

# **Syllabus**

**International Master' s Degree  
Program  
(2020-Fall Term)**

**(M40030040)Culture and Communication II[Culture and Communication II]**

<b>Subject name[English]</b>	Culture and Communication II[Culture and Communication II]				
<b>Schedule number</b>	M40030040	<b>Subject area</b>	General courses	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Thu.1~1	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	梁 志銳 RYO Shiei				
<b>Numbering</b>	GEN_LIB51025				
<b>Objectives of class</b>					
The importance of reading as a form of communication has been growing because of the emergence of the computer and the internet. The aim of this course is to understand key issues in reading, especially in reading as a second language.					
The importance of reading as a form of communication has been growing because of the emergence of the computer and the internet. The aim of this course is to understand key issues in reading, especially in reading as a second language.					
<b>Contents of class</b>					
Week 1 [face to face classroom lesson]: Introduction					
Week 2 [On-demand]: Foundations of reading 1					
Week 3 [On-demand]: Foundations of reading 2					
Week 4 [On-demand]: Foundations of reading 3					
Week 5 [face to face classroom lesson]: Review 1					
Week 6 [On-demand]: Reading a second language 1					
Week 7 [On-demand]: Reading a second language 2					
Week 8 [On-demand]: Reading a second language 3					
Week 9 [On-demand]: Reading a second language 4					
Week 10 [face to face classroom lesson]: Review 2					
Week 11 [On-demand]: Further issues in reading 1					
Week 12 [On-demand]: Further issues in reading 2					
Week 13 [On-demand]: Further issues in reading 3					
Week 14 [face to face classroom lesson]: Wrap-up					
Week 1 [face to face classroom lesson]: Introduction					
Week 2 [On-demand]: Foundations of reading 1					
Week 3 [On-demand]: Foundations of reading 2					
Week 4 [On-demand]: Foundations of reading 3					
Week 5 [face to face classroom lesson]: Review 1					
Week 6 [On-demand]: Reading a second language 1					
Week 7 [On-demand]: Reading a second language 2					
Week 8 [On-demand]: Reading a second language 3					
Week 9 [On-demand]: Reading a second language 4					
Week 10 [face to face classroom lesson]: Review 2					
Week 11 [On-demand]: Further issues in reading 1					
Week 12 [On-demand]: Further issues in reading 2					
Week 13 [On-demand]: Further issues in reading 3					
Week 14 [face to face classroom lesson]: Wrap-up					
<b>Self Preparation and Review</b>					
Revise each lecture and prepare for the next class.					
Revise each lecture and prepare for the next class.					
<b>Related subjects</b>					
特になし					
N/A					
<b>Notes for textbook</b>					
The teacher will provide all materials for this class.					
The teacher will provide all materials for this class.					
<b>Notes for reference</b>					
特になし					
N/A					
<b>Goals to be achieved</b>					

To deepen the understanding of reading.

To deepen the understanding of reading.

**Evaluation of achievement**

Students will be evaluated according to the term paper (60%), assignments (30%) and contribution to the class (10%).

Grade distribution:

S: 90% or above

A: 80-89%

B: 70-79%

C: 60-69%

Students will be evaluated according to the term paper (60%), assignments (30%) and contribution to the class (10%).

Grade distribution:

S: 90% or above

A: 80-89%

B: 70-79%

C: 60-69%

**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**

Drop-in basis

Drop-in basis

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

機械工学専攻

(A) 幅広い人間性と考え方

人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について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

(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。

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 public welfare

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

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**Key words**

Reading, second language

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

<b>Subject name[English]</b>	Principles of Japanese Grammar[Principles of Japanese Grammar]				
<b>Schedule number</b>	M40030090	<b>Subject area</b>	General courses	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Thu.1~1	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	吉村 弓子 YOSHIMURA Yumiko				
<b>Numbering</b>	GEN_LIB51425				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
Students will learn the following lessons in textbook in the following learning type. The classes of week 1, 7, 11 and 14 will be taught face to face in the real classroom. Students who are out of Japan will be able to talk interactively with the lecture over the Internet at a set time.					
Week 01 Oct.08 (Face to face/Remote simultaneous interactive) Introduction to the course and general features of Japanese, L1: Copula, Particle "wa" [topic], and Declarative, negative, and interrogative sentence					
Week 02 Oct.15 (Remote simultaneous interactive) L2 and 3: Demonstratives and Particle "no" [possession]					
Week 03 Oct.22 (Remote simultaneous interactive) 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.29 (Remote simultaneous interactive) L6 and 7; Particle "o" [object], "de" [place][means], "ni" [goal][source]					
Week 05 Nov.05 (Remote simultaneous interactive) L8: Adjectives, L 9: Particle "ga"[object]					
Week 06 Nov.12 (Remote simultaneous interactive) L10: Existence, L11: Numerals and Counter suffixes					
Week 07 Nov.19 (Face to face/Remote simultaneous interactive) L12: Past tense of adjectives, L13: Adjectives of Desire					
Week 08 Dec.03 (Remote simultaneous interactive) L14 and 15: Verb groups, "te"-form of verbs, and Sentences using "te"-form					
Week 09 Dec.10 (Remote simultaneous interactive) L16: Sentences using "te"-form, L17: "nai"-form of verbs					
Week 10 Dec.17 (Remote simultaneous interactive) L18: Dictionary form of verbs, L19: "ta"-form of verbs					
Week 11 Dec.24 (Face to face/Remote simultaneous interactive) L20: Polite and plain style, L21: Indirect speech					
Week 12 Jan.07 (Remote simultaneous interactive) L22: Noun modification					
Week 13 Jan.14 (Remote simultaneous interactive) L23: Complex sentence using "toki"[when], L25: Conditional mood					
Week 14 Jan.21 (Face to face/Remote simultaneous interactive) 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. Any changes will be					

announced on Moodle.

#### Self Preparation and Review

Read the respective parts of the textbook in advance.

Memorize the sentences learned in every class.

#### Related subjects

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

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

#### 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(対面)  
Examination(Face to Face)

#### 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 available.

#### Relations to attainment objectives of learning and education

**Key words**

elementary Japanese, grammar

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

<b>Subject name[English]</b>	Japanese Industrial Technologies and Innovations[Japanese Industrial Technologies and Innovations]				
<b>Schedule number</b>	M40030100	<b>Subject area</b>	General courses	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	大門 裕之, 北崎 充晃, 齊藤 大樹, 大和 真樹, 永田 昌明, 高野 靖, 角田 正也, 井上 光輝, 入山 恭彦, 松本 雅行, 大須賀 晋, 小林 真一 DAIMON Hiroyuki, KITAZAKI Michiteru, SAITOH Taiki, OHWA Masaki, NAGATA Masaaki, TAKANO Yasushi, KAKUTA Masaya, INOUE Mitsuteru, IRIYAMA Takahiko, MATSUMOTO Masayuki, OHSUGA Shin, KOBAYASHI Shinichi				
<b>Numbering</b>	COM_MAS51025				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
1. Masaaki Ohwa(1st): Current Status and Hurdle of Phamacuetical R&D in Japan 2. -3. Taiki Saito: Tsunami Disaster and its Prevention 4. Masaki Nagata: Trends in Natural Language Processing Technologies at NTT Co. Ltd. 5. Yasushi Takano: Environmental Noise of Railway 6. Masaya Kakuta: Industry Technology from the Design Point of View 7. Mitsuteru Inoue: Magnetics and its Electronic Applications 8. Masaaki Ohwa(2nd): Innovation in Japanese Chemical Industry1 - Polymer Materials 9. Yasushi Iriyama: Recent Development of High-performance Permanent Magnets and Their Application 10. Masayuki Matsumoto: Safe and Stable Transportation of the Shinkansen Supported by Signal System 11. Masaalo Ohwa(3rd): Innovation in Japanese Chemical Industry2 - Electronic Materials 12. Mlchteru Kitazaki: Virtual Reality in Japan 13. Shin Osuga: Media Processing in Viecles 14. Shnichiro Kobayashi: Electric Power Generation and Distribution in Japan					
<b>Self Preparation and Review</b>					
N/A					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
N/A					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
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					
<b>Evaluation of achievement</b>					
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**

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。

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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。

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。

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

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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**

industrial technology, development technology, application technology

**(M40110020)Ethics for Researchers[Ethics for Researchers]**

<b>Subject name[English]</b>	Ethics for Researchers[Ethics for Researchers]				
<b>Schedule number</b>	M40110020	<b>Subject area</b>	General courses	<b>Required elective or</b>	Required
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Wed.1~1	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering, Architecture and Civil Engineering, Electrical and Electronic Information Engineering, Computer Science and Engineering, Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	教務委員会副委員長, 田中 三郎 kyoumu iinkai fukuuintyou, TANAKA Saburo				
<b>Numbering</b>	COM_MAS51015				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
<ul style="list-style-type: none"> <li>* 1st week(2020.10.7):Guidance Introduction face to face, 1st module("Research Misconduct") in e-learning</li> <li>* 2nd – 5th week(October 14 – November 4): 2nd – 6th modules in e-learning <ul style="list-style-type: none"> <li>- 2nd moudle: "Ethical Issues in the Management of Data in Engineering Research"</li> <li>- 3rd moudle: "Responsible Authorship"</li> <li>- 4th moudle: "Ethical Issues in the Peer Review and Publication of Engineering Research"</li> <li>- 5th moudle: "Collaborative Research in Engineering Fields"</li> <li>- 6th moudle: "Whistleblowing and the Obligation to Protect the Public"</li> <li>- 7th moudle: "Managing Public Research Funds"</li> </ul> </li> </ul> <p>Submit the e-learning Certificate to the Education Division.</p> <ul style="list-style-type: none"> <li>* 6th week(November 11 – November 17): Discussion with supervisor</li> <li>* 7th week(November 18 2020) : make a final report</li> </ul>					
<b>Self Preparation and Review</b>					
Students will need to refer to their textbook to prepare for and review each lesson.					
<b>Related subjects</b>					
Philosophy of Science and Technology, Ethics for Engineers					
<b>Notes for textbook</b>					
N/A					
<b>Notes for reference</b>					
<p>For the Sound Development of Science ?The Attitude of a Conscientious Scientist  Japan Society for the Promotion of Science Editing Committee , MARUZEN PUBLISHING  2015 ISBN978-4-621-08938-5  (PDF : <a href="https://www.jsps.go.jp/j-kousei/data/rinri.pdf">https://www.jsps.go.jp/j-kousei/data/rinri.pdf</a>)</p>					
<b>Goals to be achieved</b>					
To prevent misconduct and promote fair research activities, this course provides knowledge and techniques regarding research ethics in accordance with characteristics of each graduate student's research specialties.					
<b>Evaluation of achievement</b>					
[Evaluation method] Final report(100%)					
[Evaluation basis]					
Those who take and pass the short test after each unit of e-learning contents will be evaluated with following basis.					
S: Obtained total points of reports, 90 or higher (out of 100 points).					
A: Obtained total points of reports, 80 or higher (out of 100 points).					
B: Obtained total points of reports, 70 or higher (out of 100 points).					
C: Obtained total points of reports, 60 or higher (out of 100 points).					
<b>Examination</b>					
レポートで実施					

By Report
<b>Details of examination</b>
By report
<b>Other information</b>
N/A
<b>Reference URL</b>
N/A
<b>Office hours</b>
Before/after the class
<b>Relations to attainment objectives of learning and education</b>
<p>(B) 技術者・研究者としての正しい倫理観と社会性  上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。</p> <p>(A) 幅広い人間性と考え方  人間社会を地球的な視点から多面的にとらえるグローバルな感性を持ち、人間と自然との共生、公共の福祉について考える能力を身につけている。</p> <p>(B) Sound ethics and social awareness as advanced-level engineers and researchers  Be conscious of specialized and ethical responsibilities as advanced-level engineers and researchers; and have the ability to set, solve and evaluate technical issues in society</p> <p>(A) Personality and outlook with a broad perspective  Have an international mindset to see human society from various angles with a global perspective; the ability to consider the symbiosis between humans and nature as well as public welfare</p>
<b>Key words</b>
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]**

<b>Subject name[English]</b>	Seminar on Mechanical Engineering I[Seminar on Mechanical Engineering I]				
<b>Schedule number</b>	M41610010	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	4
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 1kei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS61015				
<b>Objectives of class</b>	<p>The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.</p> <p>The seminar aims to provide a broad understanding of the mechanical engineering available for the master thesis research of a student.</p>				
<b>Contents of class</b>	<p>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.</p> <p>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.</p>				
<b>Self Preparation and Review</b>	<p>Different in each laboratory</p> <p>Different in each laboratory</p>				
<b>Related subjects</b>	<p>Different in each laboratory</p> <p>Different in each laboratory</p>				
<b>Notes for textbook</b>	<p>Different in each laboratory</p> <p>Different in each laboratory</p>				
<b>Notes for reference</b>	<p>N/A</p> <p>N/A</p>				
<b>Goals to be achieved</b>	<p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.</p> <p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems, and the presentation skill.</p>				
<b>Evaluation of achievement</b>	<p>Holding meetings to report tasks for each laboratory and comprehensively evaluating the results including contents, materials and attitudes.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>Holding meetings to report tasks for each laboratory and comprehensively evaluating the results including contents, materials and attitudes.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>				
<b>Examination</b>	<p>試験期間中には何も行わない</p> <p>None during exam period</p>				
<b>Details of examination</b>	<p>N/A</p> <p>N/A</p>				
<b>Other information</b>	<p>N/A</p> <p>N/A</p>				
<b>Reference URL</b>					

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**

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。

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 for problem 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 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

**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]**

<b>Subject name[English]</b>	Seminar on Mechanical Engineering II[Seminar on Mechanical Engineering II]				
<b>Schedule number</b>	M41610020	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 1kei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS61015				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
Given by supervisors.					
Given by supervisors.					
<b>Related subjects</b>					
N/A					
N/A					
<b>Notes for textbook</b>					
Given by supervisors.					
Given by supervisors.					
<b>Notes for reference</b>					
N/A					
N/A					
<b>Goals to be achieved</b>					
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.					
<b>Evaluation of achievement</b>					
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).					
<b>Examination</b>					
試験期間中には何も行わない					
None during exam period					
<b>Details of examination</b>					
N/A					
N/A					
<b>Other information</b>					
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 for problem 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 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 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 changes in 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]

<b>Subject name[English]</b>	Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]				
<b>Schedule number</b>	M41610030	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員, 1系各教員 1kei kyomu iin-S, 1kei kakukyouin				
<b>Numbering</b>	MEC_MAS61015				
<b>Objectives of class</b>					
<p>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.</p> <p>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.</p>					
<b>Contents of class</b>					
<p>Follow instruction of supervisors. Follow instruction of supervisors.</p>					
<b>Self Preparation and Review</b>					
<p>Follow instruction of supervisors. Follow instruction of supervisors.</p>					
<b>Related subjects</b>					
<p>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.</p>					
<b>Notes for textbook</b>					
<p>N/A N/A</p>					
<b>Notes for reference</b>					
<p>N/A N/A</p>					
<b>Goals to be achieved</b>					
<p>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.</p> <p>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.</p>					
<b>Evaluation of achievement</b>					
<p>Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>					
<b>Examination</b>					
<p>試験期間中には何も行わない None during exam period</p>					
<b>Details of examination</b>					

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**

(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。

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(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。

(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 for problem 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

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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

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(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 changes in 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]

