be able to calculate output and efficiency of fluid power components and systems
To be able to derive basic equations of fluid in pipeline
To understand water/oil hammer
To understand recent topics of fluid power systems
To understand what is the effective mathematical approach (with proper simplification) to solve combustion problem theoretically.

Evaluation of achievement
Each student's achievement is evaulated by the sum of examination (50%) and reports (50%).
Students will be evaluated as follows:
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination
定期試験を実施(対面)
Examination(Face to Face)

Details of examination
Each student has to take a calculator with him/her.

Other information
Prof.Yanada
Room: D309, Tel.(Ext.): 6668, e-mail: yanada@me.tut.ac.jp
Prof.Nakamura
Room: D311, Tel.(Ext.): 6647, e-mail: yuji@me.tut.ac.jp

Reference URL
N/A

Office hours
Basically, any time is fine, but the time for discussion can be determined through e-mails when instructor is absent from his/her office.

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about mechanical engineering and related fields; to make plans for research and development and put them intopractice; and to create new technologies to solve problems

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner

Key words
Fluid power, Wave propagation, Water hammer, Unsteady flow, Oscillatory flow, Combustion, Reacting flow

(M41630380)Robotics[Robotics]

Subject name[English]	Robotics[Robotics]				
Schedule number	M41630380	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Fri.2～2	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	内山　直樹 UCHIYAMA Naoki				
Numbering	MEC_MAS55025				

Objectives of class

Provides fundamentals of robotics; kinematics, dynamics and motion control of multiple rigid-bodies connected in series with revolute or prismatic joints.

Contents of class

(face to face) 1st week: Representation and transformation of positions and orientations in 3-D space I
(on-demand) 2nd week: Representation and transformation of positions and orientations in 3-D space II
(face to face) 3rd week: Kinematics I
(on-demand) 4th week: Kinematics II
(face to face) 5th week: Velocities and static forces I
(on-demand) 6th week: Velocities and static forces II
(face to face) 7th week: Intermediate summary (including the intermediate examination)
(face to face) 8th week: Dynamics I
(on-demand) 9th week: Dynamics II
(on-demand) 10th week: Dynamics III
(face to face) 11th week: Control I
(on-demand) 12th week: Control II
(on-demand) 13th week: Control III
(face to face) 14th week: Summary (including the end-term examination)

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

Read the handouts before the lecture.

Related subjects

Fundamentals of linear algebra, mechanics and control theory.

Notes for textbook

Handouts will be prepared.

Reference1	**Book title**	Introduction to Robotics: Mechanics and Control, 3rd Edition			**ISBN**	
	Author	J. J. Craig	**Publisher**	Prentice Hall	**Publish year**	2005
Reference2	**Book title**	Robot Modeling and Control			**ISBN**	
	Author	M. W. Spong, S. Hutchinson, M. Vidyasagar	**Publisher**	John Wiley & Sons	**Publish year**	2006

Notes for reference

N/A

Goals to be achieved

Be able to derive kinematics and dynamics of robotic manipulators.
Be able to design motion controllers for robotic manipulators.

Evaluation of achievement

The grade will be determined by reports (35%), the intermediate examination score (30%) and the end-of-term examination score (35 %).

The credit of this course is given if the score of the above examination is 60% or over.
Grade levels are C (60% – less than 70%), B (70 – less than 80%), A (80 – less than 90%) and S (90% or over).

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination

N/A

Other information

Office: Room D-406, E-mail uchiyama@tut.jp

Reference URL

N/A

Office hours

Contact the lecturer by e-mail first.

Relations to attainment objectives of learning and education

(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。

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

Key words

Manipulator, Dynamics, Control

(M41630400)Robot Kinematics[Robot Kinematics]

Subject name[English]	Robot Kinematics[Robot Kinematics]				
Schedule number	M41630400	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Fri.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	内山　直樹 UCHIYAMA Naoki				
Numbering	MEC_MAS55025				

Objectives of class

Provides fundamentals of robot kinematics on multiple rigid-bodies connected in series with revolute or prismatic joints.

Contents of class

(face to face) 1st week: Representation and transformation of positions and orientations in 3-D space I
(on-demand) 2nd week: Representation and transformation of positions and orientations in 3-D space II
(face to face) 3rd week: Kinematics I
(on-demand) 4th week: Kinematics II
(face to face) 5th week: Velocities and static forces I
(on-demand) 6th week: Velocities and static forces II
(face to face) 7th week: Summary (including the end-term examination)

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

Read the handouts before the lecture.

Related subjects

Fundamentals of linear algebra and mechanics.

Notes for textbook

Handouts will be prepared.

Reference1	**Book title**	Introduction to Robotics: Mechanics and Control, 3rd Edition			**ISBN**	
	Author	J. J. Craig	**Publisher**	Prentice Hall	**Publish year**	2005
Reference2	**Book title**	Robot Modeling and Control			**ISBN**	
	Author	M. W. Spong, S. Hutchinson, M. Vidyasagar	**Publisher**	John Wiley & Sons	**Publish year**	2006

Notes for reference

N/A

Goals to be achieved

Be able to derive kinematics of robotic manipulators.

Evaluation of achievement

The grade will be determined by reports (30%) and the end-of-term examination score (70 %).

The credit of this course is given if the score of the above examination is 60% or over.
Grade levels are C (60% – less than 70%), B (70 – less than 80%), A (80 – less than 90%) and S (90% or over).

Examination

定期試験を実施(対面)
Examination(Face to Face)

Details of examination N/A
Other information Office: Room D-406, E-mail uchiyama@tut.jp
Reference URL N/A
Office hours Contact the lecturer by e-mail first.
Relations to attainment objectives of learning and education (C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。 (C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner
Key words Manipulator, Kinematics

(M41630450)Fluid Power Engineering[Fluid Power Engineering]

Subject name[English]	Fluid Power Engineering[Fluid Power Engineering]				
Schedule number	M41630450	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Mon.1～1	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	柳田　秀記 YANADA Hideki				
Numbering	MEC_MAS56025				

Objectives of class

Fluid power systems utilize pressurized fluid (oil, air, water) to transfer power and output mechanical power through fluid power actuators. In this class, students acquire knowledge of structures and theories of fluid power components and systems as well as dynamics of fluid in pipelines. In addition, students acquire information on recent topics of fluid power engineering.

Contents of class

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.

1st week(on demand): Introduction to fluid power systems
2nd week(on demand): Strutures and theories of fluid power components
3rd week(on demand): Power loss and efficiencies of fluid power systems
4th week(on demand): Dynamics of fluid in pipeline (derivation of one-dimensional wave equation)
5th week(on demand): Dynamics of fluid in pipeline (solution of wave equation, water/oil hammer)
6th week(on demand): Dynamics of fluid in pipeline (unsteady laminar flow, frequency response)
7th week(on demand): Recent topics of fluid power systems
8th week(on demand or face to face): Recent topics of fluid power systems (45 min) and examination (45 min)

Self Preparation and Review

Students are requested to review each class and prepare the next class by reading the prnted teaching material.

Related subjects

Fluid mechanics, Mathematics (complex variables, Laplace transform)

Notes for textbook

Printed teaching materials are given.

Reference1	**Book title**	Fluid Transients			**ISBN**	
	Author	Wylie/Streeter/Lisheng	**Publisher**	McGraw-Hill	**Publish year**	

Notes for reference

N/A

Goals to be achieved

1.To understand structures and characteristics of fluid power components
2.To be able to calculate output and efficiency of fluid power components and systems
3.To be able to derive basic equations of fluid in pipeline
4.To understand water/oil hammer
5.To understand recent topics of fluid power systems

Evaluation of achievement

Each student's achievement is evaluated by the sum of examination (50%) and

reports (50%).
Students will be evaluated as follows:
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination
定期試験を実施（対面）
Examination(Face to Face)

Details of examination
Each student has to take a calculator with him/her.

Other information
Office:D-309, Tel:44-6668, e-mail:yanada@me.tut.ac.jp

Reference URL
N/A

Office hours
The date and time are arranged by e-mail.

Relations to attainment objectives of learning and education

（C）高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner

Key words
フルードパワー，波動，水撃，非定常流，振動流
Fluid power, Wave propagation, Water hammer, Unsteady flow, Oscillatory flow

(M41630463)Advances in Systems, Control and Robotics[Advances in Systems, Control and Robotics]

Subject name[English]	Advances in Systems, Control and Robotics[Advances in Systems, Control and Robotics]				
Schedule number	M41630463	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall2+Spring	**Day of the week,period**	Tue.2～2	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Mechanical Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	高木 賢太郎, 高山 弘太郎 TAKAGI Kentaro, TAKAYAMA Kotaro				
Numbering	MEC_MAS55025				

Objectives of class

The purpose of this lecture is:
(Fall semester, Prof. Takagi) to learn the fundamentals of the modern control theory and to exercise how to use them in practical applications and
(Spring semester, Prof. Takayama) to learn fundamentals of advanced agricultural engineering

Contents of class

The following contents will be provided.

(Fall semester, Prof. Takagi)
(1) (on-demand) Modeling with state equation
(2) (in-person/online) State equation and transfer function
(3) (on-demand) Stability and time response
(4) (in-person/online) Controllability and state feedback
(5) (on-demand) State feedback and pole placement
(6) (in-person/online) Observability and state observer
(7) (in-person/online) Full-order state observer and observer-based controller
(8) (in-person/online) Review 45min, examination 45min

(Spring semester, Prof. Takayama)
(1) (On-demand) Advanced agricultural production in the world
(2) Environmental control for agricultural production Ⅰ
(3) (On-demand) Environmental control for agricultural production Ⅱ
(4) Measurement system for photosynthesis and transpiration of crop Ⅰ
(5) (On-demand) Measurement system for photosynthesis and transpiration of crop Ⅱ
(6) Plant growth monitoring with imaging robot Ⅰ
(7) (On-demand) Plant growth monitoring with imaging robot Ⅱ
(8) Review 45min, examination/reporting 45min
(In-person/online unless specified)

If there is any changes about a class schedule, it will be informed via Google Classroom or KYOMU JOHO 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.

Self Preparation and Review

To enhance a learning effect, students are encouraged to refer to their textbook.
Prepare for and review the lecture for around 90 minutes each.

Related subjects

N/A

Notes for textbook

Handouts will be prepared by the lecturers.

Notes for reference

Reference books will be announced in the lecture.

Goals to be achieved

Students are expected the followings as the goal of this lecture.
(Fall semester, Prof. Takagi)
(1) To understand state space modeling

(2) To understand controllability and observability
(3) To be able to design state feedback gain by pole placement
(4) To be able to design a state observer
(Spring semester, Prof. Takayama)
(1) To acquire basic knowledge of advanced agricultural engineering
(2) To acquire adequate knowledge of environmental control and robotics in agriculture
(3) To acquire adequate knowledge of image analysis for control in agriculture

Evaluation of achievement

Exam 90%, Report or Quiz 10%
Students who attend all classes will be evaluated as follows:
S：total score of examination and report is 90 pointrs or higher.
A：total score of examination and report is 80 pointrs or higher.
B：total score of examination and report is 70 pointrs or higher.
C：total score of examination and report is 60 pointrs or higher.

Examination

定期試験を実施（オンライン）
Examination(On line)

Details of examination

A report, or web exam, or both will be taken place if the paper exam is not available.

Other information

N/A

Reference URL

N/A

Office hours

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 lecturer.

Relations to attainment objectives of learning and education

（C）高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner

Key words

Modern control, State equation, State feedback, State observer, Environmental control, Plant diagnosis, Robotization, Automation

(M41630470)Microstructural Control of Metallic Materials[Microstructural Control of Metallic Materials]

Subject name[English]	Microstructural Control of Metallic Materials[Microstructural Control of Metallic Materials]				
Schedule number	M41630470	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Thu.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	三浦 博己 MIURA Hiromi				
Numbering	MEC_MAS54025				

Objectives of class
N/A
Learn about newest strengthening mechanisms of metallic materials and microstructural control for strengthening.

Contents of class
N/A
1. Guidance and metallic materials
2. Grain-boundary energy and dislocations
3. Grain-boundary energy and mechanical properties
4. Static recrystallization and microstructural control
5. Dynamic recrystallization and microstructural control

Self Preparation and Review
N/A
Basic knowledge about metallic materials is mandatory

Related subjects
N/A
N/A

Notes for textbook
N/A
Text will be provided

Notes for reference
N/A
N/S

Goals to be achieved
N/A
To know newest topics on microstructural control for strengthening of metallic materials

Evaluation of achievement
N/A
Reports after classes are required for evaluation instead of examination

Examination
レポートで実施
By Report

Details of examination
N/A
N/A

Other information
N/A
N/A

Reference URL
N/A
N/A

Office hours
N/A
After classes

Relations to attainment objectives of learning and education
N/A

(C)高度な知識を統合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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
(C2)機械工学およびその関連分野の広範囲の知識の連携により，研究開発に対する方法論を体得して，研究開発の計画を立案および実践し，課題解決のための新たな技術を創造できる能力を身につけている。
To know newest topics on microstructural control of metallic materials

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about mechanical engineering and related fields; to make plans for research and development and put them intopractice; and to create new technologies to solve problems

Key words
N/A
Microstructural control

(M41630480)Combustion Theory[Combustion Theory]

Subject name[English]	Combustion Theory[Combustion Theory]				
Schedule number	M41630480	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Mon.3～3	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	中村　祐二 NAKAMURA Yuji				
Numbering	MEC_MAS56025				

Objectives of class

This coursework offers the advanced approach to understanding the combustion processes and its impact. Students can learn the theoretical approach to understand the feature of combustion and gain fundamentals of combustion modeling which is useful to predict the performance of the combustor.

Contents of class

1st week(face-to-face): Introduction to combustion phenomena
2nd week(face-to-face): Governing equations and non-dimensionalization
3rd week(face-to-face): chemical reaction
4th week(face-to-face): Ignition
5th week(face-to-face): One-dimensional flame theory
6th week(face-to-face): Scale modeling in reactive systems (1)
7th week(face-to-face): Scale modeling in reactive systems (2)
8h week(face-to-face): Recent topics of thermo-reactive systems (45 min) and examination (45 min)

(*) 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

Students are expected to complete their homework (if any) and exercise/training on a voluntarily basis to gain deep understanding what was taught in the coursework.
To enhance a learning effect, students are encouraged to refer to their reference materials. To prepare for and review the lecture for around 90 minutes each.

Related subjects

Fluid mechanics, Mathematics (complex variables, Laplace transform), Thermodynamics, Chemical reaction, Heat transfer

Notes for textbook

No Textbook is required

Reference1	**Book title**	Fundamental Aspects of Combustion			**ISBN**	0-19-507626-5
	Author	A. Linan and F.A. Williams	**Publisher**	Oxford Press	**Publish year**	1993

Notes for reference

N/A

Goals to be achieved

To understand what is the effective mathematical approach (with proper simplification) to solve combustion problem theoretically.

Evaluation of achievement

Each student's achievement is evaulated by the sum of examination (50%) and reports (50%).
Students will be evaluated as follows:
S: Obtained total points of exam and reports, 90 or higher (out of 100 points).
A: Obtained total points of exam and reports, 80 or higher (out of 100 points).
B: Obtained total points of exam and reports, 70 or higher (out of 100 points).
C: Obtained total points of exam and reports, 60 or higher (out of 100 points).

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination

Each student has to take a calculator with him/her.

Other information

Prof.Nakamura
Room: D311, Tel.(Ext.): 6647, e-mail: yuji@me.tut.ac.jp

Reference URL

N/A

Office hours

Basically, any time is fine, but the time for discussion can be determined through e-mails when instructor is absent from his/her office.