<b>Subject name[English]</b>	Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]				
<b>Schedule number</b>	M41610030	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~1
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員, 1系各教員 1kei kyomu iin-S, 1kei kakukyouin				
<b>Numbering</b>	MEC_MAS61015				
<b>Objectives of class</b>					
<p>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.</p> <p>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.</p>					
<b>Contents of class</b>					
<p>Follow instruction of supervisors. Follow instruction of supervisors.</p>					
<b>Self Preparation and Review</b>					
<p>Follow instruction of supervisors. Follow instruction of supervisors.</p>					
<b>Related subjects</b>					
<p>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.</p>					
<b>Notes for textbook</b>					
<p>N/A N/A</p>					
<b>Notes for reference</b>					
<p>N/A N/A</p>					
<b>Goals to be achieved</b>					
<p>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.</p> <p>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.</p>					
<b>Evaluation of achievement</b>					
<p>Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>					
<b>Examination</b>					
<p>試験期間中には何も行わない None during exam period</p>					
<b>Details of examination</b>					

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

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(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。

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(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。

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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

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**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]

<b>Subject name[English]</b>	Thesis Research on Mechanical Engineering[Thesis Research on Mechanical Engineering]				
<b>Schedule number</b>	M4161003T	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Mechanical Engineering			<b>Begging grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員, 1系各教員 1kei kyomu iin-S, 1kei kakukyouin				
<b>Numbering</b>	MEC_MAS61015				
<b>Objectives of class</b>					
<p>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.</p> <p>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.</p>					
<b>Contents of class</b>					
<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>					
<b>Self Preparation and Review</b>					
<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>					
<b>Related subjects</b>					
<p>The work is related to every classes which has been studied in graduate and undergraduate schools.</p> <p>The work is related to every classes which has been studied in graduate and undergraduate schools.</p>					
<b>Notes for textbook</b>					
<p>N/A</p> <p>N/A</p>					
<b>Notes for reference</b>					
<p>N/A</p> <p>N/A</p>					
<b>Goals to be achieved</b>					
<p>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.</p> <p>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.</p>					
<b>Evaluation of achievement</b>					
<p>Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>Research work, tangible results, presentation and oral examination in presentation of master theses, etc. are evaluated comprehensively out of a hundred.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>					
<b>Examination</b>					
<p>試験期間中には何も行わない</p> <p>None during exam period</p>					
<b>Details of examination</b>					

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。

(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 for problem 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

(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 changes in 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

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

<b>Subject name[English]</b>	Seminar on Mechanical Engineering[Seminar on Mechanical Engineering]				
<b>Schedule number</b>	M41610040	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 1kei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS51015				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
Given by supervisors.					
Given by supervisors.					
<b>Related subjects</b>					
N/A					
N/A					
<b>Notes for textbook</b>					
Given by supervisors.					
Given by supervisors.					
<b>Notes for reference</b>					
N/A					
N/A					
<b>Goals to be achieved</b>					
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.					
<b>Evaluation of achievement</b>					
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).					
<b>Examination</b>					
試験期間中には何も行わない					
None during exam period					
<b>Details of examination</b>					
N/A					
N/A					
<b>Other information</b>					
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。

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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

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(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 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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Have the skills to voluntarily make plans and learn throughout one's life in response to changes in 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



**(M41610050)Internship[Internship]**

<b>Subject name[English]</b>	Internship[Internship]				
<b>Schedule number</b>	M41610050	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	0
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 1kei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS51015				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
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.					
<b>Related subjects</b>					
N/A					
N/A					
<b>Notes for textbook</b>					
Follow instructions provided by company/institutional supervisors.					
Follow instructions provided by company/institutional supervisors.					
<b>Notes for reference</b>					
N/A					
N/A					
<b>Goals to be achieved</b>					
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.					
<b>Evaluation of achievement</b>					
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)					
<b>Examination</b>					
試験期間中には何も行わない					
None during exam period					
<b>Details of examination</b>					
N/A					
N/A					
<b>Other information</b>					
N/A					
N/A					
<b>Reference URL</b>					

N/A

N/A

**Office hours**

N/A

N/A

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

機械工学専攻

(D)グローバルに活躍できるコミュニケーション力

グローバルに変化する社会が抱える課題にチームとして協調して取り組む中で、自らの考えや成果を効果的に表現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。

Graduate Program of Mechanical Engineering for Master's Degree

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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

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**Key words**

Internship

Internship

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

<b>Subject name[English]</b>	Advanced Mechanical Systems Design I[Advanced Mechanical Systems Design I]				
<b>Schedule number</b>	M41630210	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Mon.4~4	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 1kei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS53025				
<b>Objectives of class</b>	<p>This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.</p> <p>This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.</p>				
<b>Contents of class</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Self Preparation and Review</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Related subjects</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Notes for textbook</b>	<p>N/A</p> <p>N/A</p>				
<b>Notes for reference</b>	<p>N/A</p> <p>N/A</p>				
<b>Goals to be achieved</b>	<p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems and the presentation skill.</p> <p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems and the presentation skill.</p>				
<b>Evaluation of achievement</b>	<p>Coursework, presentation and/or report.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>Coursework, presentation and/or report.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>				
<b>Examination</b>	<p>試験期間中には何も行わない</p> <p>None during exam period</p>				
<b>Details of examination</b>	<p>N/A</p> <p>N/A</p>				
<b>Other information</b>	<p>For any questions, contact your supervisor.</p> <p>For any questions, contact your supervisor.</p>				
<b>Reference URL</b>	<p>N/A</p> <p>N/A</p>				
<b>Office hours</b>	<p>Contact your supervisor.</p>				

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

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(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

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**Key words**

Mechanical Systems Design

Mechanical Systems Design

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

<b>Subject name[English]</b>	Advanced Materials and Manufacturing Process I[Advanced Materials and Manufacturing Process I]				
<b>Schedule number</b>	M41630230	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Tue.4~4	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Begging grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 1kei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS54025				
<b>Objectives of class</b>	<p>This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.</p> <p>This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.</p>				
<b>Contents of class</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Self Preparation and Review</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Related subjects</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Notes for textbook</b>	<p>N/A</p> <p>N/A</p>				
<b>Notes for reference</b>	<p>N/A</p> <p>N/A</p>				
<b>Goals to be achieved</b>	<p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems and the presentation skill.</p> <p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems and the presentation skill.</p>				
<b>Evaluation of achievement</b>	<p>Coursework, presentation and/or report.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>Coursework, presentation and/or report.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>				
<b>Examination</b>	<p>試験期間中には何も行わない</p> <p>None during exam period</p>				
<b>Details of examination</b>	<p>N/A</p> <p>N/A</p>				
<b>Other information</b>	<p>For any questions, contact your supervisor.</p> <p>For any questions, contact your supervisor.</p>				
<b>Reference URL</b>	<p>N/A</p> <p>N/A</p>				
<b>Office hours</b>					

Contact your supervisor.

Contact your supervisor.

**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。

(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。

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**Key words**

Materials, Manufacturing Process

Materials, Manufacturing Process

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

<b>Subject name[English]</b>	Advanced System, Control and Robotics I[Advanced System, Control and Robotics I]				
<b>Schedule number</b>	M41630250	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Wed.4~4	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 Ikei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS55025				
<b>Objectives of class</b>	<p>This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.</p> <p>This lecture aims to provide a broad understanding of the mechanical systems design available for the master thesis research work of a student.</p>				
<b>Contents of class</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Self Preparation and Review</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Related subjects</b>	<p>Follow instruction of supervisors.</p> <p>Follow instruction of supervisors.</p>				
<b>Notes for textbook</b>	<p>N/A</p> <p>N/A</p>				
<b>Notes for reference</b>	<p>N/A</p> <p>N/A</p>				
<b>Goals to be achieved</b>	<p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems and the presentation skill.</p> <p>To acquire fundamental knowledge of individual research fields.</p> <p>To acquire the ability to find problems, the ability to solve the problems and the presentation skill.</p>				
<b>Evaluation of achievement</b>	<p>Coursework, presentation and/or report.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p> <p>Coursework, presentation and/or report.</p> <p>Grade levels are C(60% - less than 70%), B(70- less than 80%), A(80% - less than 90 %) and S(90% or over).</p>				
<b>Examination</b>	<p>試験期間中には何も行わない</p> <p>None during exam period</p>				
<b>Details of examination</b>	<p>N/A</p> <p>N/A</p>				
<b>Other information</b>	<p>For any questions, contact your supervisor.</p> <p>For any questions, contact your supervisor.</p>				
<b>Reference URL</b>	<p>N/A</p> <p>N/A</p>				
<b>Office hours</b>	<p>Contact your supervisor.</p>				

Contact your supervisor.

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

機械工学専攻

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(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。

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(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 into practice; and to create new technologies to solve problems

**Key words**

System, Control, Robotics

System, Control, Robotics



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

<b>Subject name[English]</b>	Advanced Energy and Environmental Engineering I[Advanced Energy and Environmental Engineering I]				
<b>Schedule number</b>	M41630270	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Fri.1~1	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Begging grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S1系教務委員 1kei kyomu Iin-S				
<b>Numbering</b>	MEC_MAS56025				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
Follow instruction of supervisors.					
Follow instruction of supervisors.					
<b>Self Preparation and Review</b>					
Follow instruction of supervisors.					
Follow instruction of supervisors.					
<b>Related subjects</b>					
Follow instruction of supervisors.					
Follow instruction of supervisors.					
<b>Notes for textbook</b>					
N/A					
N/A					
<b>Notes for reference</b>					
N/A					
N/A					
<b>Goals to be achieved</b>					
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.					
<b>Evaluation of achievement</b>					
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).					
<b>Examination</b>					
試験期間中には何も行わない					
None during exam period					
<b>Details of examination</b>					
N/A					
N/A					
<b>Other information</b>					
For any questions, contact your supervisor.					
For any questions, contact your supervisor.					
<b>Reference URL</b>					
N/A					
N/A					
<b>Office hours</b>					

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。

**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 for problem 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 into practice; and to create new technologies to solve problems

**Key words**

Energy, Environment

Energy, Environment

**(M41630290)Advanced Aeroacoustics[Advanced Aeroacoustics]**

<b>Subject name[English]</b>	Advanced Aeroacoustics[Advanced Aeroacoustics]				
<b>Schedule number</b>	M41630290	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Tue.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	飯田 明由 IIDA Akiyoshi				
<b>Numbering</b>	MEC_MAS56025				
<b>Objectives of class</b>					
To get basic knowledge of aeroacoustics and noise reduction technique for aerodynamic noise.					
<b>Contents of class</b>					
Basic theory of the flow induced noise will be lectured, and experimental and numerical technique for aeroacoustics will be received.					
<ol style="list-style-type: none"> <li>1. on-demand :Principle of sound and noise(1)</li> <li>2. on-demand :Principle of sound and noise(2)</li> <li>3. on-demand :Lighthill Theory</li> <li>4. on-demand :Curle's Theory</li> <li>5. on-demand :Theory of vortex sound</li> <li>6. on-demand :Prediction of aerodynamic sound from a bluff body</li> <li>7. on-demand :Measurement technique for aerodynamic sound</li> </ol>					
<b>Self Preparation and Review</b>					
Please read handouts before the lecture. Please read your notes again for review of lecture.					
<b>Related subjects</b>					
It is recommended that students have already learned ``Thermo-Fluid Transport'' and ``Fluid Dynamics'' of undergraduate level.					
<b>Notes for textbook</b>					
Materials will be distributed at each class.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
<ol style="list-style-type: none"> <li>1)空力音響の発生機構を理解すること</li> <li>2)ライトヒル理論を理解すること</li> </ol>					
To understand the generation mechanism of aerodynamic noise. To understand the principle of Lighthill Theory.					
<b>Evaluation of achievement</b>					
Students who attend all classes will be evaluated as follows: S: Achieved all goals and obtained total points of examination, 90 or higher (out of 100 points). A: Achieved 80% of goals and obtained total points of examination, 80 or higher (out of 100 points). B: Achieved 70% of goals and obtained total points of examination, 70 or higher (out of 100 points). C: Achieved 60% of goals and obtained total points of examination, 60 or higher (out of 100 points).					
<b>Examination</b>					

<p>レポートで実施 By Report</p>
<p><b>Details of examination</b> レポートで実施 By report</p>
<p><b>Other information</b> N/A N/A</p>
<p><b>Reference URL</b> N/A</p>
<p><b>Office hours</b> Questions about the lecture will be answered after each class.</p>
<p><b>Relations to attainment objectives of learning and education</b> (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。</p> <p>(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</p>
<p><b>Key words</b> 空力音響, 音, 波, 伝熱, 対流伝熱, 相変化を伴う伝熱, 伝熱応用機器 Aeroacoustics, Turbulence, Sound Wave, Heat Transfer, Convective Heat Transfer, Heat Transfer by boiling and radiation, Applications of Heat Transfer</p>

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

<b>Subject name[English]</b>	Advances in Thermal and Fluid Mechanics[Advances in Thermal and Fluid Mechanics]				
<b>Schedule number</b>	M41630350	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Tue.2~2	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	飯田 明由, 土井 謙太郎 IIDA Akiyoshi, DOI Kentaro				
<b>Numbering</b>	MEC_MAS56025				
<b>Objectives of class</b>					
To get basic knowledge of aeroacoustics and noise reduction technique for aerodynamic noise.					
This lecture is constructed on the knowledge of undergraduate level ``Thermo-Fluid Transport'' and includes topics of convective heat transfer by turbulent flows, natural convective flows, boiling and radiative heat transfer. Some specific topics focusing on the applications of heat transfer will also be addressed.					
<b>Contents of class</b>					
First half (Prof.Iida)					
Basic theory of the flow induced noise will be lectured, and experimental and numerical technique for aeroacoustics will be received.					
1. on-demand :Principle of sound and noise(1)					
2. on-demand :Principle of sound and noise(2)					
3. on-demand :Lighthill Theory					
4. on-demand :Curle's Theory					
5. on-demand :Theory of vortex sound					
6. on-demand :Prediction of aerodynamic sound from a bluff body					
7. on-demand :Measurement technique for aerodynamic sound					
Second half (Prof.Doi)					
Following topics will be treated in this class. All lectures will be uploaded at Google Classroom.					
1. on-demand: Fundamentals and Governing Equations and Parameters					
2. on-demand: Turbulent Convection 1					
3. on-demand: Turbulent Convection 2					
4. on-demand: Natural convection					
5. on-demand: Condensation and Boiling					
6. on-demand: Radiation					
7. on-demand: Heat Exchangers					
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.					
<b>Self Preparation and Review</b>					
Please read handouts before the lecture.					
Please read your notes again for review of lecture.					
Review the last class and work on exercises.					
<b>Related subjects</b>					
It is recommended that students have already learned ``Thermo-Fluid Transport'' and ``Fluid Dynamics'' of undergraduate level.					
<b>Notes for textbook</b>					

Materials will be distributed at each class.

**Notes for reference**

**Goals to be achieved**

前半

- 1)空力音響の発生機構を理解すること
- 2)ライトヒル理論を理解すること

後半

- 1) 対流による熱輸送について基本的な知識と理解を有すること
- 2) 基礎的な体系下における熱移動量が計算できること
- 3) 伝熱機器の高性能化を可能とする原理および知識を修得すること

First half

To understand the generation mechanism of aerodynamic noise.  
To understand the principle of Lighthill Theory.

Second half

The goals of the class are as follows.

- 1) To obtain advanced knowledge on the convective heat transfer.
- 2) To furnish to abilities to calculate the heat transfer rates for simple configurations of flow.
- 3) To understand the principles and techniques to achieve the high-performance heat transfer equipment.