Relations to attainment objectives of learning and education

（C）高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1)機械工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about mechanical engineering and related fields; to make plans for research and development and put them intopractice; and to create new technologies to solve problems

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about mechanical engineering and related fields; and to utilize such knowledge in an integrated manner

Key words

Combustion, Reacting flow

(M41630490)Modern Control Engineering[Modern Control Engineering]

Subject name[English]	Modern Control Engineering[Modern Control Engineering]				
Schedule number	M41630490	**Subject area**	Advanced Mechanical Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Tue.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Mechanical Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	高木　賢太郎 TAKAGI Kentaro				
Numbering	MEC_MAS55025				

Objectives of class

The purpose of this lecture is to learn the fundamentals of the modern control theory and to exercise how to use them in practical applications.

Contents of class

The following contents will be provided;
(1) (on-demand) Modeling with state equation
(2) (in-person/online) State equation and transfer function
(3) (on-demand) Stability and time response
(4) (in-person/online) Controllability and state feedback
(5) (on-demand) State feedback and pole placement
(6) (in-person/online) Observability and state observer
(7) (in-person/online) Full-order state observer and observer-based controller
(8) (in-person/online) Review 45min, examination 45min
If there is any changes about a class schedule, it will be informed via Google Classroom or KYOMU JOHO 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.

Self Preparation and Review

To enhance a learning effect, students are encouraged to refer to their textbook.
Prepare for and review the lecture for around 90 minutes each.

Related subjects

N/A

Notes for textbook

Handouts will be prepared by the lecturer.

Notes for reference

Reference books will be announced in the lecture.

Goals to be achieved

Students are expected
(1) To understand state space modeling,
(2) To understand controllability and observability,
(3) To design state feedback gain by pole placement, and
(4) To design a state observer
as the goal of this lecture.

Evaluation of achievement

Exam 90%, Report or Quiz 10%
Students who attend all classes will be evaluated as follows:
S：total score of examination and report is 90 pointrs or higher.
A：total score of examination and report is 80 pointrs or higher.
B：total score of examination and report is 70 pointrs or higher.
C：total score of examination and report is 60 pointrs or higher.

Examination

定期試験を実施（オンライン）
Examination(On line)

Details of examination

A report, or web exam, or both will be taken place if the paper exam is not available.

Other information

N/A

Reference URL

N/A

Office hours

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 lecturer.

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about mechanical engineering and related fields and have the practical and creative skills to utilize such knowledge forproblem solving in an integrated manner

Key words

Modern control, State equation, State feedback, Controllability, Observability, Full-order observer

(M42610020)Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]

Subject name[English]	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]				
Schedule number	M42610020	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S2系教務委員, 2系各教員 2kei kyomu Iin-S, 2kei kakukyouin				
Numbering	ELC_MAS51025				

Objectives of class

The thesis research aims to provide a practical experience of research work, and to acquire his/her research skill with deep understanding of the electrical and electronic information engineering.

Contents of class

The research subject depends on the supervisor and the research group you belong to. Every student will have an individual research subject. For more details, please contact with your supervisor.

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

Reference and material will be available from the supervisor.

Notes for reference

N/A

Goals to be achieved

To get something new on individual research fields.
To develop his/her research skill including the planning and the presentation.

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

電気・電子情報工学専攻
(B)技術者・研究者としての正しい倫理観と社会性
上級技術者・研究者として社会的・倫理的責任を有し，社会における技術的課題を設定・解決・評価する能力を身につけている。
(C)高度な知識を統合的に活用できる実践力・創造力
電気・電子情報工学およびその関連分野に関する高度な知識を修得し，それらを課題解決のために統合的に活用できる実践

的・創造的能力を身につけている。
(C1) 電気・電子情報工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
(C2) 電気・電子情報工学およびその関連分野の広範囲の知識の連携により，研究開発に対する方法論を体得して，研究開発の計画を立案および実践し，課題解決のための新たな技術を創造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するコミュニケーション力を身につけている。
(D1) 論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。
(D2) チーム内の個々の要員の価値観を互いに尊重するとともに，協調して，チームとしての目標達成に寄与できる高い能力を身につけている。
(E)最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化に対応して，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。
(B) Sound ethics and social awareness as advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; have the ability to set, solve and evaluate technical issues in society
(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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team members; to contribute to the team's achievements through working cooperatively with other members
(E) Inquisitive mind and continuous learning ability for changes in the state-of-the-art technology and in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

Graduate Program of Electrical and Electronic Information Engineering for Master's Degree
(B) Sound ethics and social awareness as advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; have the ability to set, solve and evaluate technicalissues in society
(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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for researchand development and put them into practice; and to create new technologies to solve problems
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Have the communication skills to effectively express one's own ideas and results while working on issues faced by a globally changing society in cooperation with other team members
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
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(E) Inquisitive mind and continuous learning ability 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

(M42610020)Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]

Subject name[English]	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]				
Schedule number	M42610020	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S2系教務委員, 2系各教員 2kei kyomu Iin-S, 2kei kakukyouin				
Numbering	ELC_MAS51025				

Objectives of class

The thesis research aims to provide a practical experience of research work, and to acquire his/her research skill with deep understanding of the electrical and electronic information engineering.

Contents of class

The research subject depends on the supervisor and the research group you belong to. Every student will have an individual research subject. For more details, please contact with your supervisor.

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

Reference and material will be available from the supervisor.

Notes for reference

N/A

Goals to be achieved

To get something new on individual research fields.
To develop his/her research skill including the planning and the presentation.

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

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

(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
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(E) Inquisitive mind and continuous learning ability 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

(M4261002T)Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]

Subject name[English]	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]				
Schedule number	M4261002T	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S2系教務委員, 2系各教員 2kei kyomu Iin-S, 2kei kakukyouin				
Numbering	ELC_MAS51025				

Objectives of class

The thesis research aims to provide a practical experience of research work, and to acquire his/her research skill with deep understanding of the electrical and electronic information engineering.

Contents of class

The research subject depends on the supervisor and the research group you belong to. Every student will have an individual research subject. For more details, please contact with your supervisor.

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

Reference and material will be available from the supervisor.

Notes for reference

N/A

Goals to be achieved

To get something new on individual research fields.
To develop his/her research skill including the planning and the presentation.

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

N/A

Reference URL

N/AA

Office hours

N/A

Relations to attainment objectives of learning and education

(B) Sound ethics and social awareness as advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; have the ability to set, solve and evaluate technical issues in society
(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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information

engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team members; to contribute to the team's achievements through working cooperatively with other members
(E) Inquisitive mind and continuous learning ability 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

(M42610040)Seminar on Electrical and Electronic Information Engineering[Seminar on Electrical and Electronic Information Engineering]

Subject name[English]	Seminar on Electrical and Electronic Information Engineering[Seminar on Electrical and Electronic Information Engineering]				
Schedule number	M42610040	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S2系教務委員 2kei kyomu Iin-S				
Numbering	ELC_MAS51015				

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

(B) Sound ethics and social awareness as advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; have the ability to set, solve and evaluate technical issues in society
(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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team members; to contribute to the team's achievements through working cooperatively with other members
(E) Inquisitive mind and continuous learning ability 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

(M42610050)Seminar on Electrical and Electronic Information Engineering 1A[Seminar on Electrical and Electronic Information Engineering 1A]

Subject name[English]	Seminar on Electrical and Electronic Information Engineering 1A[Seminar on Electrical and Electronic Information Engineering 1A]				
Schedule number	M42610050	**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 Master's Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S2系教務委員 2kei kyomu Iin-S				
Numbering	ELC_MAS51015				

Objectives of class

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

Contents of class

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

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

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

Notes for reference

N/A

Goals to be achieved

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

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

(B) Sound ethics and social awareness as advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; have the ability to set, solve and evaluate technical issues in society
(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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information

engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team members; to contribute to the team's achievements through working cooperatively with other members
(E) Inquisitive mind and continuous learning ability 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

(M42610060)Seminar on Electrical and Electronic Information Engineering 1B[Seminar on Electrical and Electronic Information Engineering 1B]

Subject name[English]	Seminar on Electrical and Electronic Information Engineering 1B[Seminar on Electrical and Electronic Information Engineering 1B]				
Schedule number	M42610060	**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)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S2系教務委員 2kei kyomu Iin-S				
Numbering	ELC_MAS51015				

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

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

(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
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(D2) Have high-level skills to mutually respect the values of individual team members; to contribute to the team's achievements through working cooperatively with other members
(E) Inquisitive mind and continuous learning ability 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

(M42630100)Methodology of R & D 1[Methodology of R & D 1]

Subject name[English]	Methodology of R & D 1[Methodology of R & D 1]				
Schedule number	M42630100	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.3～3	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S2系教務委員 2kei kyomu Iin-S				
Numbering	ELC_MAS58025				

Objectives of class

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

Contents of class

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

Self Preparation and Review

N/A

Related subjects

N/A

Notes for textbook

Reference and material will be available from the supervisor.

Notes for reference

N/A

Goals to be achieved

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

Evaluation of achievement

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

N/A

Other information

N/A

Reference URL

N/A

Office hours

N/A

Relations to attainment objectives of learning and education

(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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about electrical and electronic information engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems

Key words

(M42630130)Material Science for Electronics 2[Material Science for Electronics 2]

Subject name[English]	Material Science for Electronics 2[Material Science for Electronics 2]				
Schedule number	M42630130	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.5～5	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
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_MAS52025				

Objectives of class

Objective of this subject is to learn about the forefront research and development on spin electronics, thermelectronics, plasmonics and optoelectronics.

Contents of class

1. Spin electronics
You will learn about materials and devices in the field of spin electronics.
1) crystal structure, 2) magnetic materials, 3) magneto-optical devices

2. Thermoelectronics
You will learn about advanced materials processing and fundamentals of thermoelectric energy conversion based on thermodynamics and transport phenomena.
1) thermodynamics and materials processing, 2) fundamentals of thermoelectronics.

3. Plasmonics and optoelectronics
You will learn about materials used in plasmonics and optoelectronic devices.
1) fundamentals of surface plasmon resonance, 2) Advanced optoelectronic devices

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

Self Preparation and Review

Related subjects

N/A

Notes for textbook

Lecture materials will be distributed.

Notes for reference

N/A

Goals to be achieved

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

Spin electronics: Hironaga Uchida: uchida@ee.tut.ac.jp
Thermoelectronics: Yuichi Nakamura: nakamura@ee.tut.ac.jp
Plasmonics and optoelectronics: Go Kawamura: gokawamura@ee.tut.ac.jp
Nanophotonics: Takashi Yatsui: yatsui.takashi.rv@tut.jp

Reference URL

N/A

Office hours

Please make an appointment via e-mail.

Relations to attainment objectives of learning and education

（C）高度な知識を統合的に活用できる実践力・創造力
電気・電子情報工学およびその関連分野に関する高度な知識を修得し，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1) 電気・電子情報工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner

Key words

magnetics, thermelectronics, plasmonics and optoelectronics, nanophotonics

(M42630170)Electrical Energy Systems 2[Electrical Energy Systems 2]

Subject name[English]	Electrical Energy Systems 2[Electrical Energy Systems 2]				
Schedule number	M42630170	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.4～4	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	穂積　直裕, 滝川　浩史 HOZUMI Naohiro, TAKIKAWA Hirofumi				
Numbering	ELC_MAS53025				

Objectives of class

This lecture is implemented as an introduction to electrical energy systems. In order to utilize electric energy in various fields, lectrues on the generation, transmission, distribution and control of electric energy, high voltage engineering, secondary batteries, discharge plasma are given. It is being useful as reference and self-study guide for the professional dealing with this important area. There are three sub courses to choose from.

This lecture is implemented as an introduction to electrical energy systems. In order to utilize electric energy in various fields, lectrues on the generation, transmission, distribution and control of electric energy, high voltage engineering, secondary batteries, discharge plasma are given. It is being useful as reference and self-study guide for the professional dealing with this important area. There are three sub courses to choose from.

Contents of class

Sub Course 1
1. Phenomena of ionized gas
2. Characteristics of discharge plasma
3. Recent trend in plasma applications

Sub Course 2
1. Energy propagation thorough distributed medium.
2. Diagnosing techniques for industrial and biomedical matters.
3. Assessment for high voltage insulation system for power use.

Sub Course 1
1. Phenomena of ionized gas
2. Characteristics of discharge plasma
3. Recent trend in plasma applications

Sub Course 2
1. Energy propagation thorough distributed medium.
2. Diagnosing techniques for industrial and biomedical matters.
3. Assessment for high voltage insulation system for power use.

Self Preparation and Review

Related subjects

Electric Power Systems, Dielectrics and Electrical Insulation, Energy Conversion, Plasma Science

Electric Power Systems, Dielectrics and Electrical Insulation, Energy Conversion, Plasma Science

Notes for textbook

Materials will be prepared by the lecturer.

Materials will be prepared by the lecturer.

Notes for reference

Goals to be achieved

To understand the basic knowledge of electric enrgy systems and related fields.

To understand the basic knowledge of electric enrgy systems and related fields.

Evaluation of achievement

Marks are based on the final examination or report (100%).

Marks are based on the final examination or report (100%).

Examination

定期試験を実施（対面）
Examination(Face to Face)

Details of examination
Other information Office: C-309, TEL: 0532-44-6958, E-mail: hozumi.naohiro.uv@tut.jp Office: C-309, TEL: 0532-44-6958, E-mail: hozumi.naohiro.uv@tut.jp
Reference URL
Office hours Before and/or after the lecture and at any time after making the appointment based on e-mail. Before and/or after the lecture and at any time after making the appointment based on e-mail.
Relations to attainment objectives of learning and education
Key words Electric Energy, Electric Power, High Voltage, Secondary Battery, Plasma, Electrical Insulation Electric Energy, Electric Power, High Voltage, Secondary Battery, Plasma, Electrical Insulation

(M42630210)Semiconductor Physics 2[Semiconductor Physics 2]

Subject name[English]	Semiconductor Physics 2[Semiconductor Physics 2]				
Schedule number	M42630210	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.2～2	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	若原　昭浩, 岡田　浩, 河野　剛士, 髙橋　一浩 WAKAHARA Akihiro, OKADA Hiroshi, KAWANO Takeshi, TAKAHASHI Kazuhiro				
Numbering	ELC_MAS54025				

Objectives of class

先端的な半導体デバイスのための理論、デバイス構造、設計や作製プロセスを理解することを目標とする。

To understand semiconductor physics, structure, design, and processing of advanced semiconductor devices.

Contents of class

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

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

講義に加えて学生が主体的に取り組むケーススタディも実施する。学生は与えられた課題についての調査研究や、要求を満足するデバイスを設計するなどの課題に取り組み、プレゼンテーションを行う。

授業の進め方は、受講学生の学習履歴や受講学生人数をみて、効果的な学習が進められる形式で行う。
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。

This subject consists of two parts. The first half begins by introducing majority- and minority-carrier behavior in fundamental pn-junction and MOS structures. Injected minority carrier dynamics in semiconductors is also included. On the latter half, student choose one from following topics.

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

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

The class will be conducted so as to achieve effective learning based on the learning history of the students and the number of students taking the class.
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

特になし

N/A

Related subjects

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

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

Notes for textbook

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

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

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

Notes for reference

特になし
N/A

Goals to be achieved

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

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

Evaluation of achievement

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

Examination

レポートで実施
By Report

Details of examination

特になし
N/A

Other information

選択に際しては下記の教員にコンタクトすること。

若原昭浩：C-608　wakahara[at]ee.tut.ac.jp
岡田浩：B-306　okada[at]las.tut.ac.jp
河野剛士：C-603 kawano[at]ee.tut.ac.jp
高橋一浩：C-606 takahashi[at]ee.tut.ac.jp

Before choosing a sub-course, contact to following professors

Akihiro Wakahara：C-608　wakahara[at]ee.tut.ac.jp
Hiroshi Okada：B-306　okada[at]las.tut.ac.jp
Takeshi Kawano:C-603 kawano[at]ee.tut.ac.jp
Kazuhiro Takahashi:C-606 takahashi[at]ee.tut.ac.jp

Reference URL

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

Office hours

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

Relations to attainment objectives of learning and education

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

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

and creative skills to utilize such knowledge for problem solving in an integrated manner

Key words

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

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

(M42630270)Advanced Electronic Information System 2[Advanced Electronic Information System 2]

Subject name[English]	Advanced Electronic Information System 2[Advanced Electronic Information System 2]				
Schedule number	M42630270	**Subject area**	Advanced Electrical and Electronic Information Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.1～1	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Electrical and Electronic Information Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	市川 周一, 田村 昌也 ICHIKAWA Shuichi, TAMURA Masaya				
Numbering	ELC_MAS55025				

Objectives of class

The aims of this lecture:
(1) To understand various topics on logic design and computer aided design (CAD),
(2) To understand the role and design of microwave circuits used in wireless systems.