**Evaluation of achievement**

Students who attend all classes will be evaluated as follows:

- S: Achieved all goals and obtained total points of examination, 90 or higher (out of 100 points).  
A: Achieved 80% of goals and obtained total points of examination, 80 or higher (out of 100 points).  
B: Achieved 70% of goals and obtained total points of examination, 70 or higher (out of 100 points).  
C: Achieved 60% of goals and obtained total points of examination, 60 or higher (out of 100 points).

**Examination**

レポートで実施  
By Report

**Details of examination**

レポートで実施  
By report

**Other information**

N/A  
N/A

**Reference URL**

N/A

**Office hours**

Questions about the lecture will be answered after each class.

**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**

空力音響, 音, 波, 伝熱, 対流伝熱, 相変化を伴う伝熱, 伝熱応用機器

Aeroacoustics, Turbulence, Sound Wave, Heat Transfer, Convective Heat Transfer, Heat Transfer by boiling and radiation, Applications of Heat Transfer

**(M41630380)Robotics[Robotics]**

<b>Subject name[English]</b>	Robotics[Robotics]				
<b>Schedule number</b>	M41630380	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Fri.2~2	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~
<b>Department Offered</b>	Mechanical Engineering			<b>Begging grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	内山 直樹 UCHIYAMA Naoki				
<b>Numbering</b>	MEC_MAS51015				
<b>Objectives of class</b>					
Provides fundamentals of robotics; kinematics, dynamics and motion control of multiple rigid-bodies connected in series with revolute or prismatic joints.					
<b>Contents of class</b>					
(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.					
<b>Self Preparation and Review</b>					
Read the handouts before the lecture.					
<b>Related subjects</b>					
Fundamentals of linear algebra, mechanics and control theory.					
<b>Notes for textbook</b>					
Handouts will be prepared.					
<b>Reference1</b>	<b>Book title</b>	Introduction to Robotics: Mechanics and Control, 3rd Edition		<b>ISBN</b>	
	<b>Author</b>	J. J. Craig	<b>Publisher</b>	Prentice Hall	<b>Publish year</b> 2005
<b>Reference2</b>	<b>Book title</b>	Robot Modeling and Control		<b>ISBN</b>	
	<b>Author</b>	M. W. Spong, S. Hutchinson, M. Vidyasagar	<b>Publisher</b>	John Wiley & Sons	<b>Publish year</b> 2006
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
Be able to derive kinematics and dynamics of robotic manipulators.					
Be able to design motion controllers for robotic manipulators.					
<b>Evaluation of achievement</b>					

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**

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。

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 for problem 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**

Manipulator, Dynamics, Control



**(M41630400)Robot Kinematics[Robot Kinematics]**

<b>Subject name[English]</b>	Robot Kinematics[Robot Kinematics]				
<b>Schedule number</b>	M41630400	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Fri.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	内山 直樹 UCHIYAMA Naoki				
<b>Numbering</b>	MEC_MAS55025				
<b>Objectives of class</b>					
Provides fundamentals of robot kinematics on multiple rigid-bodies connected in series with revolute or prismatic joints.					
<b>Contents of class</b>					
(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.					
<b>Self Preparation and Review</b>					
Read the handouts before the lecture.					
<b>Related subjects</b>					
Fundamentals of linear algebra and mechanics.					
<b>Notes for textbook</b>					
Handouts will be prepared.					
<b>Reference1</b>	<b>Book title</b>	Introduction to Robotics: Mechanics and Control, 3rd Edition		<b>ISBN</b>	
	<b>Author</b>	J. J. Craig	<b>Publisher</b>	Prentice Hall	<b>Publish year</b> 2005
<b>Reference2</b>	<b>Book title</b>	Robot Modeling and Control		<b>ISBN</b>	
	<b>Author</b>	M. W. Spong, S. Hutchinson, M. Vidyasagar	<b>Publisher</b>	John Wiley & Sons	<b>Publish year</b> 2006
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
Be able to derive kinematics of robotic manipulators.					
<b>Evaluation of achievement</b>					
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).					
<b>Examination</b>					
定期試験を実施(対面) Examination(Face to Face)					

<b>Details of examination</b>
N/A
<b>Other information</b>
Office: Room D-406, E-mail uchiyama@tut.jp
<b>Reference URL</b>
N/A
<b>Office hours</b>
Contact the lecturer by e-mail first.
<b>Relations to attainment objectives of learning and education</b>
<p>機械工学専攻</p> <p>(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。</p> <p>(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。</p> <p>Graduate Program of Mechanical Engineering for Master's Degree</p> <p>(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 for problem solving in an integrated manner</p> <p>(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</p>
<b>Key words</b>
Manipulator, Kinematics

**(M41630500)Microscale Transport Phenomena[Microscale Transport Phenomena]**

<b>Subject name[English]</b>	Microscale Transport Phenomena[Microscale Transport Phenomena]				
<b>Schedule number</b>	M41630500	<b>Subject area</b>	Advanced Mechanical Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall2 term	<b>Day of the week,period</b>	Tue.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Mechanical Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	土井 謙太郎 DOI Kentaro				
<b>Numbering</b>	MEC_MAS56025				
<b>Objectives of class</b>					
This lecture is constructed on the knowledge of undergraduate level ``Thermo-Fluid Transport'' and includes topics of convective heat transfer by turbulent flows, natural convective flows, boiling and radiative heat transfer. Some specific topics focusing on the applications of heat transfer will also be addressed.					
<b>Contents of class</b>					
Following topics will be treated in this class. Each class will be basically prepared by on-demand method. All lectures will be uploaded at Google Classroom. (on-demand) 1st week: Fundamentals and Governing Equations and Parameters (on-demand) 2nd week: Turbulent Convection 1 (on-demand) 4nd week: Turbulent Convection 2 (on-demand) 5th week: Natural Convection (on-demand) 6th week: Condensation and Boiling (on-demand) 7th week: Radiation (on-demand) 7th week: Heat Exchangers					
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.					
<b>Self Preparation and Review</b>					
Review the last class and work on exercises.					
<b>Related subjects</b>					
It is recommended that students have already learned ``Thermo-Fluid Transport'' and ``Fluid Dynamics'' of undergraduate level.					
<b>Notes for textbook</b>					
Materials will be distributed at each class.					
<b>Reference1</b>	<b>Book title</b>	Schaum's Outline of Heat Transfer, 2nd Ed.		<b>ISBN</b>	9780071764292
	<b>Author</b>	Donald Pitts, Leighton Sissom	<b>Publisher</b>	McGraw-Hill Education	<b>Publish year</b> 2011
<b>Notes for reference</b>					
特になし N/A					
<b>Goals to be achieved</b>					
1) 対流による熱輸送について基本的な知識と理解を有すること 2) 基礎的な体系下における熱移動量が計算できること 3) 伝熱機器の高性能化を可能とする原理および知識を修得すること The goals of the class are as follows. 1) To obtain advanced knowledge on the convective heat transfer. 2) To furnish to abilities to calculate the heat transfer rates for simple configurations of flow. 3) To understand the principles and techniques to achieve the high-performance heat transfer equipment.					
<b>Evaluation of achievement</b>					

Students who attend all classes will be evaluated as follows:

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

A: Achieved 80% of goals and obtained total points of examination, 80 or higher (out of 100 points).

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

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

**Examination**

レポートで実施

By Report

**Details of examination**

N/A

**Other information**

N/A

**Reference URL**

N/A

**Office hours**

Questions about the lecture will be answered after each class.

**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**

伝熱、対流伝熱、相変化を伴う伝熱、伝熱応用機器

Heat Transfer, Convective Heat Transfer, Heat Transfer by boiling and radiation, Applications of Heat Transfer

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

<b>Subject name[English]</b>	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]				
<b>Schedule number</b>	M42610020	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S2系教務委員, 2系各教員 2kei kyomu Iin-S, 2kei kakukyouin				
<b>Numbering</b>	ELC_MAS51025				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
N/A					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Reference and material will be available from the supervisor.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
To get something new on individual research fields. To develop his/her research skill including the planning and the presentation.					
<b>Evaluation of achievement</b>					
Presentation, Thesis, Coursework, and Outcomes are evaluated generally. Grades: S: 90-100, A:80-89, B:70-79, C:60-69					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
N/A					
<b>Office hours</b>					
N/A					
<b>Relations to attainment objectives of learning and education</b>					
<p>(B) 技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。</p> <p>(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。</p>					

(D) グローバルに活躍できるコミュニケーション力

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

(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

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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

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**Key words**

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

<b>Subject name[English]</b>	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]				
<b>Schedule number</b>	M42610020	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~1
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S2系教務委員, 2系各教員 2kei kyomu Iin-S, 2kei kakukyoin				
<b>Numbering</b>	ELC_MAS51025				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
N/A					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Reference and material will be available from the supervisor.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
To get something new on individual research fields. To develop his/her research skill including the planning and the presentation.					
<b>Evaluation of achievement</b>					
Presentation, Thesis, Coursework, and Outcomes are evaluated generally. Grades: S: 90-100, A:80-89, B:70-79, C:60-69					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
N/A					
<b>Office hours</b>					
N/A					
<b>Relations to attainment objectives of learning and education</b>					
<p>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</p>					

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

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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

(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

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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]

<b>Subject name[English]</b>	Thesis Research on Electrical and Electronic Information Engineering[Thesis Research on Electrical and Electronic Information Engineering]				
<b>Schedule number</b>	M4261002T	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S2系教務委員, 2系各教員 2kei kyomu Iin-S, 2kei kakukyoin				
<b>Numbering</b>	ELC_MAS51025				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
N/A					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Reference and material will be available from the supervisor.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
To get something new on individual research fields. To develop his/her research skill including the planning and the presentation.					
<b>Evaluation of achievement</b>					
Presentation, Thesis, Coursework, and Outcomes are evaluated generally. Grades: S: 90-100, A:80-89, B:70-79, C:60-69					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
N/AA					
<b>Office hours</b>					
N/A					
<b>Relations to attainment objectives of learning and education</b>					
<p>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。</p>					

(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

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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**



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

<b>Subject name[English]</b>	Seminar on Electrical and Electronic Information Engineering[Seminar on Electrical and Electronic Information Engineering]				
<b>Schedule number</b>	M42610040	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S2系教務委員 2kei kyomu Iin-S				
<b>Numbering</b>	ELC_MAS51015				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
N/A					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Textbook or material will be made available from the supervisor. To be announced by individual supervisors.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
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.					
<b>Evaluation of achievement</b>					
Coursework, presentation and/or report. Grades: S: 90-100, A:80-89, B:70-79, C:60-69					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
N/A					
<b>Office hours</b>					
N/A					
<b>Relations to attainment objectives of learning and education</b>					
<p>電気・電子情報工学専攻</p> <p>(B)技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。</p> <p>(C)高度な知識を統合的に活用できる実践力・創造力</p>					

電気・電子情報工学およびその関連分野に関する高度な知識を修得し、それらを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

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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

Graduate Program of Electrical and Electronic Information Engineering for Master's Degree

(B) Sound ethics and social awareness as advanced-level engineers and researchers

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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]

<b>Subject name[English]</b>	Seminar on Electrical and Electronic Information Engineering 1A[Seminar on Electrical and Electronic Information Engineering 1A]				
<b>Schedule number</b>	M42610050	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	4
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S2系教務委員 2kei kyomu Iin-S				
<b>Numbering</b>	ELC_MAS51015				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
N/A					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Textbook or material will be made available from the supervisor. To be announced by individual supervisors.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
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.					
<b>Evaluation of achievement</b>					
Coursework, presentation and/or report. Grades: S: 90-100, A:80-89, B:70-79, C:60-69					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
N/A					
<b>Office hours</b>					
N/A					
<b>Relations to attainment objectives of learning and education</b>					
<p>電気・電子情報工学専攻</p> <p>(B)技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者としての社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。</p> <p>(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。</p>					



(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 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

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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**



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

<b>Subject name[English]</b>	Seminar on Electrical and Electronic Information Engineering 1B[Seminar on Electrical and Electronic Information Engineering 1B]				
<b>Schedule number</b>	M42610060	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S2系教務委員 2kei kyomu Iin-S				
<b>Numbering</b>	ELC_MAS51015				
<b>Objectives of class</b>	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.				
<b>Contents of class</b>	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.				
<b>Self Preparation and Review</b>	N/A				
<b>Related subjects</b>	N/A				
<b>Notes for textbook</b>	Textbook or material will be made available from the supervisor. To be announced by individual supervisors.				
<b>Notes for reference</b>	N/A				
<b>Goals to be achieved</b>	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.				
<b>Evaluation of achievement</b>	Coursework, presentation and/or report. Grades: S: 90-100, A:80-89, B:70-79, C:60-69				
<b>Examination</b>	試験期間中には何も行わない None during exam period				
<b>Details of examination</b>	N/A				
<b>Other information</b>	N/A				
<b>Reference URL</b>	N/A				
<b>Office hours</b>	N/A				
<b>Relations to attainment objectives of learning and education</b>	<p>電気・電子情報工学専攻</p> <p>(B)技術者・研究者としての正しい倫理観と社会性 上級技術者・研究者として社会的・倫理的責任を有し、社会における技術的課題を設定・解決・評価する能力を身につけている。</p> <p>(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</p>				

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 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**



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

<b>Subject name[English]</b>	Methodology of R & D 1[Methodology of R & D 1]				
<b>Schedule number</b>	M42630100	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Tue.3~3	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S2系教務委員 2kei kyomu Iin-S				
<b>Numbering</b>	ELC_MAS58025				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
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					
<b>Self Preparation and Review</b>					
N/A					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Reference and material will be available from the supervisor.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
To acquire the ability of identifying and formulating research problem, planning and implementing specific research tasks, troubleshooting and communicating outcomes.					
<b>Evaluation of achievement</b>					
Coursework and presentation are evaluated generally. Grades: S: 90-100, A:80-89, B:70-79, C:60-69					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
N/A					
<b>Office hours</b>					
N/A					
<b>Relations to attainment objectives of learning and education</b>					
<p>(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。</p> <p>(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。</p> <p>(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。</p> <p>(C) Practical and creative skills to utilize advanced knowledge in an integrated manner</p>					

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

(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**

**(M42630120)Material Science for Electronics 1[Material Science for Electronics 1]**

<b>Subject name[English]</b>	Material Science for Electronics 1[Material Science for Electronics 1]				
<b>Schedule number</b>	M42630120	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Mon.5~5	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	内田 裕久, 八井 崇, 中村 雄一, 河村 剛 UCHIDA Hironaga, YATSUI Takashi, NAKAMURA Yuichi, KAWAMURA Go				
<b>Numbering</b>	ELC_MAS52025				
<b>Objectives of class</b>					
Objective of this subject is to learn about the forefront research and development on spin electronics and photonics in electronic materials, and thermoelectronics.					
<b>Contents of class</b>					
1.Nanophotonics You will learn about nanophotonic materials and devices. 1) nanophotonic materials and 2) nanophotonic devices.					
2.Spin electronics. You will learn about advanced magnetic materials and area from fundamentals to applications of magnetics. 1) Magnetic materials, 2) Applications of magnetics and magnetic materials, 3) Correlations between spins and various physical quantities, 4) Micro-magnetic devices and systems, 5) Spintronics and spin photonics.					
3. Thermoelectronics. You will learn about advanced thermoelectronic materials and area from fundamentals to applications of thermoelectronics. 1) thermoelectronic materials, 2) Applications and processing of thermoelectronic materials, 3) Thermoelectronic devices and systems.					
4. Photovoltaics and Photocatalysis You will learn about materials for photovoltaics and photocatalysis from fundamentals to advanced level. 1) Materials for photovoltaics and photocatalysis, 2) Mechanisms of photovoltaics and photocatalysis, 3) Applications of photovoltaic and photocatalytic systems.					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
<b>Notes for textbook</b> Lecture materials will be distributed.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> It aims at acquiring the broad knowledge of research and development by learning about the bases of recent research and development in various fields.					
<b>Evaluation of achievement</b> 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.					
<b>Examination</b> 試験期間中には何も行わない					



None during exam period

**Details of examination**

**Other information**

**Reference URL**

**Office hours**

Please make an appointment via e-mail.