Contents of class

This lecture consists of two themes shown below.

(1) As a result of recent progresses in VLSI technology, the complexity of digital circuit has rapidly increased in these years. Computer-aided design (CAD) is now essential to design logic circuit. This lecture introduces various CAD tools and the algorithms for CAD.

(face-to-face) Week 1: LSI design and CAD
(on-demand) Week 2: Logic synthesis
(face-to-face) Week 3: Layout
(on-demand) Week 4: Timing analysis
(on-demand) Week 5: Logic simulation
(face-to-face) Week 6: Verification
(on-demand) Week 7: Test
(face-to-face) Week 8: Examination

(2) The aim of this course is to acquire the knowledge and design techniques of microwave circuits used in wireless systems.

(face-to-face) Week 1: Transmission line and propagation modes
(on-demand) Week 2: Practical questions
(face-to-face) Week 3: Coupled line and its application
(on-demand) Week 4: Practical questions
(face-to-face) Week 5: Antenna and filter design
(on-demand) Week 6: Practical questions
(on-demand) Week 7: Other application circuits and Practical questions
(face-to-face) Week 8: Examination

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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, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

It is strongly recommended to prepare the lecture, e.g., to read the course materials and references before attending the corresponding lecture. Average preparation time is 90 minutes.
It is also recommended to review after the lecture. Average review time is 90 minutes.
The course materials and references will be shown by the lecturer whenever necessary.

Related subjects

Prerequisite (1): Fundamental knowledge and skills of logic design, algorithms, and computer structure.
Prerequisite (2): Fundamental Knowledge and skills of high-frequency circuit, electromagnetism, and electromagnetic wave engineering.

Notes for textbook

No textbooks are assigned.

Notes for reference

N/A

Goals to be achieved

(1) To understand various CAD tools and the algorithms for CAD,
(2) To understand the role and design of microwave circuits used in wireless systems.

Evaluation of achievement

Item (1) 50%, Item (2) 50%.

Examination

定期試験を実施(対面)
Examination(Face to Face)

Details of examination

TBD

Other information

(1) Shuichi Ichikawa, Room C-404, ext. 6897, E-mail: ichikawa@tut.jp
(2) Masaya Tamura, Room C-405, ext. 6754, E-mail: tamura@ee.tut.ac.jp

Reference URL

http://www.ccs.ee.tut.ac.jp/~ichikawa/lecture/
http://www.comm.ee.tut.ac.jp/em/index_en.html

Office hours

Please make an appointment for consultation with the lecturer via e-mail or direct communication in classroom.

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に活用できる実践力・創造力
電気・電子情報工学およびその関連分野に関する高度な知識を修得し，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1) 電気・電子情報工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。

Graduate Program of Electrical and Electronic Information Engineering for Master's 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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about electrical and electronic information engineering as well as related fields; to utilize such knowledge in an integrated manner

Key words

(1) Logic design, algorithm (2) Microwave circuit, electromagnetic wave engineering

(M43610010)Seminar on Computer Science and Engineering I[Seminar on Computer Science and Engineering I]

Subject name[English]	Seminar on Computer Science and Engineering I[Seminar on Computer Science and Engineering I]				
Schedule number	M43610010	**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 Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S3系教務委員 3kei kyomu Iin-S				
Numbering	CMP_MAS51015				

Objectives of class

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

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

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

Contents of class

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

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

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

Self Preparation and Review

教員が指定する内容に関し、予習・復習を行う。

Consult with your advisor.

Related subjects

指導教員に問い合わせること。

Consult with your advisor.

Notes for textbook

指導教員に問い合わせること。

Consult with your advisor.

Notes for reference

Goals to be achieved

(1)最先端の専門分野の英文が理解でき、わかりやすく説明できる。

(2)技術的な情報を扱う英文が解釈でき、作文できる。

(3)論文の標準的な構成ができる。

(4)発表というスタイルでの情報提供ができる。

(5)情報の不足を質問という形式で指摘できる。

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

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

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

(4) To provide information by oral presentation.

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

Evaluation of achievement

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

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

Examination

試験期間中には何も行わない
None during exam period

Details of examination

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

Other information

Reference URL

Office hours

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

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about computer science and engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems

Key words

(M43610020)Seminar on Computer Science and Engineering II[Seminar on Computer Science and Engineering II]

Subject name[English]	Seminar on Computer Science and Engineering II[Seminar on Computer Science and Engineering II]				
Schedule number	M43610020	**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)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S3系教務委員 3kei kyomu Iin-S				
Numbering	CMP_MAS61015				

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

授業にて指定する。

Consult with your advisor.

Notes for reference

Goals to be achieved

(1)最先端の専門分野の英文が理解でき、わかりやすく説明できる。
(2)技術的な情報を扱う英文が解釈でき、作文できる。
(3)論文の標準的な構成ができる。
(4)発表というスタイルでの情報提供ができる。
(5)情報の不足を質問という形式で指摘できる。

(1) To understand English literature on state-of-the-art areas of expertise, and to explain clearly.
(2) To interpret technical information written in English, and to write such information in English.
(3) To make a standard construction of a technical paper.
(4) To provide information by oral presentation.
(5) To point out the lack of information by questions.

Evaluation of achievement

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

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

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

Examination

試験期間中には何も行わない

None during exam period

Details of examination

試験期間中には何も行わない

Non during exam period

Other information

指導教員に問い合わせること。

Consult with your advisor.

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

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

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

(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about computer science and engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems

Key words

(M43610030)Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]				
Schedule number	M43610030	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Computer Science and Engineering			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S3系教務委員, 3系各教員 3kei kyomu Iin-S, 3kei kakukyouin				
Numbering	CMP_MAS61015				

Objectives of class

The course is intended for students to foster their interests in research problems on computer science and engineering and to acquire ability for independent studies.
It is also aimed for students to acquire, through thesis research, cooperativeness, a sense of responsibility, abilities for problem solving, research planning, decision making, outcome presentation and subject investigation, and to enhance their creativity and persistency, among others.

Contents of class

It is usually the case that thesis research is carried out on individual bases with specific contents differing from one student to another.
Consult with your advisor for any further details.

Self Preparation and Review

Consult with your advisor for them.

Related subjects

Consult with your advisor for them.

Notes for textbook

Consult with your advisor for them.

Notes for reference

Goals to be achieved

To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.

Evaluation of achievement

Three faculty members will be assigned to prepare the evaluation for your thesis research, based on publication records, master thesis, and oral presentation. It will be then finalized by the faculty meeting.

[Evaluation basis] Students who attend this class will be evaluated as follows:
S: Achieved the high level of "master degree", 90 or higher (out of 100 points).
A: Left something to be desired, 80 or higher (out of 100 points).
B: Left something to be desired, 70 or higher (out of 100 points).
C: Left much to be desired, 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

Reference URL

Office hours

Relations to attainment objectives of learning and education

(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するコミュニケーション力を身につけている。
(D1) 論文，口頭及び情報メディアを通じて，自分の論点や考えなどを国の内外において効果的に表現・発信し，コミュニケーションする能力を身につけている。
(D2) チーム内の個々の要員の価値観を互いに尊重するとともに，協調して，チームとしての目標達成に寄与できる高い能力を身につけている。
(E)最新の技術や社会環境の変化に対する探究心と持続的学習力
社会，環境，技術等の変化に対応して，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。
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team members; and to contribute to the team's achievements through working cooperatively with other team members

(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team members; and to contribute to the team's achievements through working cooperatively with other team members
(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 voluntarily make plans and learn throughout one's life in response to changesin society, environment and technology

Key words

(M43610030)Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]				
Schedule number	M43610030	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Computer Science and Engineering			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S3系教務委員, 3系各教員 3kei kyomu Iin-S, 3kei kakukyouin				
Numbering	CMP_MAS61015				

Objectives of class

The course is intended for students to foster their interests in research problems on computer science and engineering and to acquire ability for independent studies.
It is also aimed for students to acquire, through thesis research, cooperativeness, a sense of responsibility, abilities for problem solving, research planning, decision making, outcome presentation and subject investigation, and to enhance their creativity and persistency, among others.

Contents of class

It is usually the case that thesis research is carried out on individual bases with specific contents differing from one student to another.
Consult with your advisor for any further details.

Self Preparation and Review

Consult with your advisor for them.

Related subjects

Consult with your advisor for them.

Notes for textbook

Consult with your advisor for them.

Notes for reference

Goals to be achieved

To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.

Evaluation of achievement

Three faculty members will be assigned to prepare the evaluation for your thesis research, based on publication records, master thesis, and oral presentation. It will be then finalized by the faculty meeting.

[Evaluation basis] Students who attend this class will be evaluated as follows:
S: Achieved the high level of "master degree", 90 or higher (out of 100 points).
A: Left something to be desired, 80 or higher (out of 100 points).
B: Left something to be desired, 70 or higher (out of 100 points).
C: Left much to be desired, 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

Reference URL

Office hours
Relations to attainment objectives of learning and education (D) Communication skills for global success Have the communication skills to effectively express one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members (D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media (D2) Have high-level skills to mutually respect the values of individual team members; and to contribute to the team's achievements through working cooperatively with other team members
Key words

(M4361003T)Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]

Subject name[English]	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]				
Schedule number	M4361003T	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S3系教務委員, 3系各教員 3kei kyomu Iin-S, 3kei kakukyouin				
Numbering	CMP_MAS61015				

Objectives of class

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

Contents of class

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

Self Preparation and Review

After the guidance by an individual adviser, the student is expected to conduct his/her research on his/her own with a pioneering spirit.

Related subjects

Consult with your advisor.

Notes for textbook

Consult with your advisor.

Notes for reference

Goals to be achieved

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

Evaluation of achievement

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

[Evaluation basis] Students who attend this class will be evaluated as follows:
S: Achieved the high level of "master degree", 90 or higher (out of 100 points).
A: Left something to be desired, 80 or higher (out of 100 points).
B: Left something to be desired, 70 or higher (out of 100 points).
C: Left much to be desired, 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

Reference URL

Office hours

Relations to attainment objectives of learning and education

(D) Communication skills for global success
Have the communication skills to effectively express one's own ideas and results while working on the issues faced by a globally changing society in cooperation with other team members
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team members; and to contribute to the team's achievements through working cooperatively with other team members

Key words

(M43610040)Seminar on Computer Science and Engineering[Seminar on Computer Science and Engineering]

Subject name[English]	Seminar on Computer Science and Engineering[Seminar on Computer Science and Engineering]				
Schedule number	M43610040	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S3系教務委員 3kei kyomu Iin-S				
Numbering	CMP_MAS51015				

Objectives of class

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

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

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

Contents of class

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

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

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

Self Preparation and Review

教員が指定する内容に関し、予習・復習を行う。

Consult with your advisor.

Related subjects

指導教員に問い合わせること。

Consult with your advisor.

Notes for textbook

指導教員に問い合わせること。

Consult with your advisor.

Notes for reference

Goals to be achieved

(1)最先端の専門分野の英文が理解でき、わかりやすく説明できる。

(2)技術的な情報を扱う英文が解釈でき、作文できる。

(3)論文の標準的な構成ができる。

(4)発表というスタイルでの情報提供ができる。

(5)情報の不足を質問という形式で指摘できる。

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

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

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

(4) To provide information by oral presentation.

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

Evaluation of achievement

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

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

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

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

Relations to attainment objectives of learning and education

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

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

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

(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about computer science and engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems

Key words

(M43610060)Case Study in Imaging and Light and XR[Case Study in Imaging and Light and XR]

Subject name[English]	Case Study in Imaging and Light and XR[Case Study in Imaging and Light and XR]				
Schedule number	M43610060	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	4
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S3系教務委員, 3系各教員 3kei kyomu Iin-S, 3kei kakukyouin				
Numbering	CMP_MAS51015				

Objectives of class

As a stepping stone to a Master's research, a preliminary project involving measurement experiments or system development is carried out under the supervision of a supervisor. After a necessary and sufficient survey of the relevant research, students define the research question, consider the appropriate research methods and discuss the impact of the results obtained. A presentation opportunity is given at the end of the semester to exchange the ideas among other students and supervisors. Master's research may be carried out by improving/expanding the project.

Contents of class

The project theme is initially presented as a candidate by the supervisors and is finally decided through discussion with the students.

Self Preparation and Review

Consult with your advisor.

Related subjects

Consult with your advisor.

Notes for textbook

Consult with your advisor.

Notes for reference

Goals to be achieved

To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.

Evaluation of achievement

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

[Evaluation basis] Students who attend this class will be evaluated as follows:
S: Achieved the high level of "master degree", 90 or higher (out of 100 points).
A: Left something to be desired, 80 or higher (out of 100 points).
B: Left something to be desired, 70 or higher (out of 100 points).
C: Left much to be desired, 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

Your supervisor will evaluate your presentation and your reports.

Other information

Reference URL

Office hours

Consult with your advisor.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about computer science and engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems

Key words

(M43610070)Advanced Research Methods[Advanced Research Methods]

Subject name[English]	Advanced Research Methods[Advanced Research Methods]				
Schedule number	M43610070	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S3系教務委員, 3系各教員 3kei kyomu Iin-S, 3kei kakukyouin				
Numbering	CMP_MAS61015				

Objectives of class

The course is intended for students to study basic materials in depth, related to his/her research topics through the lab works. It is also aimed for students to acquire various skills, required in general research work, such as those for literature review, oral presentation, and technical discussion and writing.

Contents of class

While specific contents depend on the research topics 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

Consult with your advisor.

Related subjects

Consult with your advisor.

Notes for textbook

Consult with your advisor.

Notes for reference

Goals to be achieved

To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.

Evaluation of achievement

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

[Evaluation basis] Students who attend this class will be evaluated as follows:
S: Achieved the high level of "master degree", 90 or higher (out of 100 points).
A: Left something to be desired, 80 or higher (out of 100 points).
B: Left something to be desired, 70 or higher (out of 100 points).
C: Left much to be desired, 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

Non during exam period

Other information

Consult with your advisor.

Reference URL

Office hours

Consult with your advisor.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about computer science and engineering as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems

Key words

(M43610080)Data Science and Analysis 1[Data Science and Analysis 1]

Subject name[English]	Data Science and Analysis 1[Data Science and Analysis 1]				
Schedule number	M43610080	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Fall1 term	**Day of the week,period**	Mon.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	秋葉 友良 AKIBA Tomoyoshi				
Numbering	CMP_MAS52525				

Objectives of class

Important topics on statistical natural language processing will be discussed by focusing on statistical machine translation.

Contents of class

Week 1: (face-to-face) Introduction
Week 2: (on-demand) Lecture (Basic of Probability and Statistics, Recent Trends in Machine Translation)
Week 3: (on-demand) Presentation & Discussion (Statistical Method for Machine Translation)
Week 4: (on-demand) Presentation & Discussion (Language Models)
Week 5: (on-demand) Presentation & Discussion (Translation Models)
Week 6: (on-demand) Presentation & Discussion (Parameter Estimation)
Week 7: (on-demand) Presentation & Discussion (EM Algorithm)
Week 8: (on-demand) Presentation & Discussion (Advanced methods in SMT)

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, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

Students are requested to read the content written in the textbook before the class. (90 minutes)
Each student is requested to make her/his own presentation videos several times in the course. (2 to 5 hours each)
Students are encouraged to have a discussion on the presentation video posted by other students. (90 minutes)

Related subjects

Probability theory, Information theory, Formal language theory

Notes for textbook

Resumes will be provided, which are based on:
・Kevin Knight
A Statistical MT Tutorial Workbook
・Seiichi Nakagawa et al.
Spoken Language Processing and Natural Language Processing

Reference1	**Book title**	Statistical Machine Translation			**ISBN**	978-0521874151
	Author	Philipp Koehn	**Publisher**	Cambridge University Press	**Publish year**	2010
Reference2	**Book title**	A Statistical MT Tutorial Workbook			**ISBN**	
	Author	Kevin Knight	**Publisher**		**Publish year**	

Notes for reference

N/A

Goals to be achieved

Basics: Understand the basic concepts of natural language processing
Natural Language Processing: Understand the role of language resources, language and translation models, word alignments,

and parameter estimation methods,
Applications: Understand statistical machine translation system.

Evaluation of achievement

Marks are based on the submitted materials (presentation) and the activity in the class (100%).

Examination

授業を実施

Regular Class

Details of examination

N/A

Other information

Tomoyosi Akiba: C-505, 44-6758, akiba@cs.tut.ac.jp

Reference URL

N/A

Office hours

16:25-17:40, Tuesday

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1) 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

Key words

spoken language processing, natural language processing, human language technology

(M43610090)Data Science and Analysis 2[Data Science and Analysis 2]

Subject name[English]	Data Science and Analysis 2[Data Science and Analysis 2]				
Schedule number	M43610090	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Required
Time of starting a course	Fall2 term	**Day of the week,period**	Mon.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	栗山 繁, 青野 雅樹 KURIYAMA Shigeru, AONO Masaki				
Numbering	CMP_MAS52325				

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週目:情報可視化の導入と概要説明
(オンデマンド)第2週目:相関の可視化1(多変量データ)
(オンデマンド)第3週目:構造の可視化(木構造・ネットワーク)
(オンデマンド)第4週目:相関の可視化2(Glyph 表示)
(オンデマンド)第5週目:テキスト・変動の可視化と対話操作
(オンデマンド)第6週目:ワークフローの設計
(対面)第7+0.5 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. Design of workflow
(Face to face) Week 7+0.5: 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，かつレポート課題の合計点（100 点満点）が 90 点以上
A：達成目標を 90%達成しており，かつレポート課題の合計点（100 点満点）が 80 点以上
B：達成目標を 75%達成しており，かつレポート課題の合計点（100 点満点）が 70 点以上
C：達成目標を 60%達成しており，かつレポート課題の合計点（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
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
（C1） 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。

Graduate Program of Computer Science and Engineering for Master's 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 in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

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

(M43630240)Networking, Advanced 1[Networking, Advanced 1]

Subject name[English]	Networking, Advanced 1[Networking, Advanced 1]				
Schedule number	M43630240	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Wed.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	梅村 恭司 UMEMURA Kyoji				
Numbering	CMP_MAS52325				

Objectives of class

The objective of this class is mastering both profound and advanced networking technologies behind computer network programs. Precise protocols are lectured to enhance the knowledge of Internet.

The objective of this class is mastering both profound and advanced networking technologies behind computer network programs.. Precise protocols are lectured to enhance the knowledge of Internet.

Contents of class

1. Link Layer
2. Internet Protocol
3. Address Resolution Protocol
4. Internet Control Message Protocol
5. IP routing and Dynamic Routing Protocol
6. Transmission Control Protocol
6. User Datagram Protocol and Multicasting

Class id of Google Classroom will be available from or KYOMU JOHO SYSTEM.
URL of Google Meet is that of Google Classroom

1. (remote simultaneous interactiv) Link Layer
2. (remote simultaneous interactiv) Internet Protocol
3. (remote simultaneous interactiv) Address Resolution Protocol
4. (remote simultaneous interactiv) Internet Control Message Protocol
5. (remote simultaneous interactiv) IP routing and Dynamic Routing Protocol
6. (remote simultaneous interactiv) Transmission Control Protocol
7. (remote simultaneous interactiv) User Datagram Protocol and Multicasting

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, it will be informed via Google Classroom

Self Preparation and Review

Related subjects

The basic knowledge about the structure of client/server programs is required.

The basic knowledge about the structure of client/server programs is required.

Textbook1	**Book title**	TCP/IP Illustrated Volume. 1, The Protocols,			**ISBN**	
	Author	W. Richard Stevens	**Publisher**	Addison-wesley	**Publish year**	

Notes for textbook

TCP/IP Illustrated Volume. 1, The Protocols,

W. Richard Stevens, Addison-wesley

TCP/IP Illustrated Volume. 1, The Protocols,
W. Richard Stevens, Addison-wesley

Required part of this book will be accessible to students.

Notes for reference

Goals to be achieved

The goal is to understand precisely the structure of internet protocol with which computer network works.
The goal is to understand precisely the structure of internet protocol with which computer network works.

Evaluation of achievement

By Individual interactive Examination.
By Individual interactive Examination.

Examination

定期試験を実施(オンライン)
Examination(On line)

Details of examination

Other information

C－304 umemura@tut.jp

C－304 umemura@tut.jp

Reference URL

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

Office hours

From 10:00AM to 13:00, Tue to Fri
(Appointment are strongly recommended)

From 10:00AM to 13:00, Tue to Fri
(Appointment are strongly recommended)

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1) 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

Key words

Computer Network, Distributed Systems
Computer Network, Distributed Systems

(M43630250)Networking, Advanced 2[Networking, Advanced 2]

Subject name[English]	Networking, Advanced 2[Networking, Advanced 2]				
Schedule number	M43630250	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Wed.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	大村　廉 OMURA Ren				
Numbering	CMP_MAS52325				

Objectives of class

The aim of this class is to understand the concepts, system architecture, and algorithm in distributed computing. The class will cover both of theoretical discussion and practical applications.
The contents will focus on advanced topics in distributed systems, namely the knowledge of computer network and basics of distributed systems are required beforehand.

Contents of class

The 1st and 2nd weeks; Concepts of Distributed Systems (Face to face)
The 3rd week; Synchronization(Face to face)
The 4th and 5th weeks; Consistency(Face to face)
The 6th, 7th, and 8th weeks; Fault tolerance(Face to face)

Evaluation will be done by an assignment announced in a class.

If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for
Preventing the Spread of Coronavirus, the course content and evaluation of achievement are subject to change.
If there are any changes to a class schedule, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

To enhance a learning effect, students are encouraged to refer to the reference book, "Distributed Systems: Principles and Paradigms (2nd Edition)" and to search some keywords in the book on the Internet to find practical examples. To prepare for and review the lecture for around 90 minutes each.

Related subjects

Computer Network, Operating Systems, System Programming, (Basics of Distributed Systems)

Notes for textbook

The materials referenced in the class will be able to download via Google Classroom or pass out in the class.

Reference1	**Book title**	Distributed systems : principles and paradigms			**ISBN**	978-0132392273
	Author	Andrew S. Tanenbaum, Maarten van Steen	**Publisher**	Pearson Prentice Hall	**Publish year**	2007

Notes for reference

Some other related materials, such as books, videos, and web pages, are introduced in the class.

Goals to be achieved

The aim of this class is to understand;
(1) the basic methods and concepts of synchronization in distributed systems;
(2) the concepts and variations of consistency in distributed systems;

(3) the basic concepts and methods of fault tolerance in distributed systems;
(4) the basic concepts of security in distributed systems;
(5) and some practical examples of distributed systems.

Evaluation of achievement

The achievement of students is evaluated by a report assignment. (If the evaluation method is changed, it is announced in the class.)
S: 90 and over
A: 80 and over
B: 70 and over
C: 60 and over

Examination

レポートで実施
By Report

Details of examination

A report related to distributed systems is assigned. (If the evaluation method is changed, it is announced in the class.)

Other information

Teacher's Room: C-509
Internal Phone Number: 6750
E-mail: ren@tut.jp

Reference URL

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

Office hours

You can ask any questions anytime by e-mail. If you come to the teacher's office, you need to have an appointment.

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。

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

Key words

Distributed System, Computer Network, Operating System
Distributed System, Computer Network, Operating System

(M43630470)Data Science and Analysis 1[Data Science and Analysis 1]

Subject name[English]	Data Science and Analysis 1[Data Science and Analysis 1]				
Schedule number	M43630470	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Mon.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	秋葉 友良 AKIBA Tomoyoshi				
Numbering	CMP_MAS52525				

Objectives of class

Important topics on statistical natural language processing will be discussed by focusing on statistical machine translation.

Contents of class

Week 1: (face-to-face) Introduction
Week 2: (on-demand) Lecture (Basic of Probability and Statistics, Recent Trends in Machine Translation)
Week 3: (on-demand) Presentation & Discussion (Statistical Method for Machine Translation)
Week 4: (on-demand) Presentation & Discussion (Language Models)
Week 5: (on-demand) Presentation & Discussion (Translation Models)
Week 6: (on-demand) Presentation & Discussion (Parameter Estimation)
Week 7: (on-demand) Presentation & Discussion (EM Algorithm)
Week 8: (on-demand) Presentation & Discussion (Advanced methods in SMT)

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, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

Students are requested to read the content written in the textbook before the class. (90 minutes)
Each student is requested to make her/his own presentation videos several times in the course. (2 to 5 hours each)
Students are encouraged to have a discussion on the presentation video posted by other students. (90 minutes)

Related subjects

Probability theory, Information theory, Formal language theory

Notes for textbook

Resumes will be provided, which are based on:
・Kevin Knight
A Statistical MT Tutorial Workbook
・Seiichi Nakagawa et al.
Spoken Language Processing and Natural Language Processing

Reference1	**Book title**	Statistical Machine Translation			**ISBN**	978-0521874151
	Author	Philipp Koehn	**Publisher**	Cambridge University Press	**Publish year**	2010
Reference2	**Book title**	A Statistical MT Tutorial Workbook			**ISBN**	
	Author	Kevin Knight	**Publisher**		**Publish year**	

Notes for reference

N/A

Goals to be achieved

Basics: Understand the basic concepts of natural language processing
Natural Language Processing: Understand the role of language resources, language and translation models, word alignments,

and parameter estimation methods,
Applications: Understand statistical machine translation system.

Evaluation of achievement

Marks are based on the submitted materials (presentation) and the activity in the class (100%).

Examination

授業を実施

Regular Class

Details of examination

N/A

Other information

Tomoyosi Akiba: C-505, 44-6758, akiba@cs.tut.ac.jp

Reference URL

N/A

Office hours

16:25-17:40, Tuesday

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1) 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

Key words

spoken language processing, natural language processing, human language technology

(M43630480)Robotic Perception and Human-Robot Interaction 1[Robotic Perception and Human-Robot Interaction 1]

Subject name[English]	Robotic Perception and Human-Robot Interaction 1[Robotic Perception and Human-Robot Interaction 1]				
Schedule number	M43630480	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Tue.3～3	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	三浦 純 MIURA Jun				
Numbering	CMP_MAS53225				

Objectives of class

Fundamental and advanced issues in intelligent robotics will be discussed. Topics included are: statistical sensor fusion with Bayes filters, object tracking and identification, robotic mapping and localization, observation planning, human detection and identification, and task-oriented human-robot interaction.

Contents of class

Week 1: Introduction, probability basics, and sensor fusion by Bayesian inference.(face-to-face)
Week 2: Object tracking by Bayesian filters.(on-demand)
Week 3: Mobile robot localization.(on-demand)
Week 4: Mapping and SLAM (simultaneous localization and mapping)(on-demand)
Week 5: Observation planning.(on-demand)
Week 6: Human detection and identification.(on-demand)
Week 7: Task-oriented human-robot interaction.(on-demand)
Week 8: Presentation of assignment (face-to-face)

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

Students are encouraged to regularly review and prepare for the lecture using provided materials (for about 90 minutes each).

Related subjects

Fundamental knowledge of linear algebra and probability theory is useful.

Notes for textbook

Handouts with video explanation will be provided. The main reference is shown below.

Reference1	**Book title**	Probabilistic robotics			**ISBN**	978-0262201629
	Author	Sebastian Thrun, Wolfram Burgard, Dieter Fox	**Publisher**	MIT Press	**Publish year**	2006

Notes for reference

N/A

Goals to be achieved

To understand the fundamental and advanced issues in intelligent robotics, especially in robotic perception and human-robot interaction, including:
(1) statistical data fusion
(2) mobile robot localization and mapping
(3) perception and planning for human-robot interaction

Evaluation of achievement

Students who attend all classes will be evaluated as follows:
S: Achieved all goals, and obtained total points of the final assignment is 90 or higher (out of 100 points).
A: Achieved all goals, and obtained total points of the final assignment is 80 or higher (out of 100 points).
B: Achieved 80% of goals, and obtained total points of the final assignment is 70 or higher (out of 100 points).
C: Achieved 60% of goals, and obtained total points of the final assignment is 60 or higher (out of 100 points).

Examination

レポートで実施
By Report

Details of examination
N/A

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

Reference URL
All materials are delivered by Google Classroom. The class code is: y4umxsb

Office hours
Make an appointment beforehand by email.

Relations to attainment objectives of learning and education

Key words
robotics, sensor fusion, robotic perception, human-robot interaction

(M43630490)Robotic Perception and Human-Robot Interaction 2[Robotic Perception and Human-Robot Interaction 2]

Subject name[English]	Robotic Perception and Human-Robot Interaction 2[Robotic Perception and Human-Robot Interaction 2]				
Schedule number	M43630490	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Tue.3～3	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	大島　直樹, 大村　廉 OSHIMA Naoki, OMURA Ren				
Numbering	CMP_MAS53225				

Objectives of class

人とロボットとの情動的なコミュニケーションを実現するための開発ツールやプラットフォームについて、実際のシステム構築に取り組みながら修得する。

The aim of this course is to utilize tools and platforms to construct human-robot affective communication in a real-world scenario.

Contents of class

(オンデマンド)第 1 週: インタラクティブに振る舞う将来のソーシャルロボット(担当: 大島)
(オンデマンド)第 2-3 週: ソーシャルロボット構築のための、マルチモーダル処理を用いた会話生成システム(担当: 大島)
(オンデマンド)第 4 週: ソーシャルロボット制御のためのネットワークサービス(担当: 大村)
(オンデマンド)第 5 週: ロボットのボディーを物理的に出力する 3D プリンタ技術(担当: 大島)
(対面)第 6-7.5 週: 最終課題(未来のソーシャルロボットの提案、試作に向けたプロジェクトワーク)および評価ポイントの解説(担当: 大島)

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。

(オンデマンド)・・Google Classroom に講義資料を掲載する。
(対面)・・講義室にて対面授業を行う。
Week 1: Building interactive sociable robots of the future, On-demand (Dr. Ohshima)
Week 2-3: Real-time multimodal processing for constructing sociable robot's conversation system, On-demand (Dr. Ohshima)
Week 4: Network services for sociable robot manipulation, On-demand (Dr. Ohmura)
Week 5: 3D robot printing technology, On-demand (Dr. Ohshima)
Week 6-7.5: Final assignment(project work: proposing and prototyping sociable robots of the future), evaluation and review, Face to face (Dr. Ohshima)

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.

On-demand (You can take the class whenever you want.)
Face to face (Regular face to face class)

Self Preparation and Review

授業前までに指定された資料を熟読すること(予習 45 分)。授業後はその回の講義内容を復習すること(復習 45 分)。

Reviewing and preparing for the lecture using provided materials are desirable. To prepare for and review the lecture for around 45 minutes each.