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

(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

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(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**

nanophotonics, spin electronics, powder processing, thermoelectronics, photovoltaics, photocatalysis

**(M42630200)Semiconductor Physics 1[Semiconductor Physics 1]**

<b>Subject name[English]</b>	Semiconductor Physics 1[Semiconductor Physics 1]				
<b>Schedule number</b>	M42630200	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Mon.2~2	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	若原 昭浩, 岡田 浩, 河野 剛士, 高橋 一浩 WAKAHARA Akihiro, OKADA Hiroshi, KAWANO Takeshi, TAKAHASHI Kazuhiro				
<b>Numbering</b>	ELC_MAS54025				
<b>Objectives of class</b>					
<p>学部で学んだ半導体工学を基礎として、先端的な半導体デバイスのための理論、デバイス構造、設計や作製プロセスを理解することを目標とする。</p> <p>このため、この講義の履修者は、半導体工学、固体物理などの講義を受講してこと。</p> <p>This class is designed based on semiconductor physics and solid-state physics, to understand advanced semiconductor technology, including theoretical treatment, design and processing of advanced semiconductor devices.</p> <p>So it is desirable to study after learning related classes.</p>					
<b>Contents of class</b>					
<p>この科目は前半と後半の2つの部分から構成される。前半では pn 接合や MOS 構造における多数および少数キャリアの振る舞いについて扱う。注入された少数キャリアのダイナミクスについても触れる。後半では学生が以下から1つのトピックスを選択する。</p> <ol style="list-style-type: none"> <li>1. ナノ構造デバイスの作製および評価技術(岡田)</li> <li>2. バンドエンジニアリングと量子効果デバイス(若原)</li> <li>3. 先端 MEMS/NEMS 技術(河野, 高橋)</li> </ol> <p>講義は、隔週で、対面と遠隔を併用して行います。 遠隔講義は、配付した資料とオンラインでの Q&amp;A を併用して行います。</p> <p>第1回(対面) ガイダンス後半のトピックスの選択、半導体物理の基礎(復習) 第2回(遠隔) 半導体物理の基礎に関する演習 第3回(対面) pn 接合(拡散電位、I-V 特性、C-V 特性) 第4回(遠隔) pn 接合に関する解析実習 第5回(対面) MOS ダイオード(バンド構造、蓄積・反転、C-V 特性) 第6回(遠隔) MOS ダイオードに関連した解析実習 第7回(対面) MOS-FET(トランジスタ特性) 第8回(遠隔) MOS-FET に関する解析実習 第9回(対面) 選択トピックス(概論) 第10回(遠隔) 選択トピックスに関する研究背景の調査研究 第11回(対面) 選択トピックスに関する調査研究内容の発表と、 第12回(遠隔) 選択トピックスに関するデバイス解析実習 第13回(対面) 選択トピックスに関する解析結果の発表と討議 第14回(対面) 全体の総括、期末試験</p> <p>講義に加えて学生が主体的に取り組むケーススタディも実施する。学生は与えられた課題についての調査研究や、要求を満足するデバイスを設計するなどの課題に取り組み、プレゼンテーションを行う。</p> <p>This subject consists of two parts. The first half begins by introducing majority- and minority-carrier behavior in fundamental pn-junction and MOS structures. Injected minority carrier dynamics in semiconductors is also included. On the latter half, student choose one from following topics.</p> <ol style="list-style-type: none"> <li>1. Fabrication and characterization technology for Nanosturcture devices (Prof. Okada)</li> <li>2. Band engineering and quantum effect devices (Prof. Wakahara)</li> <li>3. Advanced MEMS/NEMS technologies(Prof. Kawano, Prof. Takahashi)</li> </ol> <p>Lectures are alternately done by face-to-face and remote teachings.</p>					

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

1st(Face-to-face):

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

2nd(Remote) :

Exercise of semiconductor physics.

3rd(Face to face) :

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

4th(Remote) :

Practical analysis training on pn junction.

5th(Face to face) :

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

6th(Remote) :

Analysis practice related to MOS diode.

7th(Face to face) :

MOS-FET (transistor characteristics).

8th(Remote) :

Analysis practice related to MOS-FETs.

9th(Face-to-face) :

Topics by which students choosed (overview).

10th(Remote) :

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

11th(Face-to-face) :

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

12th(Remote) :

Device analysis training on selected topics

13th(Face-to-face) :

Presentation and discussion of analysis results related to selected topics

14th(Face-to-face) :

Overall summary, final exam.

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

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

#### **Self Preparation and Review**

特になし

N/A

#### **Related subjects**

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

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

#### **Notes for textbook**

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

関連する参考文献やデータ、資料などは講義で配布する。

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

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

#### **Notes for reference**

特になし

N/A

#### **Goals to be achieved**

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

You will be able to:

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

**Evaluation of achievement**

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

**Examination**

レポートで実施  
By Report

**Details of examination**

特になし  
N/A

**Other information**

選択に際しては下記の教員にコンタクトすること。

若原昭浩 : C-608 wakahara[at]ee.tut.ac.jp  
岡田浩 : C-303B okada[at]ee.tut.ac.jp  
河野剛士 : C-603 kawano[at]ee.tut.ac.jp  
高橋一浩 : C-606 takahashi[at]ee.tut.ac.jp

Before choosing a sub-course, contact to following professors

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

**Reference URL**

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

**Office hours**

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

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

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

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

**Key words**

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

**(M42630260)Advanced Electronic Information System 1[Advanced Electronic Information System 1]**

<b>Subject name[English]</b>	Advanced Electronic Information System 1[Advanced Electronic Information System 1]				
<b>Schedule number</b>	M42630260	<b>Subject area</b>	Advanced Electrical and Electronic Information Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Mon.1~1	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Electrical and Electronic Information Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	市川 周一, 田村 昌也 ICHIKAWA Shuichi, TAMURA Masaya				
<b>Numbering</b>	ELC_MAS55025				
<b>Objectives of class</b>					
The aims of this lecture:					
(1) To understand various hardware algorithms for computer arithmetic,					
(2) To understand the role and design of microwave filter used in wireless communications.					
<b>Contents of class</b>					
This lecture consists of two themes shown below.					
(1) Algorithm is a procedure for solving a mathematical problem in a finite number of steps. The required calculation time and memory space depend on the algorithm, even for the same problem. Thus, it is essential to select the best algorithm for a given set of conditions.					
In digital hardware, an algorithm is realized as a logic design. This lecture aims to understand various hardware algorithms for computer arithmetic, together with the corresponding designs of arithmetic hardware.					
Week 1: Introduction					
Week 2: Algorithms for addition (on demand)					
Week 3: Algorithms for addition					
Week 4: Algorithms for multiplication (on demand)					
Week 5: Algorithms for multiplication					
Week 6: Algorithms for division (on demand)					
Week 7: Algorithms for division					
Weeks 1,3,5,7 are regular face-to-face classes.					
Weeks 2,4,6 are on-demand classes.					
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.					
(2) The aim of this course is to acquire the knowledge and design techniques of microwave filter used in wireless communications.					
1. Introduction of microwave filter used in wireless communications					
2. Image method and network synthesis method for filter design (on demand)					
3. Design of prototype filter and its Mapping					
4. Inverter design (on demand)					
5. Resonator design					
6. Coupled line design (on demand)					
7. Q factor and its evaluation					
Weeks 1,3,5,7 are regular face-to-face classes.					
Weeks 2,4,6 are on-demand classes.					

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

#### Self Preparation and Review

#### Related subjects

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

#### Notes for textbook

No textbooks are assigned.

#### Notes for reference

#### Goals to be achieved

- (1) To understand various hardware algorithms for computer arithmetic.
- (2) To understand the role and design of microwave filter used in wireless communications.

#### 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](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。

(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。

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 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

(1) Logic design, computer arithmetic, hardware algorithm (2) Analog filter, microwave filter, high-frequency circuit design, distributed constant circuit, Electromagnetic Engineering

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

<b>Subject name[English]</b>	Seminar on Computer Science and Engineering I[Seminar on Computer Science and Engineering I]				
<b>Schedule number</b>	M43610010	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	4
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S3系教務委員 3kei kyomu iin-S				
<b>Numbering</b>	CMP_MAS51015				
<b>Objectives of class</b> 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b> 教員が指定する内容に関し、予習・復習を行う。 Consult with your advisor.					
<b>Related subjects</b> 指導教員に問い合わせること。 Consult with your advisor.					
<b>Notes for textbook</b> 指導教員に問い合わせること。 Consult with your advisor.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> (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.					
<b>Evaluation of achievement</b> 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.					
<b>Examination</b>					

試験期間中には何も行わない

None during exam period

**Details of examination**

課題レポートやプレゼンテーションに基づいて評価する。

Your supervisor will evaluate your presentation and your reports.

**Other information**

**Reference URL**

**Office hours**

指導教員に問い合わせること。

Consult with your advisor.

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

(C) 高度な知識を統合的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。

(C2) 情報・知能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。

(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

(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]**

<b>Subject name[English]</b>	Seminar on Computer Science and Engineering II[Seminar on Computer Science and Engineering II]				
<b>Schedule number</b>	M43610020	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S3系教務委員 3kei kyomu iin-S				
<b>Numbering</b>	CMP_MAS61015				
<b>Objectives of class</b> 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b> 教員が指定する内容に関し、予習・復習を行う。 Consult with your advisor.					
<b>Related subjects</b> 指導教員に問い合わせること。 Consult with your advisor.					
<b>Notes for textbook</b> 授業にて指定する。 Consult with your advisor.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> (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.					
<b>Evaluation of achievement</b> 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) 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。

(C2) 情報・知能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。

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(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

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

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(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]**

<b>Subject name[English]</b>	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]				
<b>Schedule number</b>	M43610030	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S3系教務委員, 3系各教員 3kei kyomu iin-S, 3kei kakukyoin				
<b>Numbering</b>	CMP_MAS61015				
<b>Objectives of class</b>	<p>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.</p> <p>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.</p>				
<b>Contents of class</b>	<p>It is usually the case that thesis research is carried out on individual bases with specific contents differing from one student to another.</p> <p>Consult with your advisor for any further details.</p>				
<b>Self Preparation and Review</b>	Consult with your advisor for them.				
<b>Related subjects</b>	Consult with your advisor for them.				
<b>Notes for textbook</b>	Consult with your advisor for them.				
<b>Notes for reference</b>					
<b>Goals to be achieved</b>	To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.				
<b>Evaluation of achievement</b>	<p>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.</p> <p>[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).</p>				
<b>Examination</b>	試験期間中には何も行わない None during exam period				
<b>Details of examination</b>					
<b>Other information</b>					
<b>Reference URL</b>					

**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**

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

<b>Subject name[English]</b>	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]				
<b>Schedule number</b>	M43610030	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~1
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S3系教務委員, 3系各教員 3kei kyomu iin-S, 3kei kakukyoin				
<b>Numbering</b>	CMP_MAS61015				
<b>Objectives of class</b> 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b> Consult with your advisor for them.					
<b>Related subjects</b> Consult with your advisor for them.					
<b>Notes for textbook</b> Consult with your advisor for them.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> To acquire abilities for doing research and development at technically high level, sophisticated decision making, and leading large scale research projects.					
<b>Evaluation of achievement</b> 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).					
<b>Examination</b> 試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b>					
<b>Reference URL</b>					

**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 changes in society, environment and technology

**Key words**

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

<b>Subject name[English]</b>	Thesis Research on Computer Science and Engineering[Thesis Research on Computer Science and Engineering]				
<b>Schedule number</b>	M4361003T	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S3系教務委員, 3系各教員 3kei kyomu iin-S, 3kei kakukyoin				
<b>Numbering</b>	CMP_MAS61015				
<b>Objectives of class</b> 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b> After the guidance by an individual adviser, the student is expected to conduct his/her research on his/her own with a pioneering spirit.					
<b>Related subjects</b> Consult with your advisor.					
<b>Notes for textbook</b> Consult with your advisor.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> To acquire abilities for technical readings in English, logical thinking/explanation, and clear presentation.					
<b>Evaluation of achievement</b> 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).					
<b>Examination</b> 試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b>					
<b>Reference URL</b>					
<b>Office hours</b>					
<b>Relations to attainment objectives of learning and education</b>					

(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 changes in society, environment and technology

**Key words**



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

<b>Subject name[English]</b>	Seminar on Computer Science and Engineering[Seminar on Computer Science and Engineering]				
<b>Schedule number</b>	M43610040	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S3系教務委員 3kei kyomu iin-S				
<b>Numbering</b>	CMP_MAS51015				
<b>Objectives of class</b> 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b> 教員が指定する内容に関し、予習・復習を行う。 Consult with your advisor.					
<b>Related subjects</b> 指導教員に問い合わせること。 Consult with your advisor.					
<b>Notes for textbook</b> 指導教員に問い合わせること。 Consult with your advisor.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> (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.					
<b>Evaluation of achievement</b> 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%)					

<p><b>Examination</b>  試験期間中には何も行わない  None during exam period</p>
<p><b>Details of examination</b>  課題レポートやプレゼンテーションに基づいて評価する。  Your supervisor will evaluate your presentation and your reports.</p>
<p><b>Other information</b></p>
<p><b>Reference URL</b></p>
<p><b>Office hours</b></p>
<p><b>Relations to attainment objectives of learning and education</b></p> <p>(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。</p> <p>(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。</p> <p>(C2) 情報・知能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。</p> <p>(C) Practical and creative skills to utilize advanced knowledge in an integrated manner  Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner</p> <p>(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner</p> <p>(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</p> <p>(C) Practical and creative skills to utilize advanced knowledge in an integrated manner  Have advanced knowledge about computer science and engineering as well as related fields; and have the practical and creative skills to utilize such knowledge for problem solving in an integrated manner</p> <p>(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner</p> <p>(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</p>
<p><b>Key words</b></p>