Related subjects

特になし
N/A

Notes for textbook

ハンドアウトを用意します。主な参考書は下記の通り。

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

Reference1	Book title	Human-robot interaction : an introduction			ISBN	978-1108735407
	Author	Christoph Bartneck ... [et al.]	Publisher	Cambridge University Press	Publish year	2020

Notes for reference
特になし
N/A

Goals to be achieved
インタラクティブに振る舞うソーシャルなロボットの開発に必要な基礎技術やその応用・課題等について理解を得ること。
1) 与えられた目的に従って適切に動作するインタラクティブロボットを構築することができる
2) 機能と特徴、目的に合致したロボットデザインを提案できる
3) ソーシャルロボットの近年の動向や新規点を理解する
Understanding following fundamental and advanced issues for building interactive sociable robots.
1) Interactivity: Constructing interactive robot acting appropriately according to its purpose
2) Design: proposing new design to match its ability, features, and purpose
3) Novelty: understanding recent trends of interactive social robots

Evaluation of achievement
レポート(50%)と課題など(50%)の内容で評価する。
S: レポート・課題の合計点(100 点満点)が 90 点以上
A: レポート・課題の合計点(100 点満点)が 80 点以上
B: レポート・課題の合計点(100 点満点)が 70 点以上
C: レポート・課題の合計点(100 点満点)が 60 点以上
The grade will be determined by the class assignments and the final report (the total points are 100).
S: the total points are 90 or higher.
A: the total points are 80 or higher.
B: the total points are 70 or higher.
C: the total points are 60 or higher.

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

Details of examination
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、15:00～16:00。ただし、事前にメール(ohshima@eiiris.tut.ac.jp)でアポイントをとること。メールでの問い合わせはいつでも良い。
Tuesday, 15:00-16:00. Make an appointment beforehand by email. Students are welcome to send an email asking about the course at any time. E-mail: ohshima@eiiris.tut.ac.jp

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。

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

Key words
ロボット、デザイン工学、コミュニケーション
robot, design engineering, communication

(M43630500)Data Science and Analysis 2[Data Science and Analysis 2]

Subject name[English]	Data Science and Analysis 2[Data Science and Analysis 2]				
Schedule number	M43630500	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Mon.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	栗山 繁, 青野 雅樹 KURIYAMA Shigeru, AONO Masaki				
Numbering	CMP_MAS52525				

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週目:情報可視化の導入と概要説明
(オンデマンド)第2週目:相関の可視化1(多変量データ)
(オンデマンド)第3週目:構造の可視化(木構造・ネットワーク)
(オンデマンド)第4週目:相関の可視化2(Glyph 表示)
(オンデマンド)第5週目:テキスト・変動の可視化と対話操作
(オンデマンド)第6週目:ワークフローの設計
(対面)第7+0.5 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. Design of workflow
(Face to face) Week 7+0.5: 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，かつレポート課題の合計点（100 点満点）が 90 点以上
A：達成目標を 90%達成しており，かつレポート課題の合計点（100 点満点）が 80 点以上
B：達成目標を 75%達成しており，かつレポート課題の合計点（100 点満点）が 70 点以上
C：達成目標を 60%達成しており，かつレポート課題の合計点（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
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
（C1） 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。

Graduate Program of Computer Science and Engineering for Master's 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 in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

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

(M43630520)3D Vision Computation 1[3D Vision Computation 1]

Subject name[English]	3D Vision Computation 1[3D Vision Computation 1]				
Schedule number	M43630520	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Tue.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	金澤 靖 KANAZAWA Yasushi				
Numbering	CMP_MAS52525				

Objectives of class

This course involves fundamentals and advanced issues on 3D reconstruction from images.

This course involves fundamentals and advanced issues on 3D reconstruction from images.

Contents of class

All lectures will be done by "remote simultaneous interactive" and "on-demand".
Each "on-demand" lecture material will be available after the corresponding on-line lecture.

1. Introduction and Projective Geometry
2. Epipolar Geometry
3. 3D reconstruction from Two Views
4. Affine Projection
5. Uncalibrated Stereo
6. Structure from Motion
7. Robust Estimation in Computer Vision
8. Experiment and Discussion

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.
All lectures will be done by "remote simultaneous interactive" and "on-demand".
Each "on-demand" lecture material will be available after the corresponding on-line lecture.

1. Introduction and Projective Geometry
2. Epipolar Geometry
3. 3D reconstruction from Two Views
4. Affine Projection
5. Uncalibrated Stereo
6. Structure from Motion
7. Robust Estimation in Computer Vision
8. Experiment and Discussion

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

Since the handouts are available via web page beforehand, please read the handouts and the corresponding part on reference books.

Since the handouts are available via web page beforehand, please read the handouts and the corresponding part on reference books.

Related subjects

3D Vision Computation II
Geometry, Linear Algebra, Statistics.

Notes for textbook

Handouts will be prepared.
Handouts will be prepared.

Reference1	**Book title**	Guide to 3D vision computation : geometric analysis and implementation			**ISBN**	978-3319484921
	Author	Kenichi Kanatani, Yasuyuki Sugaya, Yasushi Kanazawa	**Publisher**	Springer International Publishing AG	**Publish year**	2016
Reference2	**Book title**	Multiple view geometry in computer vision			**ISBN**	978-0521540513
	Author	Richard Hartley, Andrew Zisserman	**Publisher**	Cambridge University Press	**Publish year**	2003

Notes for reference

N/A
N/A

Goals to be achieved

The goals of this course are to

(1) Understand and explain the basic knowledge of projective geometry.
(2) Understand and explain the epipolar geometry.
(3) Understand and explain the basic theory of 3-D reconstruction from images.
(4) Understand and explain the basic knowledge of robust estimation.
(5) Understand and explain the basic method of image matching.
The goals of this course are to

(1) Understand and explain the basic knowledge of projective geometry.
(2) Understand and explain the epipolar geometry.
(3) Understand and explain the basic theory of 3-D reconstruction from images.
(4) Understand and explain the basic knowledge of robust estimation.
(5) Understand and explain the basic method of image matching.

Evaluation of achievement

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

Examination

レポートで実施
By Report

Details of examination

Other information

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

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

Reference URL

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

Office hours

Anytime. Please make an appointment beforehand by E-mail.

Anytime. Please make an appointment beforehand by E-mail.

Relations to attainment objectives of learning and education

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

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

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

Key words

3D reconstruction, computer vision

3D reconstruction, computer vision

(M43630530)3D Vision Computation 2[3D Vision Computation 2]

Subject name[English]	3D Vision Computation 2[3D Vision Computation 2]				
Schedule number	M43630530	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Tue.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	菅谷 保之 SUGAYA Yasuyuki				
Numbering	CMP_MAS52525				

Objectives of class

このコースではコンピュータビジョン技術を用いたカメラ校正手法と、AR マーカー、円形マーカー、自然特徴点や直線特徴を用いた AR アプリケーションについて解説する。そして、これらの技術を用いた AR アプリケーションを実際に開発して議論する。

This course will introduce camera calibration methods and AR applications with various markers, including a famous AR marker, a circular marker, and natural points and lines features. Students develop an AR application based on the studied knowledge and discuss the performance of it.

Contents of class

1. カメラの射影、カメラ校正の基礎
2. AR アプリケーション
3. 矩形マーカーを用いたカメラの位置推定、円形マーカーを用いたカメラの位置推定
4. 実験と議論1
5. 自然特徴点を用いたカメラの位置推定
6. 直線特徴を用いたカメラの位置推定
7. 実験と議論2
8. 実験と議論3

1. Introduction and camera projection and Fundamental of camera calibration
2. AR applications
3. Camera pose estimation by a rectangular marker and Camera pose estimation by a circular maker
4. Experiment and discussion
5. Camera pose estimation by 2-D textures
6. Camera pose estimation by lines
7. Experiment and discussion
8. Experiment and discussion

Self Preparation and Review

The handouts are available via web page(google classroom) beforehand.
The handouts are available via web page(google classroom) beforehand.

Related subjects

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

Notes for textbook

Handouts will be prepared.
Handouts will be prepared.

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

Notes for reference
特になし
N/A

Goals to be achieved
Understanding of the fundamentals and advanced issues on image processing and computer vision including:
- camera projection
- camera calibration from various features
- AR applications
Understanding of the fundamentals and advanced issues on image processing and computer vision including:
- camera projection
- camera calibration from various features
- AR applications

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

Examination
レポートで実施
By Report

Details of examination
特になし
N/A

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

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

Reference URL
Google classroom
Google classroom

Office hours
week day
Please send an appointment e-mail in advance.
week day
Please send an appointment e-mail in advance.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

Key words
コンピュータビジョン、カメラ校正、AR アプリケーション
computer vision, camera calibration, AR application

(M43630550)Advanced System and Knowledge Sciences[Advanced System and Knowledge Sciences]

Subject name[English]	Advanced System and Knowledge Sciences[Advanced System and Knowledge Sciences]				
Schedule number	M43630550	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Tue.5～5	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	石田　好輝 ISHIDA Yoshiteru				
Numbering	CMP_MAS53125				

Objectives of class

Focusing on: Matching Automaton as a modeling and design framework
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

(Face to Face) 1st week: Introduction on Self-Action model
(Face to Face) 2nd week: Matching Automaton
(on-demand) 3rd week: Classification of Stable Marriage Problem (chap. 3)
(on-demand) 4th week: Visualization of Stable Marriage Problem (chap. 4)
(on-demand) 5th week: Discrete Modeling of Visual Recognition (chap. 5)
(on-demand) 6th week: Discrete Modeling of Auditory Recognition (chap. 6)
(Face to Face) 7th week: Design by Matching Automaton (chap.7-10)

Self Preparation and Review

Related subjects

Notes for textbook

No textbook. References other than below will be suggested at the first class.
Roth, A.E., Sotomayor, M.A.O.: Two-sided matching: A study in game-theoretic modeling and analysis. vol. 18. Cambridge University Press, (1992);
Gale, D., Shapley, L.S.: College admissions and the stability of marriage. American mathematical monthly, 9-15 (1962);
Gusfield, D., Irving, R.W.: The stable marriage problem: structure and algorithms. MIT press, (1989);
Ishida, Y.: Immunity-Based Systems, Springer (2004);
Ishida, Y : Self-Repair Networks, Springer (2015);
Barabasi, A.L.: Linked, Perseus, (2002);
Strogatz, S. H. Sync, Hyperion (2003);

Notes for reference

Goals to be achieved

Evaluation of achievement

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

Course Evaluation
Evaluation is based on class performance(presentations) and reports (100 points).
S: total points of reports and presentations, 90 or higher (out of 100 points).
A: total points of reports and presentations, 80 or higher (out of 100 points).
B: total points of reports and presentations, 70 or higher (out of 100 points).
C: total points of reports and presentations, 60 or higher (out of 100 points).

Examination

その他
Other

Details of examination

Other information
Room F-504, Ext. 6895

Reference URL

Office hours
Tuesday 16:30-17:00

Relations to attainment objectives of learning and education

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

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

(M43630560)Human Sensation and Perception 1[Human Sensation and Perception 1]

Subject name[English]	Human Sensation and Perception 1[Human Sensation and Perception 1]				
Schedule number	M43630560	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Tue.4～4	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	中内 茂樹 NAKAUCHI Shigeki				
Numbering	CMP_MAS53025				

Objectives of class

This course is designed to introduce you to the scientific study of human nature. You will learn why and how scientists ask question about the sensation and perception and the relation of brain and behavior.You will also learn about the research methods to measure the perception and cognition used in the field of psychology and cognitive science.Finally, you will be able to create your own experiments using the 'OpenSesame', worldwide well-known software for creating experiments for psychology, cognitive science, neuroscience and experimental economics.

This course is designed to introduce you to the scientific study of human nature. You will learn why and how scientists ask question about the sensation and perception and the relation of brain and behavior.You will also learn about the research methods to measure the perception and cognition used in the field of psychology and cognitive science.Finally, you will be able to create your own experiments using the 'OpenSesame', worldwide well-known software for creating experiments for psychology, cognitive science, neuroscience and experimental economics.

Contents of class

1. [face-to-face or remote] Introduction to "Science of Human Sensation and Perception"
2. [on-demand] Video (MIT open courseware) and short quiz (assignment)
3. [face-to-face or remote] Measuring Perception – research methodology –
4. [on-demand] Short quiz and Online experiment (assignment)
5. [face-to-face or remote] Workshop for creating experiments using "OpenSesame"
6. [on-demand] Perform experiment and analyze your own data (assignment)
7. [on-demand] Perform experiment and analyze your own data (assignment)
8. [face-to-face or remote] Wrap up the course

Note: If there is any changes about a class schedule, it will be informed on Google Classroom or KYOMU JOHO SYSTEM.

1. [face-to-face or remote] Introduction to "Science of Human Sensation and Perception"
2. [on-demand] Video (MIT open courseware) and short quiz (assignment)
3. [face-to-face or remote] Measuring Perception – research methodology –
4. [on-demand] Short quiz and Online experiment (assignment)
5. [face-to-face or remote] Workshop for creating experiments using "OpenSesame"
6. [on-demand] Perform experiment and analyze your own data (assignment)
7. [on-demand] Perform experiment and analyze your own data (assignment)
8. [face-to-face or remote] Wrap up the course

Note: If there is any changes about a class schedule, it will be informed on Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

Read the documents provided before each lecture. Review the lectures in consultation with the references and other resources such as the Internet. In order to increase the learning effect, it is desirable to prepare and review the class content (about 90 minutes for each) by referring to the relevant sections of the textbook.

Read the documents provided before each lecture. Review the lectures in consultation with the references and other resources such as the Internet. In order to increase the learning effect, it is desirable to prepare and review the class content (about 90 minutes for each) by referring to the relevant sections of the textbook.

Related subjects

Human Sensation and Perception ＩＩ

Human Sensation and Perception ＩＩ

Notes for textbook

Documents (pdfs of the textbook and slides) will be provided via google classroom before commencement of the lectures.

Documents (pdfs of the textbook and slides) will be provided via google classroom before commencement of the lectures.

Reference1	Book title	Cognitive Neuroscience; Fourth International Student edition			ISBN	978-0393922288
	Author	Michael S. Gazzaniga	Publisher	W. W. Norton & Company	Publish year	2008

Notes for reference
N/A
N/A

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

Evaluation of achievement
Grades will be based on theme reports from each lecture (60%) and the final report (40%)
S: total points, 90 or higher (out of 100 points).
A: total points, 80 or higher (out of 100 points).
B: total points, 70 or higher (out of 100 points).
C: total points, 60 or higher (out of 100 points).
Grades will be based on theme reports from each lecture (60%) and the final report (40%)
S: total points, 90 or higher (out of 100 points).
A: total points, 80 or higher (out of 100 points).
B: total points, 70 or higher (out of 100 points).
C: total points, 60 or higher (out of 100 points).

Examination
レポートで実施
By Report

Details of examination
N/A
N/A

Other information
Please contact Prof. Nakauchi (F2-702-2, nakauchi@tut.jp) if you have any questions.
Please contact Prof. Nakauchi (F2-702-2, nakauchi@tut.jp) if you have any questions.

Reference URL
Will be announced during the lecture.
Will be announced during the lecture.

Office hours
Anytime, but contact to Prof.Nakauchi by e-mail beforehand.
Anytime, but contact to Prof.Nakauchi by e-mail beforehand.

Relations to attainment objectives of learning and education
(C1) 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。

(C1) 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
(C1) To acquire theoretical and applied knowledge of information and intelligence engineering and related fields on their own initiative, and to acquire the ability to utilize such knowledge in an integrated manner.