**(M43630390)Algorithm Engineering, Advanced[Algorithm Engineering, Advanced]**

<b>Subject name[English]</b>	Algorithm Engineering, Advanced[Algorithm Engineering, Advanced]					
<b>Schedule number</b>	M43630390	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective	
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Wed.4~4	<b>Credit(s)</b>	1	
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~	
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1	
<b>Charge teacher name[Roman alphabet mark]</b>	藤戸 敏弘 FUJITO Toshihiro					
<b>Numbering</b>	CMP_MAS52525					
<b>Objectives of class</b>						
<p>離散最適化問題に対する数値計画的手法, および効率的アルゴリズムの設計方法を習得する. 時間が許せば, 計算困難(NP困難)な場合の対処法として, 高精度近似アルゴリズムの設計方法を習得する.</p> <p>To learn mathematical programming approaches for combinatorial optimization problems and how to design efficient algorithms for them. Designing high-performance approximation algorithms for computationally hard (NP-hard) problems will be covered as well, if time permits.</p>						
<b>Contents of class</b>						
<p>1(対面). 線形計画問題と整数計画問題  2(オンデマンド). 離散最適化問題と整数計画問題  3(オンデマンド). 凸多面体の基礎  4(オンデマンド). 凸多面体の整数性  5(オンデマンド). 完全双対整数性と完全ユニモジュラ行列  6(オンデマンド). 完全双対整数性: ネットワークフロー  7(対面). 定期試験</p> <p>1(face-to-face). Linear Program and Integer Program  2(on-demand). Combinatorial Optimization and Integer Program  3(on-demand). Basics of Convex Polytopes  4(on-demand). Integrality of Convex Polytopes  5(on-demand). Total Dual Integrality and Totally Unimodular Matrices  6(on-demand). Total Dual Integrality: Network Flow  7(face-to-face). Final exam</p>						
<b>Self Preparation and Review</b>						
<p>ガイダンス資料に公開されている講義計画・講義用資料を参照して, 予習・復習により講義内容とその理解を確認すること.</p> <p>It is highly recommended to go through the guidance materials provided on the Google classroom for self preparation and reviews.</p>						
<b>Related subjects</b>						
<p>「アルゴリズムとデータ構造」(「計算理論」や「形式言語論」も履修していることが望ましい)</p> <p>"Algorithms and Data Structures" (to the lesser extent, "Theory of Computation" and "Formal Languages" are also related).</p>						
<b>Notes for textbook</b>						
<p>Google classroom より資料を配布する。</p> <p>All the course materials used will be provided through the Google classroom.</p>						
<b>Reference1</b>	<b>Book title</b>	最適化法		<b>ISBN</b>	4320016165	
	<b>Author</b>	田村 明久, 村松 正和著	<b>Publisher</b>	共立出版	<b>Publish year</b> 2002	
<b>Reference2</b>	<b>Book title</b>	Combinatorial optimization			<b>ISBN</b>	047155894X
	<b>Author</b>	William J. Cook ... [et al.]	<b>Publisher</b>	Wiley	<b>Publish year</b> 1998	
<b>Reference3</b>	<b>Book title</b>	Combinatorial Optimization			<b>ISBN</b>	3540443894
	<b>Author</b>	Alexander Schrijver	<b>Publisher</b>	Springer	<b>Publish year</b> 2003	
<b>Notes for reference</b>						

**Goals to be achieved**

離散最適化問題の構造解析や効率的解法設計のために、線形計画を中心として数理計画法によるモデル化や双対定理、最大最小定理といった系統的手法を身につける。

To earn the ability of problem modelings, based on mathematical programmings (and LP in particular), and applying systematic approaches for structure analysis and algorithm designing for combinatorial optimization problems.

**Evaluation of achievement**

達成目標全体の達成を総合的に評価する定期試験で評価する。

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

[Evaluation basis]

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

S: 90 or higher (out of 100 points).

A: 80 or higher (out of 100 points).

B: 70 or higher (out of 100 points).

C: 60 or higher (out of 100 points).

**Examination**

定期試験を実施(対面)

Examination(Face to Face)

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

特になし

N/A

**Office hours**

随時(eメールにより事前にアポイントメントをとってください)。

eメールによる質問も歓迎。

Arranged by appointment..

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

(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 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

(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**

アルゴリズム 組合せ最適化 線形計画法 計算量

algorithms, combinatorial optimization, linear programming, computational complexity

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

<b>Subject name[English]</b>	Robotic Perception and Human-Robot Interaction 1[Robotic Perception and Human-Robot Interaction 1]				
<b>Schedule number</b>	M43630480	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Tue.3~3	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	三浦 純 MIURA Jun				
<b>Numbering</b>	CMP_MAS53225				
<b>Objectives of class</b>					
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.					
<b>Contents of class</b>					
Week 1: Introduction, probability basics, and sensor fusion by Bayesian inference. Week 2: Object tracking by Bayesian filters. Week 3: Mobile robot localization. Week 4: Mapping and SLAM (simultaneous localization and mapping) Week 5: Observation planning. Week 6: Human detection and identification. Week 7: Task-oriented human-robot interaction.					
<b>Self Preparation and Review</b>					
Regularly reviewing and preparing for the lecture using provided materials are desirable.					
<b>Related subjects</b>					
Fundamental knowledge of linear algebra and probability theory is useful.					
<b>Notes for textbook</b>					
Handouts with video explanation will be provided. The main reference is shown below.					
<b>Reference1</b>	<b>Book title</b>	Probabilistic robotics		<b>ISBN</b>	978-0262201629
	<b>Author</b>	Sebastian Thrun, Wolfram Burgard, Dieter Fox	<b>Publisher</b>	MIT Press	<b>Publish year</b> 2006
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
To understand the fundamental and advanced issues in intelligent robotics, especially in robotic perception and human-robot interaction.					
<b>Evaluation of achievement</b>					
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).					
<b>Examination</b>					
レポートで実施 By Report					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					

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

**Reference URL**

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

**Office hours**

Make an appointment beforehand by email.

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

情報・知能工学専攻

(C) 高度な知識を統合的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 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**

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

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

<b>Subject name[English]</b>	Robotic Perception and Human-Robot Interaction 2[Robotic Perception and Human-Robot Interaction 2]				
<b>Schedule number</b>	M43630490	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall2 term	<b>Day of the week,period</b>	Tue.3~3	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	大島 直樹, 大村 廉 OSHIMA Naoki, OMURA Ren				
<b>Numbering</b>	CMP_MAS53225				
<b>Objectives of class</b>					
The aim of this course is to utilize tools and platforms to construct human-robot affective communication in a real-world scenario.					
<b>Contents of class</b>					
Week 1: Building interactive sociable robots of the future Week 2-3: Real-time multimodal processing for constructing sociable robot's conversation system Week 4: Cloud network for sociable robot manipulation Week 5: 3D robot printing technology Week 6-7: Final assignment(project work: proposing and prototyping sociable robots of the future), evaluation and review					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.					
On-demand(You can take the class whenever you want.)					
<b>Self Preparation and Review</b>					
Reviewing and preparing for the lecture using provided materials are desirable.					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Handouts will be prepared. The main reference is shown below.					
<b>Reference1</b>	<b>Book title</b>	Designing Sociable Robots		<b>ISBN</b>	
	<b>Author</b>	C. Breazeal	<b>Publisher</b>	A Bradford Book	<b>Publish year</b> 2004
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
Understanding fundamental and advanced issues for building interactive sociable robots.					
<b>Evaluation of achievement</b>					
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.					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
N/A					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
N/A					

**Office hours**

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

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

## 情報・知能工学専攻

(C) 高度な知識を統合的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 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**

robot, design engineering, communication



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

<b>Subject name[English]</b>	3D Vision Computation 1[3D Vision Computation 1]				
<b>Schedule number</b>	M43630520	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Tue.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	金澤 靖 KANAZAWA Yasushi				
<b>Numbering</b>	CMP_MAS52525				
<b>Objectives of class</b>					
This course involves fundamentals and advanced issues on 3D reconstruction from images.					
This course involves fundamentals and advanced issues on 3D reconstruction from images.					
<b>Contents of class</b>					
All lectures will be done by "remote simultaneous interactive" and "on-demand". Each "On-demand" lecture material will be available after the corresponding on-line class.					
1st week: Introduction & Projective Geometry 2nd week: Epipolar Geometry 3rd week: 3-D Reconstruction from Two Views 4th week: Affine Projection 5th week: Uncalibrated Stereo 6th week: Structure from Motion 7th week: Robust Estimation in Computer Vision					
ll lectures will be done by "remote simultaneous interactive" and "on-demand". Each "On-demand" lecture material will be available after the corresponding on-line class.					
1st week: Introduction & Projective Geometry 2nd week: Epipolar Geometry 3rd week: 3-D Reconstruction from Two Views 4th week: Affine Projection 5th week: Uncalibrated Stereo 6th week: Structure from Motion 7th week: Robust Estimation in Computer Vision					
<b>Self Preparation and Review</b>					
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.					
<b>Related subjects</b>					
Geometry, Linear Algebra, Statistics.					
Geometry, Linear Algebra, Statistics.					
<b>Notes for textbook</b>					
Handouts will be prepared.					
Handouts will be prepared.					
<b>Reference1</b>	<b>Book title</b>	Multiple View Geometry		<b>ISBN</b>	
	<b>Author</b>	R.I. Hartley and A. Zisserman	<b>Publisher</b>	Cambridge University Press	<b>Publish year</b> 2000
<b>Reference2</b>	<b>Book title</b>	Computer Vision -- A Modern Approach --		<b>ISBN</b>	
	<b>Author</b>	D.A. Forsyth and J. Ponce	<b>Publisher</b>	Prentice Hall	<b>Publish year</b> 2003

<b>Reference3</b>	<b>Book title</b>	Guide to 3D Vision Computation		<b>ISBN</b>	
	<b>Author</b>	K. Kanatani, Y. Sugaya, and Y. Kanazawa	<b>Publisher</b>	Springer	<b>Publish year</b> 2016
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
<p>Understanding of the fundamentals and advanced issues on image processing and computer vision including:</p> <ul style="list-style-type: none"> <li>- camera model,</li> <li>- epipolar geometry,</li> <li>- 3-D reconstruction from images,</li> <li>- optimization</li> </ul> <p>Understanding of the fundamentals and advanced issues on image processing and computer vision including:</p> <ul style="list-style-type: none"> <li>- camera model,</li> <li>- epipolar geometry,</li> <li>- 3-D reconstruction from images,</li> <li>- optimization</li> </ul>					
<b>Evaluation of achievement</b>					
<p>Grade will be determined by all submitted reports:</p> <p>S: score <math>\geq 90</math>  A: score <math>\geq 80</math>  B: score <math>\geq 70</math>  C: score <math>\geq 60</math></p> <p>Grade will be determined by all submitted reports:</p> <p>S: score <math>\geq 90</math>  A: score <math>\geq 80</math>  B: score <math>\geq 70</math>  C: score <math>\geq 60</math></p>					
<b>Examination</b>					
レポートで実施 By Report					
<b>Details of examination</b>					
<b>Other information</b>					
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)					
<b>Reference URL</b>					
<a href="http://www.img.cs.tut.ac.jp/">http://www.img.cs.tut.ac.jp/</a> <a href="http://www.img.cs.tut.ac.jp/">http://www.img.cs.tut.ac.jp/</a>					
<b>Office hours</b>					
<b>Relations to attainment objectives of learning and education</b>					
(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					
<b>Key words</b>					
3D reconstruction, computer vision, image processing 3D reconstruction, computer vision, image processing					

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

<b>Subject name[English]</b>	Advanced System and Knowledge Sciences[Advanced System and Knowledge Sciences]				
<b>Schedule number</b>	M43630550	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Tue.5~5	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	石田 好輝 ISHIDA Yoshiteru				
<b>Numbering</b>	CMP_MAS53115				
<b>Objectives of class</b>					
<p>Focusing on: Matching Automaton as a modeling and design framework  This course provides opportunities to learn the followings:</p> <ul style="list-style-type: none"> <li>* Modeling and analysis on complex systems and learning systems,</li> <li>* System theoretic analysis on complex systems and learning systems ,</li> <li>* Computer simulations and implications, and</li> <li>* Implementation of complex systems and learning systems.</li> </ul> <p>Recent topics on complex systems and learning systems will be also discussed in the course.</p>					
<b>Contents of class</b>					
<p>(Face to Face) 1st week: Introduction on Self-Action model  (Face to Face) 2nd week: Matching Automaton  (on-demand) 3rd week: Classification of Stable Marriage Problem (chap. 3)  (on-demand) 4th week: Visualization of Stable Marriage Problem (chap. 4)  (on-demand) 5th week: Discrete Modeling of Visual Recognition (chap. 5)  (on-demand) 6th week: Discrete Modeling of Auditory Recognition (chap. 6)  (Face to Face) 7th week: Design by Matching Automaton (chap.7-10)</p>					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
<b>Notes for textbook</b>					
<p>No textbook. References other than below will be suggested at the first class.  Roth, A.E., Sotomayor, M.A.O.: Two-sided matching: A study in game-theoretic modeling and analysis. vol. 18. Cambridge University Press, (1992);  Gale, D., Shapley, L.S.: College admissions and the stability of marriage. American mathematical monthly, 9-15 (1962);  Gusfield, D., Irving, R.W.: The stable marriage problem: structure and algorithms. MIT press, (1989);  Ishida, Y.: Immunity-Based Systems, Springer (2004);  Ishida, Y : Self-Repair Networks, Springer (2015);  Barabasi, A.L.: Linked, Perseus, (2002);  Strogatz, S. H. Sync, Hyperion (2003);</p>					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
<b>Evaluation of achievement</b>					
<p>Class performance (50%) and term-end report (50%)</p> <p>Course Evaluation  Evaluation is based on class performance(presentations) and reports (100 points).  S: total points of reports and presentations, 90 or higher (out of 100 points).  A: total points of reports and presentations, 80 or higher (out of 100 points).  B: total points of reports and presentations, 70 or higher (out of 100 points).  C: total points of reports and presentations, 60 or higher (out of 100 points).</p>					
<b>Examination</b>					

その他  
Other

**Details of examination**

**Other information**

Room F-504, Ext. 6895

**Reference URL**

**Office hours**

Tuesday 16:30-17:00

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

情報・知能工学専攻

(C) 高度な知識を統合的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 such knowledge for problem solving, understanding the methodology of research, creating original technology, and integrating all knowledges organically

Graduate Program of Computer Science and Engineering for 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 such knowledge for problem solving in an integrated manner

**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]

<b>Subject name[English]</b>	Human Sensation and Perception 1[Human Sensation and Perception 1]				
<b>Schedule number</b>	M43630560	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Tue.4~4	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	中内 茂樹 NAKAUCHI Shigeki				
<b>Numbering</b>	CMP_MAS53025				
<b>Objectives of class</b>					
<p>This course is designed to introduce you to the scientific study of human nature. You will learn why and how scientists ask question about the sensation and perception and the relation of brain and behavior.You will also learn about the research methods to measure the perception and cognition used in the field of psychology and cognitive science.Finally, you will be able to create your own experiments using the 'OpenSesame', worldwide well-known software for creating experiments for psychology, cognitive science, neuroscience and experimental economics.</p> <p>This course is designed to introduce you to the scientific study of human nature. You will learn why and how scientists ask question about the sensation and perception and the relation of brain and behavior.You will also learn about the research methods to measure the perception and cognition used in the field of psychology and cognitive science.Finally, you will be able to create your own experiments using the 'OpenSesame', worldwide well-known software for creating experiments for psychology, cognitive science, neuroscience and experimental economics.</p>					
<b>Contents of class</b>					
<p>1. [face-to-face or remote] Introduction to "Science of Human Sensation and Perception"</p> <p>2. [on-demand] Video (MIT open courseware) and short quiz (assignment)</p> <p>3. [face-to-face or remote] Measuring Perception - research methodology -</p> <p>4. [on-demand] Short quiz and Online experiment (assignment)</p> <p>5. [face-to-face or remote] Workshop for creating experiments using "OpenSesame"</p> <p>6-7. [on-demand] Perform experiment and analyze your own data (assignment)</p> <p>Note: If there is any changes about a class schedule, it will be informed on Google Classroom or KYOMU JOHO SYSTEM.</p> <p>1. [face-to-face or remote] Introduction to "Science of Human Sensation and Perception"</p> <p>2. [on-demand] Video (MIT open courseware) and short quiz (assignment)</p> <p>3. [face-to-face or remote] Measuring Perception - research methodology -</p> <p>4. [on-demand] Short quiz and Online experiment (assignment)</p> <p>5. [face-to-face or remote] Workshop for creating experiments using "OpenSesame"</p> <p>6-7. [on-demand] Perform experiment and analyze your own data (assignment)</p> <p>Note: If there is any changes about a class schedule, it will be informed on Google Classroom or KYOMU JOHO SYSTEM.</p>					
<b>Self Preparation and Review</b>					
<p>Read the documents provided before each lecture. Review the lectures in consultation with the references and other resources such as the Internet.</p> <p>Read the documents provided before each lecture. Review the lectures in consultation with the references and other resources such as the Internet.</p>					
<b>Related subjects</b>					
Human Sensation and Perception I I Human Sensation and Perception I I					
<b>Notes for textbook</b>					
Documents (pdfs of the textbook and slides) will be provided via web before commencement of the lectures. Documents (pdfs of the textbook and slides) will be provided via web before commencement of the lectures.					
<b>Reference1</b>	<b>Book title</b>	Cognitive Neuroscience; Fourth International Student edition		<b>ISBN</b>	978-0393922288
	<b>Author</b>	Michael S.	<b>Publisher</b>	W. W. Norton & Company	<b>Publish year</b> 2008
<b>Reference2</b>	<b>Book title</b>	イラストレクチャー 認知神経科学		<b>ISBN</b>	978-4274208225

	<b>Author</b>	村上郁也 編著	<b>Publisher</b>	オーム社	<b>Publish year</b>	2010
<b>Notes for reference</b>						
N/A						
N/A						
<b>Goals to be achieved</b>						
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						
<b>Evaluation of achievement</b>						
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).						
<b>Examination</b>						
レポートで実施						
By Report						
<b>Details of examination</b>						
N/A						
N/A						
<b>Other information</b>						
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.						
<b>Reference URL</b>						
Will be announced during the lecture.						
Will be announced during the lecture.						
<b>Office hours</b>						
Anytime, but contact to Prof.Nakauchi by e-mail beforehand.						
Anytime, but contact to Prof.Nakauchi by e-mail beforehand.						
<b>Relations to attainment objectives of learning and education</b>						
(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) 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						
<b>Key words</b>						
cognitive neurosciences, perception, vision						
cognitive neurosciences, perception, vision						

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

<b>Subject name[English]</b>	X Reality and Psychology 1[X Reality and Psychology 1]				
<b>Schedule number</b>	M43630580	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Thu.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	北崎 充晃 KITAZAKI Michiteru				
<b>Numbering</b>	CMP_MAS53225				
<b>Objectives of class</b>					
<p>After the course, students will understand the principles of X reality (cross reality: XR) including virtual reality (VR), mixed reality (MR), and augmented reality (AR) on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.</p> <p>After the course, students will understand the principles of X reality (cross reality: XR) including virtual reality (VR), mixed reality (MR), and augmented reality (AR) on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.</p>					
<b>Contents of class</b>					
<p>講義は全て英語で行われます(All lectures are conducted in English).</p> <p>X Reality including Virtual Reality, Mixed Reality, and Augmented Reality is explained about its mechanisms and functions not only in the engineering perspective but also psychological perspective. The final part of the class is composed of students' presentations of their original application, device or idea on X Reality and the discussion on it.</p> <p>(on-demand) 1. Introduction to XR and Psychology (on-demand) 2. Two components of reality (on-demand) 3. Visual reality, Mixed Reality and Augmented reality (on-demand) 4. Multi- and Cross-modality phenomenon (face-to-face / online interactive) 5. Embodied cognition and Augmented human (face-to-face / online interactive) 6. Presentations by students (face-to-face / online interactive) 7. Presentations by students</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.</p> <p>X Reality including Virtual Reality, Mixed Reality, and Augmented Reality is explained about its mechanisms and functions not only in the engineering perspective but also psychological perspective. The final part of the class is composed of students' presentations of their original application, device or idea on X Reality and the discussion on it.</p> <p>(on-demand) 1. Introduction to XR and Psychology (on-demand) 2. Two components of reality (on-demand) 3. Visual reality, Mixed Reality and Augmented reality (on-demand) 4. Multi- and Cross-modality phenomenon (face-to-face / online interactive) 5. Embodied cognition and Augmented human (face-to-face / online interactive) 6. Presentations by students (face-to-face / online interactive) 7. Presentations by students</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.</p>					
<b>Self Preparation and Review</b>					
<p>Read the documents provided before each lecture. Review the lectures in consultation with the references provided and other resources such as scientific articles and research youtube video.</p> <p>Read the documents provided before each lecture. Review the lectures in consultation with the references provided and other resources such as scientific articles and research youtube video.</p>					
<b>Related subjects</b>					
X Reality and Psychology 2					

<p>Sensation and Perception 1 and 2  X Reality and Psychology 2  Sensation and Perception 1 and 2</p>
<p><b>Notes for textbook</b>  NA  NA</p>
<p><b>Notes for reference</b>  Read the documents provided before each lecture. Review the lectures in consultation with references and other resources such as scientific articles and youtube research video.  Read the documents provided before each lecture. Review the lectures in consultation with references and other resources such as scientific articles and youtube research video.</p>
<p><b>Goals to be achieved</b>  To understand fundamentals on perception and cognition as basics for virtual reality (VR)  To understand principles of virtual reality (VR), mixed reality (MR), and augmented reality (AR)  To understand current findings on VR/MR/AR research  To consider the benefits and challenges of VR/MR/AR on the future society  To understand fundamentals on perception and cognition as basics for virtual reality (VR)  To understand principles of virtual reality (VR), mixed reality (MR), and augmented reality (AR)  To understand current findings on VR/MR/AR research  To consider the benefits and challenges of VR/MR/AR on the future society</p>
<p><b>Evaluation of achievement</b>  Grades will be based on performance in each lecture (30%) and the final report (70%)  S: 90 points or higher (out of 100)  A: 80 points or higher (out of 100)  B: 70 points or higher (out of 100)  C: 60 points or higher (out of 100)  Grades will be based on performance in each lecture (30%) and the final report (70%)  S: 90 points or higher (out of 100)  A: 80 points or higher (out of 100)  B: 70 points or higher (out of 100)  C: 60 points or higher (out of 100)</p>
<p><b>Examination</b>  レポートで実施  By Report</p>
<p><b>Details of examination</b>  N/A  N/A</p>
<p><b>Other information</b>  N/A  N/A</p>
<p><b>Reference URL</b>  N/A  N/A</p>
<p><b>Office hours</b>  One hour after lecture  One hour after lecture</p>
<p><b>Relations to attainment objectives of learning and education</b></p> <p>(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。</p> <p>(C1) Have the skills to voluntarily acquire theories and applied knowledge about computer science and engineering as well as related fields; and to utilize such knowledge in an integrated manner</p>
<p><b>Key words</b>  virtual reality, augmented reality, cognition  virtual reality, augmented reality, cognition</p>



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

<b>Subject name[English]</b>	X Reality and Psychology 2[X Reality and Psychology 2]				
<b>Schedule number</b>	M43630590	<b>Subject area</b>	Advanced Computer Science and Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall2 term	<b>Day of the week,period</b>	Thu.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Computer Science and Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	松井 淑恵, 南 哲人 MATSUI Toshie, MINAMI Tetsuto				
<b>Numbering</b>	CMP_MAS53025				
<b>Objectives of class</b>					
<p>仮想現実(virtual reality, VR)、複合現実(mixed reality, MR)、拡張現実(augmented reality, AR)、およびクロスリアリティ(cross reality, XR)の原理を、心理的、生理学的、および機能レベルで理解できるようになります。また、将来の社会におけるVR/MR/AR/XRの利点と課題についての理解を深めます。</p> <p>After the course, students will understand the principles of virtual reality (VR), mixed reality (MR), augmented reality (AR), and X reality (cross reality: XR), on psychological, physiological, and functional levels. They will also be able to understand the benefits and challenges of VR/MR/AR/XR on the future society.</p>					
<b>Contents of class</b>					
<p>X reality and Psychology I(第一クォーター)で学んだ、視覚認知、聴覚認知、触覚およびその他のモダリティの認知、クロスモーダル認知、VR、MR、およびARについて、関連する話題についての講義と演習を行います。</p> <p>第1週 導入(対面)  第2週 計測手法一般(オンデマンド)  第3週 脳波(オンデマンド)  第4週 眼球運動(オンデマンド)  第5週 空間聴覚(オンデマンド)  第6週 バイノーラル聴覚と音のリアリティ(オンデマンド)  第7週 視覚と聴覚のインタラクション(オンデマンド)</p> <p>本学の新型コロナウイルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。</p> <p>授業実施形態が変更になる場合は、GoogleClassroomまたは教務情報システムより通知します。</p> <p>Lectures and project works related topics on X reality and Psychology I (1st quarter): visual cognition, auditory cognition, tactile and other modality cognition, cross-modal cognition, VR, MR, and AR.</p> <p>Week 1. Introduction (face to face)  Week 2. Methods of X reality and Psychology (On-demand: you can take the class whenever you want)  Week 3. EEG (On-demand)  Week 4. Eye-tracking (On-demand)  Week 5. Spatial hearing (On-demand)  Week 6. Binaural hearing and sound reality (On-demand)  Week 7. Interaction between the visual and auditory system (On-demand)</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.  If there is any changes about a class schedule, we will inform you on Google Classroom or KYOMU JOHO SYSTEM.</p>					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
X Reality and Psychology I Human perception and sensation X Reality and Psychology I Human perception and sensation					
<b>Notes for textbook</b>					
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付き、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 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**

**(M44610050)Seminar on Applied Chemistry and Life Science 1[Seminar on Applied Chemistry and Life Science 1]**

<b>Subject name[English]</b>	Seminar on Applied Chemistry and Life Science 1[Seminar on Applied Chemistry and Life Science 1]				
<b>Schedule number</b>	M44610050	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	3
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員 4kei kyomu Iin-S				
<b>Numbering</b>	CHE_MAS55015				
<b>Objectives of class</b> 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 for the students 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b> 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					
<b>Notes for textbook</b> Supervisor will recommend textbooks, papers, and research materials to students.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> 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					
<b>Evaluation of achievement</b> 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)					
<b>Examination</b> 試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b> Supervisor(s)					
<b>Reference URL</b> <a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>					
<b>Office hours</b> Students are encouraged visiting by appointment.					
<b>Relations to attainment objectives of learning and education</b>  (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]**

<b>Subject name[English]</b>	Seminar on Applied Chemistry and Life Science 2[Seminar on Applied Chemistry and Life Science 2]				
<b>Schedule number</b>	M44610060	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	3
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員 4kei kyomu Iin-S				
<b>Numbering</b>	CHE_MAS65015				
<b>Objectives of class</b> 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b> 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					
<b>Notes for textbook</b> Supervisor will recommend textbooks, papers, and research materials to students.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> 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.					
<b>Evaluation of achievement</b> 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)					
<b>Examination</b> 試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b> Supervisor(s)					
<b>Reference URL</b> <a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>					
<b>Office hours</b> Students are encouraged visiting by appointment.					
<b>Relations to attainment objectives of learning and education</b>					

**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]

<b>Subject name[English]</b>	Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]				
<b>Schedule number</b>	M44610070	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyoin				
<b>Numbering</b>	CHE_MAS68015				
<b>Objectives of class</b>					
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 lesson 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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
Seminar on Applied Chemistry and Life Science 1 Seminar on Applied Chemistry and Life Science 2					
<b>Notes for textbook</b>					
Supervisor will recommend textbooks, papers, and research materials to students.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
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					
<b>Evaluation of achievement</b>					
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)					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b>					
Supervisor					
<b>Reference URL</b>					
<a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>					

**Office hours**

Students are encouraged visiting by 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

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。

(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。

(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]

<b>Subject name[English]</b>	Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]				
<b>Schedule number</b>	M44610070	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	2Years	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~1
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1, M2
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyoin				
<b>Numbering</b>	CHE_MAS68015				
<b>Objectives of class</b>					
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 lesson 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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
Seminar on Applied Chemistry and Life Science 1 Seminar on Applied Chemistry and Life Science 2					
<b>Notes for textbook</b>					
Supervisor will recommend textbooks, papers, and research materials to students.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
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					
<b>Evaluation of achievement</b>					
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)					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b>					
Supervisor					
<b>Reference URL</b>					
<a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>					

**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

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

<b>Subject name[English]</b>	Thesis Research on Applied Chemistry and Life Science[Thesis Research on Applied Chemistry and Life Science]				
<b>Schedule number</b>	M4461007T	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員, 4系各教員 4kei kyomu Iin-S, 4kei kakukyouin				
<b>Numbering</b>	CHE_MAS68015				
<b>Objectives of class</b>					
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 lesson 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.					
<b>Contents of class</b>					
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.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
Seminar on Applied Chemistry and Life Science 1 Seminar on Applied Chemistry and Life Science 2					
<b>Notes for textbook</b>					
Supervisor will recommend textbooks, papers, and research materials to students.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
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					
<b>Evaluation of achievement</b>					
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)					
<b>Examination</b>					
試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b>					
Supervisor(s)					
<b>Reference URL</b>					
<a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>					

**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]**

<b>Subject name[English]</b>	Seminar on Applied Chemistry and Life Science[Seminar on Applied Chemistry and Life Science]				
<b>Schedule number</b>	M44610080	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Required
<b>Time of starting a course</b>	Year	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	6
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	2~2
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M2
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員 4kei kyomu Iin-S				
<b>Numbering</b>	CHE_MAS68015				
<b>Objectives of class</b> 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.					
<b>Contents of class</b> 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.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b> Thesis Research on Applied Chemistry and Life Science All other relevant subjects in Applied Chemistry and Life Sciences					
<b>Notes for textbook</b> Supervisor will recommend textbooks and papers to students.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b> 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					
<b>Evaluation of achievement</b> 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)					
<b>Examination</b> 試験期間中には何も行わない None during exam period					
<b>Details of examination</b>					
<b>Other information</b> Supervisor					
<b>Reference URL</b> <a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>					
<b>Office hours</b> Students are encouraged visiting by appointment.					
<b>Relations to attainment objectives of learning and education</b>  (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]**

<b>Subject name[English]</b>	Advanced Polymer Chemistry[Advanced Polymer Chemistry]				
<b>Schedule number</b>	M44630070	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Tue.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	伊津野 真一, 原口 直樹 ITSUNO Shinichi, HARAGUCHI Naoki				
<b>Numbering</b>	CHE_MAS52225				
<b>Objectives of class</b>					
This course focuses on the synthetic aspects of polymer-supported chemistry. Several applications of solid-supported organic chemistry will be discussed.					
<b>Contents of class</b>					
<p>Itsuno  (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  Electrophilic 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</p> <p>Haraguchi  (face to face) Week 4 Principles for living polymerization  (on-demand) Week 5 Anionic Polymerization  (face to face) Week 6 Polymer Microsphere</p> <p>(on-demand) Week 7 Report</p>					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
Organic chemistry Polymer chemistry					
<b>Notes for textbook</b>					
No textbook will be used.					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
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					
<b>Evaluation of achievement</b>					
S: テスト・レポートの合計点(100点満点)が90点以上 A: テスト・レポートの合計点(100点満点)が80点以上 B: テスト・レポートの合計点(100点満点)が70点以上 C: テスト・レポートの合計点(100点満点)が60点以上 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)
<b>Examination</b> レポートで実施 By Report
<b>Details of examination</b> N/A
<b>Other information</b> B-502 6813 itsuno@chem.tut.ac.jp  B-403 6812 haraguchi@chem.tut.ac.jp
<b>Reference URL</b> <a href="http://chem.tut.ac.jp/chiral/index.html">http://chem.tut.ac.jp/chiral/index.html</a>
<b>Office hours</b> Any time
<b>Relations to attainment objectives of learning and education</b>  (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
<b>Key words</b> Polymer reaction, Optically active polymers, Polymeric catalyst, Asymmetric reactions, Peptide