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

Key words
cognitive neurosciences, perception, vision
cognitive neurosciences, perception, vision

(M43630570)Human Sensation and Perception 2[Human Sensation and Perception 2]

Subject name[English]	Human Sensation and Perception 2[Human Sensation and Perception 2]				
Schedule number	M43630570	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Tue.4～4	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	鯉田　孝和 KOIDA Kowa				
Numbering	CMP_MAS53025				

Objectives of class

After the course, students will be able to understand the structure and function of the sensory systems and how sensation and perception work together to help us to guide our behavior. Students will able to utilize psychophysical methods to measure the perception, and data analysis theory as well.

Contents of class

Courses on physiological mechanisms for sensation and perception, the visual cortex and beyond (1st quarter), colour perception, objects/scene, depth and size, motion, attention, and project work on "Illusion Hack" (2nd quarter).

Course moderator: Prof. Shigeki Nakauchi
Course instructors: Prof. Shigeki Nakauchi, Assoc.prof. Kowa Koida

Self Preparation and Review

Related subjects

Notes for textbook

Reference1	**Book title**	カンデル神経科学			**ISBN**	4895927717
	Author	Eric R. Kandel [ほか] 編 ; Sarah Mack アート・エディター	**Publisher**	メディカル・サイエンス・インターナショナル	**Publish year**	2014

Notes for reference

カンデル神経科学
E. Kandel et al., "Principles of Neural Science", 5th Edition

Goals to be achieved

Course and project work, active participation.

Evaluation of achievement

(written assignments / project work) Scale 0–5 (0 = fail, 5 = excellent)

Examination

授業を実施
Regular Class

Details of examination

Other information

Reference URL

Office hours

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考える能力を身につけている。

Graduate Program of Computer Science and Engineering for Master's 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

Key words

(M43630580)X Reality and Psychology 1[X Reality and Psychology 1]

Subject name[English]	X Reality and Psychology 1[X Reality and Psychology 1]				
Schedule number	M43630580	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Thu.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	北﨑　充晃 KITAZAKI Michiteru				
Numbering	CMP_MAS53225				

Objectives of class

After the course, students will understand the principles of X reality (cross reality: XR) including virtual reality (VR), mixed reality (MR), and augmented reality (AR) on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.

After the course, students will understand the principles of X reality (cross reality: XR) including virtual reality (VR), mixed reality (MR), and augmented reality (AR) on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.

Contents of class

講義も学生のプレゼンも全て英語で行われます(All lectures including presentations are conducted in English)。

X Reality including Virtual Reality, Mixed Reality, and Augmented Reality will be explained about its mechanisms and functions not only in the engineering perspective but also psychological perspective. The final part of the class is composed of students' presentations of their original application, device or idea on X Reality and the discussion on it.

(on-demand) 1. Introduction to XR and Psychology
(on-demand) 2. Two components of reality
(on-demand) 3. Visual reality, Mixed Reality and Augmented reality
(on-demand) 4. Multi- and Cross-modality phenomenon
(on-demand) 5. Embodied cognition and Augmented human
(online interactive) 6. Exploring cyberspace
(online interactive) 7. Presentations by students and Discussion
(online interactive) 8. Presentations by students and Discussion

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.

X Reality including Virtual Reality, Mixed Reality, and Augmented Reality will be explained about its mechanisms and functions not only in the engineering perspective but also psychological perspective. The final part of the class is composed of students' presentations of their original application, device or idea on X Reality and the discussion on it.

(on-demand) 1. Introduction to XR and Psychology
(on-demand) 2. Two components of reality
(on-demand) 3. Visual reality, Mixed Reality and Augmented reality
(on-demand) 4. Multi- and Cross-modality phenomenon
(on-demand) 5. Embodied cognition and Augmented human
(online interactive) 6. Exploring cyberspace
(online interactive) 7. Presentations by students and Discussion
(online interactive) 8. Presentations by students and Discussion

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

Read the documents provided before each lecture (90min).

Review the lectures in consultation with the references provided and other resources such as scientific articles and research youtube video (90min).
Read the documents provided before each lecture (90min).
Review the lectures in consultation with the references provided and other resources such as scientific articles and research youtube video (90min).

Related subjects

X Reality and Psychology 2
Human Sensation and Perception 1 and 2
X Reality and Psychology 2
Human Sensation and Perception 1 and 2

Notes for textbook

NA
NA

Notes for reference

Read the documents provided before each lecture. Review the lectures in consultation with references and other resources such as scientific articles and youtube research video.
Read the documents provided before each lecture. Review the lectures in consultation with references and other resources such as scientific articles and youtube research video.

Goals to be achieved

To understand fundamentals on perception and cognition as basics for virtual reality (VR)
To understand principles of virtual reality (VR), mixed reality (MR), and augmented reality (AR)
To understand current findings on VR/MR/AR research
To consider the benefits and challenges of VR/MR/AR on the future society
To understand fundamentals on perception and cognition as basics for virtual reality (VR)
To understand principles of virtual reality (VR), mixed reality (MR), and augmented reality (AR)
To understand current findings on VR/MR/AR research
To consider the benefits and challenges of VR/MR/AR on the future society

Evaluation of achievement

Grades will be based on performance in each lecture (40%) and the final report (60%)
S: 90 points or higher (out of 100)
A: 80 points or higher (out of 100)
B: 70 points or higher (out of 100)
C: 60 points or higher (out of 100)
Grades will be based on performance in each lecture (40%) and the final report (60%)
S: 90 points or higher (out of 100)
A: 80 points or higher (out of 100)
B: 70 points or higher (out of 100)
C: 60 points or higher (out of 100)

Examination

レポートで実施
By Report

Details of examination

NA
NA

Other information

NA
NA

Reference URL

NA
NA

Office hours

One hour after lecture. Please contact by e-mail mich@tut.jp
One hour after lecture. Please contact by e-mail mich@tut.jp

Relations to attainment objectives of learning and education

Key words

virtual reality, augmented reality, cognition
virtual reality, augmented reality, cognition

(M43630590)X Reality and Psychology 2[X Reality and Psychology 2]

Subject name[English]	X Reality and Psychology 2[X Reality and Psychology 2]				
Schedule number	M43630590	**Subject area**	Advanced Computer Science and Engineering	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Thu.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Computer Science and Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	松井 淑恵, 南 哲人 MATSUI Toshie, MINAMI Tetsuto				
Numbering	CMP_MAS53025				

Objectives of class

仮想現実(virtual reality, VR)、複合現実(mixed reality, MR)、拡張現実(augmented reality, AR)、およびクロスリアリティ(cross reality, XR)の原理を、心理的、生理学的、および機能レベルで理解できるようになります。 また、将来の社会における VR/MR/AR/XR の利点と課題についての理解を深めます。

After the course, students will understand the principles of virtual reality (VR), mixed reality (MR), augmented reality (AR), and X reality (cross reality: XR), on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.

Contents of class

X reality and Psychology I(第一クォーター)で学んだ、視覚認知、聴覚認知、触覚およびその他のモダリティの認知、クロスモーダル認知、VR、MR、および AR について、関連する話題についての講義と演習を行います。

第 1 週 導入(対面) 担当: 南
第 2 週 計測手法一般(オンデマンド) 担当: 南
第 3 週 脳波(オンデマンド) 担当: 南
第 4 週 眼球運動(オンデマンド) 担当: 南
第 5 週 空間聴覚(オンデマンド) 担当: 松井
第 6 週 バイノーラル聴覚と音のリアリティ(オンデマンド) 担当: 松井
第 7 週 視覚と聴覚のインタラクション(オンデマンド) 担当: 松井

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。

Lectures and project works related topics on X reality and Psychology I (1st quarter): visual cognition, auditory cognition, tactile and other modality cognition, cross-modal cognition, VR, MR, and AR.

Week 1. Introduction (face to face) by Prof. Minami
Week 2. Methods of X reality and Psychology (On-demand: you can take the class whenever you want) by Prof. Minami
Week 3. EEG (On-demand) by Prof. Minami
Week 4. Eye-tracking (On-demand) by Prof. Minami
Week 5. Spatial hearing (On-demand) by Assoc. prof. Matsui
Week 6. Binaural hearing and sound reality (On-demand) by Assoc. prof. Matsui
Week 7. Interaction between the visual and auditory system (On-demand) by Assoc. prof. Matsui

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

Self Preparation and Review

予習: 講義の指定範囲を事前に下調べする。(90 分)
復習:配布資料を整理し、関連情報を検索して知識の幅を広げる。(90 分)
Preparation: Preliminary research on the designated range of the lecture. (90 minutes)
Review: Organize handouts and search for relevant information to broaden your knowledge. (90 minutes)

Related subjects

X Reality and Psychology I
Human perception and sensation
X Reality and Psychology I

Human perception and sensation

Notes for textbook

授業中にハンドアウトを配布します。
Handouts will be distributed in the class.

Notes for reference

特になし
N/A

Goals to be achieved

仮想現実（Virtual Reality）、複合現実（Mixed Reality）、拡張現実（Augmented Reality）、およびクロスリアリティ（Crossed reality）の原理を、心理的、生理学的、および機能レベルにおける理解。 また、将来の社会における VR/MR/AR/XR の利点と課題についての理解
To understand the principles of virtual reality (VR), mixed reality (MR), augmented reality (AR), and X reality (cross reality: XR), on psychological, physiological, and functional levels. And to understand the benefits and challenges of VR/MR/AR/XR on the future society.

Evaluation of achievement

評価基準：原則的にすべての講義に出席したものにつき、下記のように成績を評価する。
S：レポートの合計点（100 点満点）が 90 点以上
A：レポートの合計点（100 点満点）が 80 点以上
B：レポートの合計点（100 点満点）が 70 点以上
C：レポートの合計点（100 点満点）が 60 点以上
Students who attend all the classes will be evaluated as follows:
S: Obtained total points of weekly assignments, 90 or higher (out of 100 points).
A: Obtained total points of weekly assignments, 80 or higher (out of 100 points).
B: Obtained total points of weekly assignments, 70 or higher (out of 100 points).
C: Obtained total points of weekly assignments, 60 or higher (out of 100 points).

Examination

試験期間中には何も行わない
None during exam period

Details of examination

特になし
N/A

Other information

特になし
N/A

Reference URL

特になし
N/A

Office hours

必要に応じて随時対応します。メールなどで事前に連絡を取ってください。

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

Relations to attainment objectives of learning and education

（C）高度な知識を統合的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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
（C1） 情報・知能工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner

Key words

(M44610050)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	M44610050	**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)**	3
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_MAS55015				

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 textbooks and scientific papers under the guidance of his/her supervisor. The aim of the lesson is to learn 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 textbooks and 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

Preparation (20 minutes or more) and review (25 minutes or more) are generally required for each class.
Your advisor will give you more detailed instructions on preparation and review as needed.

Related subjects

Seminar on Applied Chemistry and Life Science 2
Thesis Research on Applied Chemistry and Life Science
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

N/A

Goals to be achieved

To acquire basic 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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team member; and to contribute to the team's achievements through working cooperatively with other team members
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M44610060)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	M44610060	**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)**	3
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_MAS65015				

Objectives of class

Based on the Seminar on Applied Chemistry and Life Science 1, this course will further provide the students with the opportunity to study on his/her research subject in applied chemistry and life science by reading textbooks and papers under the guidance of his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in the seminar.

Contents of class

The students will be required to read textbooks and 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

Preparation (20 minutes or more) and review (25 minutes or more) are generally required for each class.
Your advisor will give you more detailed instructions on preparation and review as needed.

Related subjects

Seminar on Applied Chemistry and Life Science 1
Thesis Research on Applied Chemistry and Life Science
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

N/A

Goals to be achieved

To acquire basic 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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team member; and to contribute to the team's achievements through working cooperatively with other team members
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M44610070)Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]

Subject name[English]	Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]				
Schedule number	M44610070	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyouin				
Numbering	CHE_MAS68015				

Objectives of class

In the course, the students will perform advanced researches on applied chemistry and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a master's thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master's Thesis.

Contents of class

The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a master's thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense.

Self Preparation and Review

Related subjects

Seminar on Applied Chemistry and Life Science 1
Seminar on Applied Chemistry and Life Science 2

Notes for textbook

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

Notes for reference

Goals to be achieved

To acquire basic knowledge on applied chemistry and life science
To master experimental techniques and analytical skills required for research on a given field of applied chemistry and life science
To be able to present and discuss on the results of his/her research
To be able to make safety control in experimental work

Evaluation of achievement

The score of the course is based on his/her master's thesis and the presentation in the final review of his/her master's thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation etc).
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

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

(M44610070)Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]

Subject name[English]	Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]				
Schedule number	M44610070	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyouin				
Numbering	CHE_MAS68015				

Objectives of class

In the course, the students will perform advanced researches on applied chemistry and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a master's thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master's Thesis.

Contents of class

The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a master's thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense.

Self Preparation and Review

The supervisor will give instructions on preparation and review as necessary.

Related subjects

Seminar on Applied Chemistry and Life Science 1
Seminar on Applied Chemistry and Life Science 2

Notes for textbook

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

Notes for reference

N/A

Goals to be achieved

To acquire basic knowledge on applied chemistry and life science
To master experimental techniques and analytical skills required for research on a given field of applied chemistry and life science
To be able to present and discuss on the results of his/her research
To be able to make safety control in experimental work

Evaluation of achievement

The score of the course is based on his/her master's thesis and the presentation in the final review of his/her master's thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation etc).
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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team member; and to contribute to the team's achievements through working cooperatively with other team members
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M4461007T)Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]

Subject name[English]	Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]				
Schedule number	M4461007T	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyouin				
Numbering	CHE_MAS68015				

Objectives of class

In the course, the students will perform advanced researches on applied chemistry and life science under the direction of his/her supervisor in the laboratory. The aims of this lessen are to acquire the knowledge and experimental and analytical skills required for his/her research subject, to learn the scientific and social importance of his/her subject by researching for related studies by others, and to write a master's thesis. The students will acquire the skills and capacities of presentation by discussing in the final review of his/her Master' s Thesis.

Contents of class

The students are required to have his/her research subject under the direction of his/her supervisor and perform his/her research by acquiring the experimental and analytical skills in the laboratory. The students will be expected to learn the scientific and social background of his/her research subject by collecting and reading the references relating to his/her research. The results from his/her research must be described as a master's thesis. The students must also present the results from his/her research, discuss, and answer the questions with the reviewers in the final master's dissertation defense.

Self Preparation and Review

The supervisor will give instructions on preparation and review as necessary.

Related subjects

Seminar on Applied Chemistry and Life Science 1
Seminar on Applied Chemistry and Life Science 2

Notes for textbook

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

Notes for reference

N/A

Goals to be achieved

To acquire basic knowledge on applied chemistry and life science
To master experimental techniques and analytical skills required for research on a given field of applied chemistry and life science
To be able to present and discuss on the results of his/her research
To be able to make safety control in experimental work

Evaluation of achievement

The score of the course is based on his/her master's thesis and the presentation in the final review of his/her master's thesis (the quality of his/her research, presentation skills, discussions and answering the questions on his/her presentation etc).
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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team member; and to contribute to the team's achievements through working cooperatively with other team members
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M44610080)Seminar on Applied Chemistry and Life Science[Seminar on Applied Chemistry and Life Science]

Subject name[English]	Seminar on Applied Chemistry and Life Science[Seminar on Applied Chemistry and Life Science]				
Schedule number	M44610080	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_MAS68015				

Objectives of class

This course will provide the students with the opportunity to study on his/her research subject in applied chemistry and life science by reading textbooks and papers under the guidance of his/her supervisor. The students will learn the knowledge and the presentation skills required for his/her research in the seminar.

Contents of class

The students will be expected to read textbooks and papers written by foreign language that are indicated by his/her supervisor, and report and discuss deeply on his/her research subject in the seminar.

Self Preparation and Review

The supervisor will give instructions on preparation and review as necessary.
Your advisor will give you more detailed instructions on preparation and review as needed.