**(M44630120)Advanced Molecular Life Science[Advanced Molecular Life Science]**

<b>Subject name[English]</b>	Advanced Molecular Life Science[Advanced Molecular Life Science]				
<b>Schedule number</b>	M44630120	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Thu.3~3	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	田中 照通 TANAKA Terumichi				
<b>Numbering</b>	CHE_MAS53225				
<b>Objectives of class</b>					
<p>Aim: Students have to enlarge knowledge of biology, biochemistry, and molecular biology by reading good papers in this field. Papers of Nobel Prize Laureates are used in this Class, to learn both importance and impact of the work.</p> <p>Aim: Students have to enlarge knowledge of biology, biochemistry, and molecular biology by reading good papers in this field. Papers of Nobel Prize Laureates are used in this Class, to learn both importance and impact of the work.</p>					
<b>Contents of class</b>					
<p>Style: No Lecture. (on demand) Students choose and read Nobel Prize Laureates' Papers, and Make a Presentation of the content.</p> <p>Before the presentation by the Students begins, Dr. Tanaka will have guidance of Biochemistry and Molecular Biology.</p> <p>Style: No Lecture. (on demand) Class Code=hcy2ydb Students choose and read Nobel Prize Laureates' Papers, and Make a Presentation of the content.</p> <p>Before the presentation by the Students begins, Dr. Tanaka will have guidance of Biochemistry and Molecular Biology.</p>					
<b>Self Preparation and Review</b>					
<p>Process: (1) Visit the HP of "Nobel Prize" Organization. <a href="http://nobelprize.org/">http://nobelprize.org/</a></p> <p>(2) Choose two "Nobel Prize Awards" in the List described below, (Limited from "Chemistry" and "Physiology or Medicine") and Get and Read carefully "original papers" of the Laureates. (the information of Original Paper(s) may appear in the HP or not. So you have to Find the Original Paper(s) which is/are strongly related with the Award.) *Note: You cannot choose the "Award" which was already chosen by other Student.</p> <p>(3) Send me e-mail(s) which "Awards" you have chosen. (by 30th, Oct., 2018) in the e-mail, you have to describe: (i) your name, (ii) your student ID, (iii) the name of Laboratory to which you belong, (iv) the year of each Award which you have chosen, (for two "Awards") (v) all name(s) of Laureates of the Award, and (vi) information of the Original papers of the Laureates (journal name, year, volume, pages, authors' name, and title)</p> <p>(4) Make a presentation to the Audience (Students and me) for each "Award".</p> <p>Process: (1) Visit the HP of "Nobel Prize" Organization. <a href="http://nobelprize.org/">http://nobelprize.org/</a></p> <p>(2) Choose two "Nobel Prize Awards" in the List described below, (Limited from "Chemistry" and "Physiology or Medicine") and Get and Read carefully "original papers" of the Laureates. (the information of Original Paper(s) may appear in the HP or not.</p>					

So you have to Find the Original Paper(s) which is/are strongly related with the Award.)

\*Note:

You cannot choose the "Award" which was already chosen by other Student.

(3) Send me e-mail(s) which "Awards" you have chosen. (by 22nd, Oct., 2020)

in the e-mail, you have to describe:

(i) your name, (ii) your student ID,

(iii) the name of Laboratory to which you belong,

(iv) the year of each Award which you have chosen, (for two "Awards")

(v) all name(s) of Laureates of the Award, and

(vi) information of the Original papers of the Laureates (journal name, year, volume, pages, authors' name, and title)

(4) Make a presentation to the Audience (Students and me) for each "Award".

**Related subjects**

N/A

N/A

**Notes for textbook**

N/A

N/A

**Notes for reference**

N/A

N/A

**Goals to be achieved**

1) Obtain standard knowledge of biochemistry

2) Brush up skills of presentation

1) Obtain standard knowledge of biochemistry

2) Brush up skills of presentation

**Evaluation of achievement**

For the Credit:

40 credits for each Presentation. (40x2=80)

You can get up to 20 credits by Good questions and comment to the Audience.

S: 90 or higher (out of 100 points)

A: 80 or higher (out of 100 points)

B: 70 or higher (out of 100 points)

C: 60 or higher (out of 100 points)

For the Credit:

40 credits for each Presentation. (40x2=80)

You can get up to 20 credits by Good questions and comment to the Audience.

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

n/A

**Other information**

Contact (e-mail): [terumichi-tanaka@tut.jp](mailto:terumichi-tanaka@tut.jp)

Contact (e-mail): [terumichi-tanaka@tut.jp](mailto:terumichi-tanaka@tut.jp)

**Reference URL**

N/A

N/A

**Office hours**

any time, but e-mail must be sent to me in advance.

any time, but e-mail must be sent to me 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 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

(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**

Nobel prize, presentation, molecular biology, biochemistry

Nobel prize, presentation, molecular biology, biochemistry

**(M44630310)Advanced Separation Chemistry[Advanced Separation Chemistry]**

<b>Subject name[English]</b>	Advanced Separation Chemistry[Advanced Separation Chemistry]				
<b>Schedule number</b>	M44630310	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Mon.4~4	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	齊戸 美弘 SAITO Yoshihiro				
<b>Numbering</b>	CHE_MAS53225				
<b>Objectives of class</b>					
<p>Due to the recent requirements for stationary phases in chromatography such as higher selectivity, various novel stationary phases have been developed by the systematic analysis of the retention behavior of sample solutes. Miniaturization and automation of the whole separation instruments have been regarded as additional important projects in separation science, because of the increasing requirements for recent separation systems, such as selective/specific detection with high sensitivities, high throughput processing, as well as an environmentally-friendly feature of the systems. In this course, novel technologies of sample preparation and chromatographic separations will be provided along with the miniaturization of the hyphenated analytical systems.</p>					
<b>Contents of class</b>					
<ol style="list-style-type: none"> <li>1. Development of novel stationary phases in liquid chromatography based on the systematic analysis of retention behavior.</li> <li>2. Development of novel sample preparation media and the applications to real sample analysis in various chromatographic methods.</li> <li>3. Miniaturization of analytical systems and the hyphenation.</li> </ol> <p>1st week: Novel stationary phases in separation science (Part 1)  2nd week: Novel stationary phases in separation science (Part 2)  3rd week: Molecular recognition mechanism using polycyclic aromatic compounds (Part 1)  4th week: Molecular recognition mechanism using polycyclic aromatic compounds (Part 2)  5th week: Needle-type sample preparation and applications (Part 1)  6th week: Needle-type sample preparation and applications (Part 2)  7th week: Recent topics in separation science</p> <p>If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change. If there is any changes in the above class schedule, I will inform you on Google Classroom or KYOMU JOHO SYSTEM.</p>					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
<b>Notes for textbook</b>					
No text book is required, however, basic knowledge of chromatography is desirable.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
<b>Evaluation of achievement</b>					
<p>The evaluation will be made based on the score of the report and presentation.</p> <p>[Evaluation basis] Students who attend all classes will be evaluated as follows:  S: Achieved all goals and obtained total points of presentation or reports, 90 or higher (out of 100 points).  A: Achieved 80 % of goals and obtained total points of presentation or reports, 80 or higher (out of 100 points).  B: Achieved 70 % of goals and obtained total points of presentation or reports, 70 or higher (out of 100 points).  C: Achieved 60 % of goals and obtained total points of presentation or reports, 60 or higher (out of 100 points).</p>					
<b>Examination</b>					

レポートで実施

By Report

**Details of examination**

**Other information**

Room# B-402 or B2-408; Phone 6803; E-mail: saito@tut.jp

**Reference URL**

N/A

**Office hours**

Anytime if available, however, an appointment by e-mail is strongly recommended.

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

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

**(M44630330)Advanced Genomics[Advanced Genomics]**

<b>Subject name[English]</b>	Advanced Genomics[Advanced Genomics]				
<b>Schedule number</b>	M44630330	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall2 term	<b>Day of the week,period</b>	Thu.3~3	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	浴 俊彦 EKI Toshihiko				
<b>Numbering</b>	CHE_MAS53225				
<b>Objectives of class</b>					
Students will learn the significance and methods for genomics in basic and applied biological sciences. The aim of this class is to improve the ability to present and discuss with each other by reading effective research papers published in high-impact journals.					
<b>Contents of class</b>					
1st week(face-to-face or on-demand): Introduction of genomics 2nd week(on-demand): Genome structural analyses 3rd week(on-demand): Applied DNA sequencing 4th week(on-demand): Genome functional analyses(1) 5th week(on-demand): Genome functional analyses(2) 6th week(on-demand): Applications of genomics 7th week(face-to-face or remote simultaneous interactive): Presentation of subjected papers by students Note: The number of presentation depends on the number of students.					
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.					
<b>Self Preparation and Review</b>					
Handout or reference files for lecture will be given. Students are strongly encouraged to preview and review of these materials.					
<b>Related subjects</b>					
Related subjects: Molecular Biology I and II, Genetic Engineering					
<b>Notes for textbook</b>					
Handout or reference files for lectures will be provided.					
<b>Reference1</b>	<b>Book title</b>	Principles of Genome Analysis and Genomics 3rd Ed		<b>ISBN</b>	1-4051-0120-2
	<b>Author</b>	S. B. Primrose and R. M. Twyman	<b>Publisher</b>	Blackwell Publishing	<b>Publish year</b> 2003
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
To understand and describe basic technical terms in genomics. To be able to read papers in genomics journals. To make an oral presentation of effective research papers.					
<b>Evaluation of achievement</b>					
Grades for the course will be based on the subject scores (short tests, presentation and report).					
[Evaluation basis] Students who attend all classes will be evaluated as follows:					
S: Achieved all goals and obtained total points of short tests, presentation and reports, 90 or higher (out of 100 points). A: Achieved 80% of goals and obtained total points of short tests, presentation and reports, 80 or higher (out of 100 points). B: Achieved 70% of goals and obtained total points of short tests, presentation and reports, 70 or higher (out of 100 points). C: Achieved 60% of goals and obtained total points of short tests, presentation and reports, 60 or higher (out of 100 points).					

<p><b>Examination</b>  試験期間中には何も行わない  None during exam period</p>
<p><b>Details of examination</b>  N/A</p>
<p><b>Other information</b>  T. Eki (G505, ex. 6907) e-mail: eki@chem.tut.ac.jp</p>
<p><b>Reference URL</b>  N/A</p>
<p><b>Office hours</b>  Make an appointment by e-mail.</p>
<p><b>Relations to attainment objectives of learning and education</b></p> <p>応用化学・生命工学専攻  (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。  (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。  (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。  (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  (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</p> <p>Graduate Program of Applied Chemistry and Life Science for Master's Degree  (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  (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  (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</p>
<p><b>Key words</b>  genomics, metagenomics</p>

**(M44630430)Advanced Molecular Design Chemistry 1[Advanced Molecular Design Chemistry 1]**

<b>Subject name[English]</b>	Advanced Molecular Design Chemistry 1[Advanced Molecular Design Chemistry 1]				
<b>Schedule number</b>	M44630430	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員 4kei kyomu Iin-S				
<b>Numbering</b>	CHE_MAS52225				
<b>Objectives of class</b>	This course will provide the students with the opportunity to study on the selected subject in the realm of advanced molecular design chemistry.				
<b>Contents of class</b>	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.				
<b>Self Preparation and Review</b>					
<b>Related subjects</b>	Advanced Molecular Design Chemistry 2				
<b>Notes for textbook</b>	Supervisor will recommend textbooks and papers to students.				
<b>Notes for reference</b>					
<b>Goals to be achieved</b>	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.				
<b>Evaluation of achievement</b>	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)				
<b>Examination</b>	試験期間中には何も行わない None during exam period				
<b>Details of examination</b>					
<b>Other information</b>	Supervisor				
<b>Reference URL</b>	<a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>				
<b>Office hours</b>	Students are encouraged visiting by appointment.				
<b>Relations to attainment objectives of learning and education</b>	(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]**

<b>Subject name[English]</b>	Advanced Molecular Functional Chemistry 1[Advanced Molecular Functional Chemistry 1]				
<b>Schedule number</b>	M44630450	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員 4kei kyomu Iin-S				
<b>Numbering</b>	CHE_MAS52225				
<b>Objectives of class</b>	This course will provide the students with the opportunity to study on the selected subject in the realm of advanced molecular functional chemistry.				
<b>Contents of class</b>	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.				
<b>Self Preparation and Review</b>					
<b>Related subjects</b>	Advanced Molecular Functional Chemistry 2				
<b>Notes for textbook</b>	Supervisor will recommend textbooks and papers to students.				
<b>Notes for reference</b>					
<b>Goals to be achieved</b>	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.				
<b>Evaluation of achievement</b>	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)				
<b>Examination</b>	試験期間中には何も行わない None during exam period				
<b>Details of examination</b>					
<b>Other information</b>	Supervisor				
<b>Reference URL</b>	<a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>				
<b>Office hours</b>	Students are encouraged visiting by appointment.				
<b>Relations to attainment objectives of learning and education</b>	(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]**

<b>Subject name[English]</b>	Advanced Molecular Biological Chemistry 1[Advanced Molecular Biological Chemistry 1]				
<b>Schedule number</b>	M44630470	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Intensive	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	S4系教務委員 4kei kyomu Iin-S				
<b>Numbering</b>	CHE_MAS52225				
<b>Objectives of class</b>	This course will provide the students with the opportunity to study on the selected subject in the realm of advanced molecular biological chemistry.				
<b>Contents of class</b>	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.				
<b>Self Preparation and Review</b>					
<b>Related subjects</b>	Advanced Molecular Biological Chemistry 2				
<b>Notes for textbook</b>	Supervisor will recommend textbooks and papers to students.				
<b>Notes for reference</b>					
<b>Goals to be achieved</b>	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.				
<b>Evaluation of achievement</b>	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)				
<b>Examination</b>	試験期間中には何も行わない None during exam period				
<b>Details of examination</b>					
<b>Other information</b>	Supervisor				
<b>Reference URL</b>	<a href="http://chem.tut.ac.jp/en/">http://chem.tut.ac.jp/en/</a>				
<b>Office hours</b>	Students are encouraged visiting by appointment.				
<b>Relations to attainment objectives of learning and education</b>	(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

**(M44630490)Advanced Environmental Biotechnology[Advanced Environmental Biotechnology]**

<b>Subject name[English]</b>	Advanced Environmental Biotechnology[Advanced Environmental Biotechnology]				
<b>Schedule number</b>	M44630490	<b>Subject area</b>	Advanced Applied Chemistry and Life Science	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall1 term	<b>Day of the week,period</b>	Mon.2~2	<b>Credit(s)</b>	1
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Applied Chemistry and Life Science			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	山田 剛史 YAMADA Takeshi				
<b>Numbering</b>	CHE_MAS53225				
<b>Objectives of class</b>					
Students will aim to understand new environmental biotechnology as well as biological wastewater treatment technology using microorganisms. In addition, the goal of this class is to acquire the ability to understand and present research papers on new environmental biotechnology.					
<b>Contents of class</b>					
1st-week (face-to-face) : Environmental microbiology and Biogeochemical cycling 2nd-week (On-demand) : Aerobic wastewater treatment 3rd-week (On-demand) : Advanced biological wastewater treatment 4th-week (On-demand) : Anaerobic wastewater treatment 5th-week (On-demand) : Resent topics of environmental biotechnology 6th-week (face-to-face or remote simultaneous interactive) : Presentation of subjected papers by students (1) 7th-week : (face-to-face or remote simultaneous interactive) Presentation of subjected papers by students (2)					
If there are any changes regarding 'Toyoohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona Virus', the course contents and evaluation methods of achievement can be changed. Any changes of class schedules will be announced on Google Classroom or KYOMU JOHO SYSTEM.					
<b>Self Preparation and Review</b>					
Lecture materials are distributed every week. Exercises are performed to deeply understand the contents of lecture. Subjected papers will be informed you.					
<b>Related subjects</b>					
Life Science, Applied Life Science, Chemical Engineering					
<b>Notes for textbook</b>					
Handouts will be distributed.					
<b>Reference1</b>	<b>Book title</b>	Anaerobic biotechnology for industrial wastewaters		<b>ISBN</b>	0-9650226-0-9
	<b>Author</b>	Richard E. Speece	<b>Publisher</b>	Archae Press	<b>Publish year</b> 1996
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
(1) Basic technical terms and technologies on environmental biotechnology can be understood. (2) Published English papers on environmental biotechnology can be understood, and present about it.					
<b>Evaluation of achievement</b>					
In principle, grades are evaluated for students who attend all classes. Grades are evaluated comprehensively using quiz scores and presentation scores. S : Achieved all goals and obtained total points of quiz scores and presentation scores, 90 or higher (out of 100 points). A : Achieved all goals and obtained total points of quiz scores and presentation scores, 80 or higher (out of 100 points). B : Achieved all goals and obtained total points of quiz scores and presentation scores, 70 or higher (out of 100 points). C : Achieved all goals and obtained total points of quiz scores and presentation scores, 60 or higher (out of 100 points).					
<b>Examination</b>					

試験期間中には何も行わない

None during exam period

**Details of examination**

Nothing special during examination period.