Related subjects

Thesis Research on Applied Chemistry and Life Science
All other relevant subjects in Applied Chemistry and Life Sciences

Notes for textbook

Supervisor will recommend textbooks and papers to students.

Notes for reference

N/A

Goals to be achieved

To acquire basic 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 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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

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

Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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
(D1) Have the skills to effectively express and communicate one's own ideas as well as points in question at home and abroad through papers, oral reports or information media
(D2) Have high-level skills to mutually respect the values of individual team member; and to contribute to the team's achievements through working cooperatively with other team members
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M44630070)Advanced Polymer Chemistry[Advanced Polymer Chemistry]

Subject name[English]	Advanced Polymer Chemistry[Advanced Polymer Chemistry]				
Schedule number	M44630070	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Tue.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	原口　直樹 HARAGUCHI Naoki				
Numbering	CHE_MAS52225				

Objectives of class

This course focuses on the synthetic aspects of polymer-supported chemistry. Several applications of solid-supported organic chemistry will be discussed.

Contents of class

(face to face) Week 1 Preparation of functionalized monomers
Preparation method of polymer-support
Preparation of functional polymers by polymer reaction method
Preparation of functional polymers by polymerization method
(on-demand)　Week 2 Nucleophilic reactions on the functional polymer
Electrophhilic reactions on the functional polymers
Polymer-supported reagents
(face to face) Week 3 Polymer-supported catalysts
Asymmetric reaction using polymer-supported catalyst
Solid phase peptide synthesis
(face to face) Week 4 Principles for living polymerization
(on-demand)　Week 5 Anionic Polymerization
(face to face) Week 6 Polymer Microsphere
(on-demand)　Week 7 Report

Self Preparation and Review

To enhance a learning effect, students are encouraged to examine the contents in advance.
To prepare for and review the lecture for around 90 minutes each.

Related subjects

Organic chemistry
Polymer chemistry

Notes for textbook

No textbook will be used.

Notes for reference

Goals to be achieved

1）To understand radical polymerization of vinyl monomers
2）To understand reactions of polymers
3）To understand the synthesis of optically active polymers
4）To understand the structure formation of peptides and proteins

Evaluation of achievement

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

Examination

レポートで実施
By Report

Details of examination

N／A

Other information

B-404

6812

haraguchi@chem.tut.ac.jp

Reference URL

http://chem.tut.ac.jp/chiral/index.html

Office hours

Any time

Relations to attainment objectives of learning and education

(C)高度な知識を統合的に活用できる実践力・創造力

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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。

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

Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner

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

(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems

(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilizesuch knowledge for problem solving in an integrated manner

Key words

Polymer reaction, Optically active polymers, Polymeric catalyst, Asymmetric reactions, Peptide

(M44630080)Advanced Polymer Engineering[Advanced Polymer Engineering]

Subject name[English]	Advanced Polymer Engineering[Advanced Polymer Engineering]				
Schedule number	M44630080	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Fall2 term	**Day of the week,period**	Tue.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	吉田 絵里 YOSHIDA Eri				
Numbering	CHE_MAS52225				

Objectives of class

1. To acquire knowledge of advanced polymer syntheses including well-controlled polymerizations and heterogeneous polymerizations in supercritical carbon dioxide.
2. To understand molecular self-assembly in vivo and in vitro.

Contents of class

(face-to-face) Week 1 Controlled radical polymerization 1
(face-to-face) Week 2 Controlled radical polymerization 2
(face-to-face) Week 3 Macromolecular design using living radical polymerization
(face-to-face) Week 4 Heterogeneous polymerizations
(on-demand) Week 5 Polymerization using supercritical carbon dioxide
(on-demand) Week 6 Supramolecular chemistry
(on-demand) Week 7 Theory of molecular self-assembly
(on-demand) Week 8 Nanotechnology based on molecular self-assembly

Due to changes in the standards for activities to prevent the spread of COVID-19 infection at the Toyohashi University of Technology, there may be changes in the class content and grade evaluation method. When the class form changes, you will be notified from Google Classroom or the Academic Affairs Information System.

Self Preparation and Review

Go over the lecture materials and your notebook to enhance your understanding.

Related subjects

N／A

Notes for textbook

No textbook is needed.

Notes for reference

N／A

Goals to be achieved

To understand the cutting-edge technology and industrial applications of well-controlled polymers.

Evaluation of achievement

Report assignment

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

Available at anytime

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考える能力を身につけている。
(B)技術者・研究者としての正しい倫理観と社会性
上級技術者・研究者として社会的・倫理的責任を有し，社会における技術的課題を設定・解決・評価する能力を身につけている。
(C)高度な知識を統合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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
>>(C1) 応用化学・生命工学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
>>(C2) 応用化学・生命工学およびその関連分野の広範囲の知識の連携により，研究開発に対する方法論を体得して，研究開発の計画を立案および実践し，課題解決のための新たな技術を創造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，技術等の変化に対応して，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 Applied Chemistry and Life Science for Master's Degree
(A) Personality and outlook with a broad perspective
Have a mindset to see human society from various angles with a global perspective; and the ability to consider the symbiosis between humans and nature as well as public welfare
(B) Sound ethics and social awareness as advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; and have the ability to set, solve and evaluatetechnical issues in society
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilizesuch knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive knowledge about applied chemistry and life science as well as related fields; to make plans for research and developmentand put them into practice; and to create new technologies to solve problems
(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 voluntarily make plans and learn throughout one's life in response to changesin society, environment and technology

Key words
Controlled/living radical polymerization, Molecular self-assembly, Supramolecular chemistry

(M44630300)Applied Environmental Biology[Applied Environmental Biology]

Subject name[English]	Applied Environmental Biology[Applied Environmental Biology]				
Schedule number	M44630300	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Fall1 term	**Day of the week,period**	Fri.2～2	**Credit(s)**	1
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	中鉢　淳 NAKABACHI Atsushi				
Numbering	CHE_MAS53225				

Objectives of class

The aim of this course is to learn concepts of what life is, and how we can use the knowledge of biology in environmental/agricultural sciences.

Contents of class

1st week：Biodiversity and evolution
2nd week：Prokaryotic genomes
3rd week：Eukaryotic genomes
4th week：Plant–microbe interactions
5th week：Agricultural pests and diseases
6th week：Integrated pest management
7th week：Genetically modified crops
8th week：Summary

All classes will be held in a "remote simultaneous interactive" way using Google Meet.
Any changes of class schedules will be announced on Google Classroom or KYOMU JOHO SYSTEM.

If there are any changes regarding "Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona Virus", the course contents and achievement evaluation methods can be changed.

Self Preparation and Review

Although no preparation is required, after class review of handouts is recommended.

Related subjects

N/A

Notes for textbook

No textbooks are required.

Reference1	**Book title**	Molecular Biology of the Cell			**ISBN**	978-0815344643
	Author	Bruce Alberts et al.	**Publisher**	Garland Science	**Publish year**	2014
Reference2	**Book title**	Plant Physiology and Development			**ISBN**	978-1605352558
	Author	Lincoln Taiz, Eduardo Zeiger	**Publisher**	Sinauer Associates Inc.	**Publish year**	2014

Notes for reference

N/A

Goals to be achieved

(1) Understand the concept of evolution and biodiversity.
(2) Can explain how genomes are analyzed.
(3) Can tell the difference between prokaryotic and eukaryotic genomes.
(4) Know various biological interactions.
(5) Know important agricultural pests and diseases.
(6) Understand the concept of integrated pest management.
(7) Understand the technology for developing genetically modified crops.

Evaluation of achievement

Achievements are evaluated by essays/term papers.
S: Achieved all goals and obtained 90–100 points (out of 100) in essays/term papers.
A: Achieved 80% of goals and obtained 80–89 points (out of 100) in essays/term papers.
B: Achieved 70% of goals and obtained 70–79 points (out of 100) in essays/term papers.
C: Achieved 60% of goals and obtained 60–69 points (out of 100) in essays/term papers.

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

Emails are welcome.

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考える能力を身につけている。
(B)技術者・研究者としての正しい倫理観と社会性
上級技術者・研究者として社会的・倫理的責任を有し，社会における技術的課題を設定・解決・評価する能力を身につけている。
(C)高度な知識を統合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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(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するコミュニケーション力を身につけている。

Graduate Program of Applied Chemistry and Life Science for Master's Degree
(A) Personality and outlook with a broad perspective
Have a mindset to see human society from various angles with a global perspective; and the ability to consider the symbiosis between humans and nature as well as public welfare
(B) Sound ethics and social awareness as advanced-level engineers and researchers
Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; and have the ability to set, solve and evaluatetechnical issues in society
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilizesuch 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 the issues faced by a globally changing society in cooperation with other team members

Key words

The instructor has a working experience at RIKEN and University of Arizona, USA.

(M44630430)Advanced Molecular Design Chemistry 1[Advanced Molecular Design Chemistry 1]

Subject name[English]	Advanced Molecular Design Chemistry 1[Advanced Molecular Design Chemistry 1]				
Schedule number	M44630430	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_MAS52225				

Objectives of class

This course will provide the students with the opportunity to study on the selected subject in the realm of advanced molecular design chemistry.

Contents of class

The classes will be given by his/her supervisor. The students will be required to read textbooks and papers but the type and contents of this course depend on his/her supervisor.

Self Preparation and Review

90 minutes of preparation and 90 minutes of review are generally required for each class of 90 minutes.

Related subjects

Advanced Molecular Design Chemistry 2

Notes for textbook

Supervisor will recommend textbooks and papers to students.

Notes for reference

N/A

Goals to be achieved

To acquire advanced knowledge on advanced molecular design chemistry.
To be able to report and discuss the contents of textbooks and papers he/she has read.

Evaluation of achievement

The evaluation is based on the scores of reports, presentations, and examination.
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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive

knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M44630450)Advanced Molecular Functional Chemistry 1[Advanced Molecular Functional Chemistry 1]

Subject name[English]	Advanced Molecular Functional Chemistry 1[Advanced Molecular Functional Chemistry 1]				
Schedule number	M44630450	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_MAS52225				

Objectives of class

This course will provide the students with the opportunity to study on the selected subject in the realm of advanced molecular functional chemistry.

Contents of class

The classes will be given by his/her supervisor. The students will be required to read textbooks and papers but the type and contents of this course depend on his/her supervisor.

Self Preparation and Review

90 minutes of preparation and 90 minutes of review are generally required for each class of 90 minutes.

Related subjects

Advanced Molecular Functional Chemistry 2

Notes for textbook

Supervisor will recommend textbooks and papers to students.

Notes for reference

N/A

Goals to be achieved

To acquire advanced knowledge on advanced molecular functional chemistry.
To be able to report and discuss the contents of textbooks and papers he/she has read.

Evaluation of achievement

The evaluation is based on the scores of reports, presentations, and examination.
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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive

knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M44630470)Advanced Molecular Biological Chemistry 1[Advanced Molecular Biological Chemistry 1]

Subject name[English]	Advanced Molecular Biological Chemistry 1[Advanced Molecular Biological Chemistry 1]				
Schedule number	M44630470	**Subject area**	Advanced Applied Chemistry and Life Science	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Applied Chemistry and Life Science			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S4系教務委員 4kei kyomu Iin-S				
Numbering	CHE_MAS52225				

Objectives of class

This course will provide the students with the opportunity to study on the selected subject in the realm of advanced molecular biological chemistry.

Contents of class

The classes will be given by his/her supervisor. The students will be required to read textbooks and papers but the type and contents of this course depend on his/her supervisor.

Self Preparation and Review

90 minutes of preparation and 90 minutes of review are generally required for each class of 90 minutes.

Related subjects

Advanced Molecular Biological Chemistry 2

Notes for textbook

Supervisor will recommend textbooks and papers to students.

Notes for reference

N/A

Goals to be achieved

To acquire advanced knowledge on advanced molecular biological chemistry.
To be able to report and discuss the contents of textbooks and papers he/she has read.

Evaluation of achievement

The evaluation is based on the scores of reports, presentations, and examination.
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

N/A

Other information

N/A

Reference URL

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

Office hours

Students are encouraged visiting by appointment.

Relations to attainment objectives of learning and education

(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about applied chemistry and life science as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about applied chemistry and life science as well as related fields; and to utilize such knowledge in an integrated manner
(C2) Have the skills to learn, by experience, methodologies for research and development through integrating extensive

knowledge about applied chemistry and life science as well as related fields; to make plans for research and development and put them into practice; and to create new technologies to solve problems
(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 voluntarily make plans and learn throughout one's life in response to changes in society, environment and technology

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

(M45610010)Seminar on Architecture and Civil Engineering I[Seminar on Architecture and Civil Engineering I]

Subject name[English]	Seminar on Architecture and Civil Engineering I[Seminar on Architecture and Civil Engineering I]				
Schedule number	M45610010	**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)**	3
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS51015				

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

その他

Other

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

(M45610020)Seminar on Architecture and Civil Engineering II[Seminar on Architecture and Civil Engineering II]

Subject name[English]	Seminar on Architecture and Civil Engineering II[Seminar on Architecture and Civil Engineering II]				
Schedule number	M45610020	**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)**	3
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS61015				

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

その他

Other

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

(M45610030)Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]

Subject name[English]	Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]				
Schedule number	M45610030	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS61015				

Objectives of class

This thesis research on architecture and civil engineering is designated to deepen the knowledge and enhance the skills of the students in their research fields through the self-oriented endeavour with the instruction of his/her supervisor(s).

Contents of class

The subjects and the contents of the thesis vary depending on the laboratory. All students must present their thesis at the end of the course and take a final examination on the thesis, as a requirement for the graduation of the master course. The study for the thesis is planned and conducted under the guidance of the supervisor(s).

Self Preparation and Review

Related subjects

TBD by the laboratory

Notes for textbook

TBD by the laboratory

Notes for reference

Goals to be achieved

Evaluation of achievement

This credit is assigned for all the process for the preparation and presentation of the thesis.

Examination

その他

Other

Details of examination

Other information

Refer to administration office.

Reference URL

Refer to the URL of each laboratory

Office hours

Refer to administration office.

Relations to attainment objectives of learning and education

Key words

(M45610030)Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]

Subject name[English]	Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]				
Schedule number	M45610030	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Required
Time of starting a course	2Years	**Day of the week,period**	Intensive	**Credit(s)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～1
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1, M2
Charge teacher name[Roman alphabet mark]	S5系教務委員, 5系各教員 5kei kyomu Iin-S, 5kei kakukyouin				
Numbering	ARC_MAS61015				

Objectives of class

This thesis research on architecture and civil engineering is designated to deepen the knowledge and enhance the skills of the students in their research fields through the self-oriented endeavour with the instruction of his/her supervisor(s).

Contents of class

The subjects and the contents of the thesis vary depending on the laboratory. All students must present their thesis at the end of the course and take a final examination on the thesis, as a requirement for the graduation of the master course. The study for the thesis is planned and conducted under the guidance of the supervisor(s).

Self Preparation and Review

Related subjects

TBD by the laboratory

Notes for textbook

TBD by the laboratory

Notes for reference

Goals to be achieved

Evaluation of achievement

This credit is assigned for all the process for the preparation and presentation of the thesis.

Examination

その他

Other

Details of examination

Other information

Refer to administration office.

Reference URL

Refer to the URL of each laboratory

Office hours

Refer to administration office.

Relations to attainment objectives of learning and education

Key words

(M4561003T)Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]

Subject name[English]	Thesis Research on Architecture and Civil Engineering[Thesis Research on Architecture and Civil Engineering]				
Schedule number	M4561003T	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS61015				

Objectives of class

This thesis research on architecture and civil engineering is designated to deepen the knowledge and enhance the skills of the students in their research fields through the self-oriented endeavour with the instruction of his/her supervisor(s).

Contents of class

The subjects and the contents of the thesis vary depending on the laboratory. All students must present their thesis at the end of the course and take a final examination on the thesis, as a requirement for the graduation of the master course. The study for the thesis is planned and conducted under the guidance of the supervisor(s).