**Other information**

N/A

**Reference URL**

Room : G507, Phone extension : 6906, E. mail : tyamada@chem.tut.ac.jp

**Office hours**

If you have some questions, please make 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

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。

(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**

Environmental microorganisms, Biogeochemical cycling, Environmental biotechnology, biological treatment

**(M45630020)Finite Element Method for Continua and Bar Structures[Finite Element Method for Continua and Bar Structures]**

<b>Subject name[English]</b>	Finite Element Method for Continua and Bar Structures[Finite Element Method for Continua and Bar Structures]				
<b>Schedule number</b>	M45630020	<b>Subject area</b>	Advanced Architecture and Civil Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Tue.4~4	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Architecture and Civil Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	中澤 祥二 NAKAZAWA Shoji				
<b>Numbering</b>	ARC_MAS52125				

**Objectives of class**

このコースは、有限要素解析とトラス構造などの単純な線材のコンピュータプログラミングを使用して、静的解析と動的解析の基礎を学習します。

The course provides fundamentals for static analysis and dynamic analysis by using Finite Element Analysis and computer programming for simple bars, such as truss structures.

**Contents of class****第1部:有限要素法による静的構造解析**

- (対面)(オンデマンド)第1週 平面トラスの釣合い式
- (対面)(オンデマンド)第2週 平面トラスの有限要素法による解法1(剛性マトリクスの誘導の誘導)
- (対面)(オンデマンド)第3週 平面トラスの有限要素法による解法2(全体剛性マトリクスの誘導, 演習)
- (対面)(オンデマンド)第4週 平面ラーメンの釣合い式
- (対面)(オンデマンド)第5週 平面トラスの有限要素法による解法1(剛性マトリクスの誘導の誘導)
- (対面)(オンデマンド)第6週 平面トラスの有限要素法による解法2(全体剛性マトリクスの誘導, 演習)
- (対面)(オンデマンド)第7週 有限要素法のプログラミング

**第2部:有限要素法による動的構造解析**

- (対面)(オンデマンド)第8週 ガイダンス, 1自由度系の振動方程式の誘導
- (対面)(オンデマンド)第9週 自由振動解, ステップ荷重に対する解の誘導
- (対面)(オンデマンド)第10週 弾性地震応答解析法, 数値積分法(Newmark- $\beta$ 法)
- (対面)(オンデマンド)第11週 応答スペクトル, エネルギースペクトルの意味
- (対面)(オンデマンド)第12週 多自由度系の弾性振動方程式の誘導
- (対面)(オンデマンド)第13週 多自由度系の固有振動解析
- (対面)(オンデマンド)第14週 モーダルアナリシス, RSS法による最大応答推定

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

**1st half: Static analysis by Finite Element Method**

face to face and remote simultaneous interactive, 1st week, Equilibrium of truss structures

face to face and remote simultaneous interactive, 2nd week, FEM analysis for truss structures; Part 1

face to face and remote simultaneous interactive, 3rd week, FEM analysis for truss structures; Part 1 face to face and remote simultaneous interactive, 4th week, Equilibrium of frame structures

face to face and remote simultaneous interactive, 5th week, FEM analysis for frame structures; Part 1

face to face and remote simultaneous interactive, 6th week, FEM analysis for frame structures; Part 2

face to face and remote simultaneous interactive, 7th week, Program for Finite Element Analysis

**2nd half Dynamic response analysis by Finite Element Method**

face to face and remote simultaneous interactive, 8th week, Introduction, Dynamic equation for a single degree of freedom (SDOF) system

face to face and remote simultaneous interactive, 9th week, Solutions for free vibration and step function

face to face and remote simultaneous interactive, 10th week, Seismic response analysis of SDOF system, Numerical solution



( Newmark-beta method)

face to face and remote simultaneous interactive, 11th week, Response spectrum, Energy spectrum

face to face and remote simultaneous interactive, 12th week, Dynamic equation for a Multi degree of freedom (MDOF) system

face to face and remote simultaneous interactive, 13th week, Dynamic eigenvalue analysis

face to face and remote simultaneous interactive, 14th week, Modal analysis, Response Spectrum Method, square-root-of-the-sum-of-the-squares (SRSS) method

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

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

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

#### Related subjects

特になし

N/A

#### Notes for textbook

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

Reference1	Book title	Concepts and Applications of finite Element Analysis		ISBN	
	Author	Robert D. Cook	Publisher		Publish year

#### Notes for reference

#### Goals to be achieved

1)トラス構造物の有限要素法を理解すること

2)有限要素法プログラミングと多自由度連立方程式の解法を理解すること

1) To understand the finite element method of truss structures

2) To understand the finite element method programming and the solution of simultaneous equations with multiple degrees of freedom

#### Evaluation of achievement

評価基準:原則的にすべての講義に出席し、かつすべての演習問題レポートを提出したものに付き、下記のように成績を評価する。

S: 達成目標をすべて達成しており、かつテストの合計点(100点満点)が90点以上

A: 達成目標を90%達成しており、かつテストの合計点(100点満点)が80点以上

B: 達成目標を80%達成しており、かつテストの合計点(100点満点)が70点以上

C: 達成目標を70%達成しており、かつテストの合計点(100点満点)が60点以上

[Evaluation basis] Students who attend all the classes and submitted all the exercise reports will be evaluated as follows:

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

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

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

C: Obtained total points of exams, 60 or higher (out of 100 points).

#### Examination

レポートで実施

By Report

#### Details of examination

#### Other information

Contact to Shoji Nakazawa :

Room : D-816, Phone :6857

E-mail : nakazawa@ace.tut.ac.jp

#### Reference URL

<http://www.st.ace.tut.ac.jp/~nakazawa>

#### Office hours

月曜日 16:30-17:30

16:30 to 17:30 on Monday

#### Relations to attainment objectives of learning and education

**Key words**

**(M45630050)Geotechnical Analysis[Geotechnical Analysis]**

<b>Subject name[English]</b>	Geotechnical Analysis[Geotechnical Analysis]				
<b>Schedule number</b>	M45630050	<b>Subject area</b>	Advanced Architecture and Civil Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Thu.2~2	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Architecture and Civil Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	三浦 均也 MIURA Kinya				
<b>Numbering</b>	ARC_MAS52725				
<b>Objectives of class</b>					
Understand the concept of analytical methods for flow problem in geotechnical engineering, and master the associated mathematical calculation methods.					
<b>Contents of class</b>					
Week01 (face to face) Introductory guidance for the class Installing Python and associated IDE.					
Week02 (face to face) Learning basic grammar of Python					
Week03 (face to face) Processing data and drawing figures					
Week04 (face to face) Derivation of diffusion equations for heat conduction problems					
Week05 (face to face) Fundamental solution of the diffusion equation					
Week06 (face to face) Analytical solution for static boundary value problem in 1-D condition					
Week07 (face to face) Mid-term examination: report					
Week08 (face to face) Numerical solution for the problem by using FDM					
Week09 (face to face) Numerical solution for the problem by using FEM					
Week10 (face to face) Drawing figures for the results					
Week11 (face to face) Analytical solution for static boundary value problem in 2-D condition					
Week12 (face to face) Numerical solution for the problem by using FDM					
Week13 (face to face) Numerical solution for the problem by using FEM					
Week14 (face to face) Term-end examination: Report					
Students are required to prepare their own computer (notebook) available for python programming.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
Geolgic hazards and mitigation planning (English Masre course)					
<b>Notes for textbook</b>					
Handouts are distributed at the lectures					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
Understanding the basic concept of analytical method for flow problems in geotechnical analysis.					
<b>Evaluation of achievement</b>					
The achievement is evaluated based on the report.					
<b>Examination</b>					
レポートで実施 By Report					
<b>Details of examination</b>					
<b>Other information</b>					
D803, Tel: 0532-44-6844, Mail: k-miura@ace.tut.ac.jp					
<b>Reference URL</b>					
under preparing					
<b>Office hours</b>					
12:00-14:00 on Wednesday					
<b>Relations to attainment objectives of learning and education</b>					

not specified

**Key words**

Disaster, Earthquake, Geologic Hazards, Numerical Analysis

## (M45630290)Seismic Design of Structures[Seismic Design of Structures]

<b>Subject name[English]</b>	Seismic Design of Structures[Seismic Design of Structures]				
<b>Schedule number</b>	M45630290	<b>Subject area</b>	Advanced Architecture and Civil Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Wed.3~3	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Architecture and Civil Engineering			<b>Begging grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	齊藤 大樹 SAITOH Taiki				
<b>Numbering</b>	ARC_MAS52125				
<b>Objectives of class</b>					
The objective of this class is to learn the evaluation method of structural performance of the building based on dynamic behavior and ultimate strength and deformation capacity.					
The objective of this class is to learn the evaluation method of structural performance of the building based on dynamic behavior and ultimate strength and deformation capacity.					
<b>Contents of class</b>					
1-2 週間、1 自由度システムの振動					
3-4 週、弾性地震応答解析、数値積分法					
5-6 週、多自由度振動系、固有値解析					
7-8 週間、応答スペクトル					
9 週目、弾塑性地震応答解析					
10 週目、等価線形化法					
11 週、設計入力地盤運動					
12~13 週、エネルギー法の基本					
14 週、限界強度計算の基本					
<p>本学の新型コロナウイルス感染拡大防止のための活動基準の変更に伴い、授業内容および成績の評価法に変更が生じる場合があります。</p> <p>1-2 weeks, Vibration of one degree of freedom system</p> <p>3-4 weeks, Elastic seismic response analysis, numerical integration method</p> <p>5-6 weeks, Multi-degree-of-freedom system of vibration, Eigen value analysis</p> <p>7-8 weeks, Response spectrum</p> <p>9 week, Elastic-plastic seismic response analysis</p> <p>10 week, Equivalent linearization method</p> <p>11 week, Design input ground motion</p> <p>12-13 weeks, Basic of the energy method</p> <p>14 weeks, Basic of the limit strength calculation</p>					
If there will be any changes regarding Toyohashi University of Technology Activity Restrictions Level for Preventing the Spread of Corona virus, the course content and evaluation of achievement are subject to change.					
<b>Self Preparation and Review</b>					
<b>Related subjects</b>					
None					
None					
<b>Notes for textbook</b>					
<b>Notes for reference</b>					
<b>Goals to be achieved</b>					
振動解析の背景と理論を理解し、振動解析に基づく構造物の設計手法を理解する。					
Understand the background and theory of vibration analysis and the design method of the structure based on vibration analysis.					
<b>Evaluation of achievement</b>					

Report Report
<b>Examination</b> レポートで実施 By Report
<b>Details of examination</b>
<b>Other information</b> Professor Taiki Saito (D805), e-mail: tsaito@ace.tut.ac.jp (Room: D-805) Professor Taiki Saito (D805), e-mail: tsaito@ace.tut.ac.jp (Room: D-805)
<b>Reference URL</b> <a href="http://www.rc.ace.tut.ac.jp/saito/index-e.html">http://www.rc.ace.tut.ac.jp/saito/index-e.html</a> <a href="http://www.rc.ace.tut.ac.jp/saito/index-e.html">http://www.rc.ace.tut.ac.jp/saito/index-e.html</a>
<b>Office hours</b> Please contact by e-mail to make an appointment. Please contact by e-mail to make an appointment.
<b>Relations to attainment objectives of learning and education</b>
<b>Key words</b>

**(M45630420)Advanced Transportation Engineering[Advanced Transportation Engineering]**

<b>Subject name[English]</b>	Advanced Transportation Engineering[Advanced Transportation Engineering]				
<b>Schedule number</b>	M45630420	<b>Subject area</b>	Advanced Architecture and Civil Engineering	<b>Required or elective</b>	Elective
<b>Time of starting a course</b>	Fall term	<b>Day of the week,period</b>	Tue.3~3	<b>Credit(s)</b>	2
<b>Faculty</b>	Graduate Program for Master's Degree			<b>Subject grade</b>	1~
<b>Department Offered</b>	Architecture and Civil Engineering			<b>Beggining grade</b>	M1
<b>Charge teacher name[Roman alphabet mark]</b>	松尾 幸二郎 MATSUO Kojiro				
<b>Numbering</b>	ARC_MAS53025				
<b>Objectives of class</b>					
Students will learn methodologies for traffic safety management that make use of data and statistical methods. Students will learn methodologies for traffic safety management that make use of data and statistical methods.					
<b>Contents of class</b>					
(basically face to face)					
Students read, summarize and give a presentation about some parts of books or papers on traffic safety analyses and management. And then studetns and lecturere make discussions in each 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.					
<b>Self Preparation and Review</b>					
Students need to prepere for the presentation.					
<b>Related subjects</b>					
N/A					
<b>Notes for textbook</b>					
Class materials will be distributed.					
<b>Notes for reference</b>					
N/A					
<b>Goals to be achieved</b>					
- Understanding and being able to explain methodologies for traffic safety management that make use of data and statistical methods.					
<b>Evaluation of achievement</b>					
Evaluation criteria: Students who meet required attendance and submit all reports and presatations assigned will be evaluated as follows: S: Total points obtained from reports / presentation is 90 or higher (out of 100 points). A: Total points obtained from reports / presentation is 80 or higher (out of 100 points). B: Total points obtained from reports / presentation is 70 or higher (out of 100 points). C: Total points obtained from reports / presentation is 60 or higher (out of 100 points).					
<b>Examination</b>					
レポートで実施 By Report					
<b>Details of examination</b>					
Nothing during the exam period					
<b>Other information</b>					
N/A					
<b>Reference URL</b>					
- Matsuo: <a href="http://www.tr.ace.tut.ac.jp/">http://www.tr.ace.tut.ac.jp/</a>					
<b>Office hours</b>					
- Matsuo: At any time. Please contact Matsuo by e-mail in advance.					
<b>Relations to attainment objectives of learning and education</b>					
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。

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 utilize such 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**

Transportation planning, Transportation engineering, Urban planning, Infrastructure planning, Management, Data analysis