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

This credit is assigned for all the process for the preparation and presentation of the thesis.

Examination

試験期間中には何も行わない

None during exam period

Details of examination

Other information

Refer to administration office.

Reference URL

Refer to the URL of each laboratory

Office hours

Refer to administration office.

Relations to attainment objectives of learning and education

Key words

(M45610040)Seminar on Architecture and Civil Engineering[Seminar on Architecture and Civil Engineering]

Subject name[English]	Seminar on Architecture and Civil Engineering[Seminar on Architecture and Civil Engineering]				
Schedule number	M45610040	**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)**	6
Faculty	Graduate Program for Master's Degree			**Subject grade**	2～2
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M2
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS51015				

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

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

Self Preparation and Review

Related subjects

Notes for textbook

Notes for reference

Goals to be achieved

Evaluation of achievement

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

Key words

(M45630010)Elasticity and Stability[Elasticity and Stability]

Subject name[English]	Elasticity and Stability[Elasticity and Stability]				
Schedule number	M45630010	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Tue.4～4	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	松本　幸大 MATSUMOTO Yukihiro				
Numbering	ARC_MAS52025				

Objectives of class

This lecture is concerned with the static continuum mechanics of elastic 2-dimensional bodies. The primary purpose is to encourage students to gain the fundamental concept and to raise their potential abilities for advanced and practical applications in the future.

This lecture is concerned with the static continuum mechanics of elastic 2-dimensional bodies. The primary purpose is to encourage students to gain the fundamental concept and to raise their potential abilities for advanced and practical applications in the future.

Contents of class

1st - 6th week; Mechanics of elasticity
Tensor Analysis in Cartesian Coordinates
Stresses and Equilibrium
Strain-Displacement Relations
Constitutive Equations in Isotropic Elastic Materials
7th - 11th week; Mechanics of elasticity for composite material
Orthotropic material
Mixturing rule
Laminate theory
12th - 15th week;　Elastic buckling of bars and plates

1st - 6th week; Mechanics of elasticity
Tensor Analysis in Cartesian Coordinates
Stresses and Equilibrium
Strain-Displacement Relations
Constitutive Equations in Isotropic Elastic Materials
7th - 11th week; Mechanics of elasticity for composite material
Orthotropic material
Mixturing rule
Laminate theory
12th - 15th week;　Elastic buckling of bars and plates

Self Preparation and Review

Related subjects

Notes for textbook

Some handouts will be distributed.

Some handouts will be distributed.

Reference1	**Book title**	Theory of plates and shells			**ISBN**	978-0070858206
	Author	S. Timoshenko	**Publisher**	McGraw-Hill Publishing Company	**Publish year**	1964

Reference2	**Book title**	Theory of Elastic Stability			**ISBN**	978-0486472072
	Author	S. Timoshenko	**Publisher**	Dover Publications	**Publish year**	2009
Reference3	**Book title**	Mechanics of Composite Materials			**ISBN**	978-0486442396
	Author	Richard M. Christensen	**Publisher**	Dover Publications	**Publish year**	2005

Notes for reference

Goals to be achieved

The primary purpose is to encourage students to gain the fundamental concept and to raise their potential abilities for advanced and practical applications in the future.

The primary purpose is to encourage students to gain the fundamental concept and to raise their potential abilities for advanced and practical applications in the future.

Evaluation of achievement

Based on reports

Based on reports

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

http://www.st.ace.tut.ac.jp/

http://sel.ace.tut.ac.jp/y-matsum/

http://www.st.ace.tut.ac.jp/

http://sel.ace.tut.ac.jp/y-matsum/

Office hours

Please contact by email.

Please contact by email.

Relations to attainment objectives of learning and education

Key words

(M45630090)Coastal Hydraulics[Coastal Hydraulics]

Subject name[English]	Coastal Hydraulics[Coastal Hydraulics]				
Schedule number	M45630090	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.3～3	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	加藤 茂 KATO Shigeru				
Numbering	ARC_MAS54325				

Objectives of class

To understand the basic theory of coastal engineering and the advanced knowledge of coastal process and protection, including data analysis and numerical calculation.

Contents of class

1st(face to face): Introductory guidance for this class
2nd(face to face): Review of basic knowledge of hydraulics
3rd(face to face): Basic knowledge of wave
4th(face to face): Small amplitude wave theory (1)
5th(face to face): Small amplitude wave theory (2)
6th(face to face): Wave transformation
7th(face to face): Long-period wave, water surface oscillation (1)
8th(face to face): Long-period wave, water surface oscillation (2)
9th(face to face): Statistical property of wave
10th(face to face): Shore processes
11th(face to face): Sediment transport (1)
12th(face to face): Sediment transport (2)
13th(face to face): Numerical modeling (1)
14th(face to face): Numerical modeling (2)
15th(face to face): Shore protection
16th(face to face): Term-end examination

(Attention)
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

Self preparation and review of the lecture for around 90 minutes each are essential.
Students can use the distributed handout and some references.

Related subjects

Subjects related to hydraulics and water engineering

Notes for textbook

No textbook is specified.
Lecture handouts will be distributed.

Reference1	**Book title**	Water Wave Mechanics for Engineers and Scientists – Advanced Series on Ocean Engineering – Vol. 2			**ISBN**	
	Author	Robert G. Dean & Robert A Dalrymple	**Publisher**	World Scientific	**Publish year**	
Reference2	**Book title**	Introduction to Coastal Engineering and Management –			**ISBN**	

		Advanced Series on OceanEngineering – Vol. 16				
	Author	J. William Kamphuis	**Publisher**	World Scientific	**Publish year**	
Reference3	**Book title**	Basic Coastal Engineering			**ISBN**	
	Author	Robert M. Sorensen	**Publisher**	Kluwer Academic Publishers	**Publish year**	

Notes for reference

The reference books are in the university library or in the instructor's laboratory.
Other useful books are also in the library.
Each student should study using reference books.

Goals to be achieved

– Basic knowledge and understanding of the concept and theory of coastal engineering
– Understanding the procedure and method of data analysis related to coastal engineering

Evaluation of achievement

[Evaluation method]
Reports(30%) & attendance(10%) & Examination(60%)
Students are required to attend essentially all classes, and to submit all assignments for evaluation.
More than four classes of absence are not allowed for evaluation.
Evaluation is based on total points (out of 100 points) of reports, class attendance, and examination.

[Evaluation criteria]
S: 90 or higher
A: 80 or higher to lower than 90
B: 70 or higher to lower than 80
C: 60 or higher to lower than 70

Examination

定期試験を実施(対面)
Examination(Face to Face)

Details of examination

N/A

Other information

Room : D-812
E-mail : s-kato@ace.tut.ac.jp.

Reference URL

https://www.umi.ace.tut.ac.jp/

Office hours

At any time.
But please contact me in advance about the visit time.

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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
(C1) 建築・都市システム学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用できる能力を身につけている。
N/A

Graduate Program of Architecture and Civil Engineering for Master's Degree
(C) Practical and creative skills to utilize advanced knowledge in an integrated manner
Have advanced knowledge about architecture and civil engineering as well as related fields; and have the practical and creative skills to utilizesuch knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about architecture and civil engineering as well as related fields; and to utilize such knowledge in an integrated manner

Key words

Waves, Current, Sediment transport, Shore protection

(M45630190)Advanced Structural System Planning and Design I[Advanced Structural System Planning and Design I]

Subject name[English]	Advanced Structural System Planning and Design I[Advanced Structural System Planning and Design I]				
Schedule number	M45630190	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS52025				

Objectives of class

It depends on the laboratory. The resistered 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

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

(M45630210)Advanced Environmental System Planning and Design I[Advanced Environmental System Planning and Design I]

Subject name[English]	Advanced Environmental System Planning and Design I[Advanced Environmental System Planning and Design I]				
Schedule number	M45630210	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS54025				

Objectives of class

It depends on the laboratory. The resistered 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

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

(M45630230)Advanced Regional System Planning and Design I[Advanced Regional System Planning and Design I]

Subject name[English]	Advanced Regional System Planning and Design I[Advanced Regional System Planning and Design I]				
Schedule number	M45630230	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Intensive	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	S5系教務委員 5kei kyomu Iin-S				
Numbering	ARC_MAS53025				

Objectives of class

It depends on the laboratory. The resistered 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

Examination

レポートで実施

By Report

Details of examination

Other information

Reference URL

Office hours

Relations to attainment objectives of learning and education

Key words

(M45630290)Seismic Design of Structures[Seismic Design of Structures]

Subject name[English]	Seismic Design of Structures[Seismic Design of Structures]				
Schedule number	M45630290	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Wed.3～3	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	齊藤　大樹 SAITOH Taiki				
Numbering	ARC_MAS52125				

Objectives of class
Contents of class
Self Preparation and Review
Related subjects
Notes for textbook
Notes for reference
Goals to be achieved
Evaluation of achievement
Examination
Details of examination
Other information
Reference URL
Office hours
Relations to attainment objectives of learning and education
Key words

(M45630330)Geohazards[Geohazards]

Subject name[English]	Geohazards[Geohazards]				
Schedule number	M45630330	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Thu.2～2	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	松田　達也 MATSUDA Tatsuya				
Numbering	ARC_MAS52725				

Objectives of class

The objective is to understand the characteristics of natural disasters and their damages.

Contents of class

1: (On-demand) Introduction
2: (On-demand) Natural Disasters
3: (On-demand) Earthquake Geology and Seismology
4: (On-demand) Plate Techtonics and Earthquake
5: (On-demand) Earthquakes and Structures Damage
6: (On-demand) Earthquakes and Liquefaction of Soil
7: (On-demand) Tsunami and Wind-caused wave
8: (On-demand) Protect in coastal area during waves
9: (On-demand) Typhoons, Hurricanes, or Cyclone
10: (On-demand) Coastal Erosion
11: (On-demand) Heavy rain and Flooding
12: (On-demand) Levees Damage
13: (On-demand) Landslides
14: (On-demand) Slope Failure and Rockfall
15: (On-demand) Debris flow

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, it will be informed via Google Classroom or KYOMU JOHO SYSTEM.

Self Preparation and Review

To enhance a learning effect, students are encouraged to investigate the natural hazards and to prepare for and review the lecture for around 90 minutes each.

Related subjects

Geotechnical Analysis, Advanced Geotechnical Engineering and Hazard Mitigation
Geotechnical Analysis, Advanced Geotechnical Engineering and Hazard Mitigation

Notes for textbook

N／A

Notes for reference

Refer to "Natural Disasters, Ninth Edition" Patrick L. Abbott

Goals to be achieved

・Understanding the characteristics of Natural disasters and their damages.

Evaluation of achievement

Report and the presentation of the report.
S: Obtained total points, 90 or higher (out of 100 points).
A: Obtained total points, 80 or higher (out of 100 points).
B: Obtained total points, 70 or higher (out of 100 points).
C: Obtained total points, 60 or higher (out of 100 points).

Examination
レポートで実施
By Report

Details of examination
N／A

Other information
office:D-808
Tel:0532-44-6849
E-mail:matsuda.tatsuya.mp@tut.jp

Reference URL
N／A

Office hours
12:00-13:00 on Thursday

Relations to attainment objectives of learning and education

（C）高度な知識を統合的に活用できる実践力・創造力
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，それらを課題解決のために統合的に活用できる実践的・創造的能力を身につけている。
（C1） 建築・都市システム学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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 architecture and civil engineering as well as related fields; and have the practical and creative skills to utilizesuch knowledge for problem solving in an integrated manner
(C1) Have the skills to voluntarily acquire theories and applied knowledge about architecture and civil engineering as well as related fields; and to utilize such knowledge in an integrated manner

Key words
geohazard, Natural disasters

(M45630400)Environmental Control in Biology[Environmental Control in Biology]

Subject name[English]	Environmental Control in Biology[Environmental Control in Biology]				
Schedule number	M45630400	**Subject area**	Advanced Architecture and Civil Engineering	**Required or elective**	Elective
Time of starting a course	Fall term	**Day of the week,period**	Mon.4～4	**Credit(s)**	2
Faculty	Graduate Program for Master's Degree			**Subject grade**	1～
Department Offered	Architecture and Civil Engineering			**Beggining grade**	M1
Charge teacher name[Roman alphabet mark]	髙山　弘太郎, 東海林　孝幸 TAKAYAMA Kotaro, TOKAIRIN Takayuki				
Numbering	ARC_MAS54025				

Objectives of class

（東海林担当部分）

Exchange of momentum, heat and gas between plant canopy and atmosphere is significant to evaluate eco-system and grobal environment. This lecture will provide mathematical treatment of interaction between bio-system (plant canopy) and atmosphere, especially focuses on transport phenomena (momentu, heat etc).

(Prof. Takayama)

Learn fundamentals of advanced agricultural engineering

Contents of class

Tokairin.

1. Introduction
2. Momentum transport
3. Heat and mass transport
4. Radiative environment in plant canopy
5. Heat budget of plant canpy
6. Multi-layer canopy model
7. Report

Prof. Takayama

(1) (On-demand) Advanced agricultural production in the world
(2) Environmental control for agricultural production Ⅰ
(3) (On-demand) Environmental control for agricultural production Ⅱ
(4) Measurement system for photosynthesis and transpiration of crop Ⅰ
(5) (On-demand) Measurement system for photosynthesis and transpiration of crop Ⅱ
(6) Plant growth monitoring with imaging robot Ⅰ
(7) (On-demand) Plant growth monitoring with imaging robot Ⅱ

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

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

Self Preparation and Review

Review each lecture.

Related subjects

calculus, linear algebra

Textbook1	**Book title**	N/A	**ISBN**	

	Author		Publisher		Publish year	
Notes for textbook プリント配布 Handouts will be prepared by the lecturer.						
Reference1	**Book title**	N/A			**ISBN**	
	Author		**Publisher**		**Publish year**	
Notes for reference 特になし N/A						
Goals to be achieved (1) Acquire basic knowledge of advanced agricultural engineering (2) Acquire adequate knowledge of environmental control and robotics in agriculture (3) Acquire adequate knowledge of image analysis for control in agriculture						
Evaluation of achievement 出席状況（50%）、演習またはレポートを50%として評価する。 S：上記の合計が 90 点（100 点満点）以上 A：上記の合計が 80 点（100 点満点）以上 B：上記の合計が 70 点（100 点満点）以上 C：上記の合計が 60 点（100 点満点）以上 [Evaluation basis] Students who attend all classes will be evaluated as follows: S: Total points obtained from attendance and report, 90 or higher (out of 100 points). A: Total points obtained from attendance and report, 80 or higher (out of 100 points). B: Total points obtained from attendance and report, 70 or higher (out of 100 points). C: Total points obtained from attendance and report, 60 or higher (out of 100 points). A: obtained total points of reports, 80 or higher (out of 100 points). B: obtained total points of reports, 65 or higher (out of 100 points). C: obtained total points of reports, 55 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 記述なし N/A						
Office hours						

随時

anytime

Relations to attainment objectives of learning and education

環境や生態系の保全に関して現れる場の方程式の定式化に関する能力を養い、それを数値的に解く手法について理解・修得する。

(A)幅広い人間性と考え方
人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち，人間と自然との共生，公共の福祉について考える能力を身につけている。
(C1) 建築・都市システム学およびその関連分野の理論・応用知識を自発的に獲得し，それらを統合的に活用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，技術等の変化に対応して，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。

(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
(C1) Have the skills to voluntarily acquire theories and applied knowledge about architecture and civil engineering as well as related fields; and to utilize such knowledge in an integrated manner
(E) Inquisitive outlook and skills for continuous learning in response to state-of-the-art technology and changes in the social environment
Have the skills to voluntarily make plans and learn throughout one's life in response to changesin society, environment and technology

Key words

Environmental control, Plant diagnosis, Robotization, Automation