■		1		2	1
		1		2	5
		1		2	
		2		2	2
	○ ○Academic Presentation I	1		2	3
	○ ○Academic Presentation II	2		2	4
	○	2		2	
		1		2	
		1		2	92
		1		2	102
	I	1 /2		2	
	II	1 /2		2	
		1		2	5
	H28				
		1 /2		2	7
■	I ( )	1 /2		2	8

■	II ( )	1 /2		2	8
	III ( )	1 /2		2	8
■ ■	○ ○	1		2	9
	○ ○	2		2	10
	○ ○	1		2	11
	○ ○	1		2	12
	○ ○	2		2	13
	○ ○	2		2	14
	○	1		2	
	○ ○	2		2	15
	○ ○	1		2	16
	○ ○	2		2	17
	○ ○	2		2	18
	I I	1		2	19
	II II	2		2	20

■ ■	○ ○	1		2	21
	○ ○	2		2	22
	○ ○	2		2	23
	○ ○	1		2	24
	○ ○	1		2	25
	○ ○	2		2	26
	○ ○	2		2	27
	○ ○	2		2	28
	○ ○	1		2	29
	○ ○	1		2	30
	○ ○	1		2	31
	Ⅰ Ⅰ	1		2	32
	Ⅱ Ⅱ	2		2	33
■	○ ○	1		2	34
		1		2	

■ ■	○ ○	1		2	35
	○ ○	2		2	36
	○ ○	2		2	37
	○ ○	2		2	38
	○ IA ○ I H28	1		2	39
	IB II H28	2		2	40
	IA IA	1		2	41
	IB IB	2		2	42
	IA	1		2	43
	IB	2		2	
	○ ○	1		2	44
	○ ○	2		2	45
	○ ○	1		2	46
	○ ○	2		2	47
	○ ○	1		2	48

■ ■	○ ○	1		2	49
	○ ○	1		2	50
	○	1		2	
	○	1		2	
	○ ○	1		2	6
	○ ○	1		2	51
	○ ○	1		2	52
	○ ○	1		2	53
	○ ○	1		2	25
	○ ○	1		2	21
■	○ ○	1		2	54
	○	1		2	
	○ ○	2		2	55
	○ ○	2		2	56
	○ ○	2		2	57

■ ■	○	2		2	
	○ ○	1		2	58
	○ ○	2		2	59
	○	1		2	
	○ ○	1		2	60
	○ ○	2		2	62
	○ ○	1		2	61
	○ ○	1		2	63
	○ ○	2		2	64
	○ ○	2		2	65
	○ ○	2		2	56
■		2		2	66
	○ ○	1		2	67
		1		2	68
	○ ○	1		2	69

■ ■		1		2	70
		2		2	71
		2		2	72
		2		2	73
		1		2	74
		1		2	75
		2		2	76
	○ ○	1		2	77
		1		2	78
		2		2	79
		2		2	80
■		1		2	
	○	2		2	
	○ ○	1		2	81
	○ ○	1		2	82

■ ■		2		2	83
		1		2	84
	○ ○	1		2	85
	○ ○	1		2	86
	○ ○	2		2	87
	○ ○	1		2	88
	○ ○	1		2	89
	○	1		2	
		1		2	90
		2		2	
		1		2	
		2		2	91
■		1		2	100
		2		2	101
	○	1		2	93

■ ■		1		2	
	○	1		2	
	○ ○VLSI	2		2	94
	○ ○	1		2	95
	○ ○	1		2	96
	 ○	1		2	97
	○	2		2	
		2		2	98
	○ ○	1		2	103
	○ ○	1		2	99
■ ■	○ Ⅰ ○ Ⅰ			6	104
	○ Ⅱ ○ Ⅱ			4	105

(Corporate Environmental Management)

/ Yasunori HEGI /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	事業経営における環境マネジメントの手法の変遷と現状を理解する。
技能	Ⅱ	◎	工場等における環境管理係長業務を実施できる。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	○	環境マネジメントの課題とこれからのあり方について、検討できるようになる。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

企業環境マネジメント論

/Course Description

An environmental problem of Japan has changed from the industrial pollution problem on the highly developed economic growth period to the global environmental problem. And an environmental management in the business has chenged too from directly regulations to the combined technique which contains an economical technique and independent controls.
This lecture will be going to think the problem and solution in the case study of actually business management. To do the jobs in charge of environmental control subsection chief in the factories.

/Textbooks

isutribution of original textbook.

(○) /References Available in the library: ○

References are introduced in lecture, if necessarry.

(Corporate Environmental Management)

/Class schedules and Contents

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14.
15.
1. Promotion of Environmental control measures in the company
2. History of environmental problem
3. The environmental various lows around the company
4. Outline of the each environmental lows (air, water, etc.)
5. Outline of the basic law for establishing the recycling-based society
6. Outline of the environmental management system
7. Cons ruction of the environmental management system
8. Environmental accounting & Environmental material flow cost
9. Outline of corporate social responsibility & management
10. Practice of the environmental management in the factories
11. Practice of the environmental assessment
12. Practice of the environmental consultation business
13. Measures of the global environmental problem
14. Views of the environmental management
15. Generalization

/Assessment Method

50% 50
Report 50% Matching to class 50

/Preparation and Review

/Remarks

PC
Resume or texts will be distributed at each time. The lecture will be given by powerpoints and handouts, using a PC and a projector, when necessary.

This course is taught in Japanese.

Ways of the preparation and review for the class are suggested from theteacher.

/Message from the Instructor

/Keywords

(The Creation　Protection and Utilization of Intellectual Property)

/ Masashi INOUE /

/Instructor

/Year　　/Credits　2　/Semester　2　/Class Format　　/Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

/Department

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	知的財産権に関する法律を理解する。
技能	Ⅱ	◎	知的財産権に関する法律の知識を運用できる。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	○	技術者としての自らの知的財産権の重要性に関心をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

知的財産の生産と活用

/Course Description

The purpose of the intellectual property rights system is to promote development of the culture and the industrial development of our country by planning protection and the use of the right about the intellectual property which is result of the human intellectual activity.
The aim of this course is understanding of the laws about the intellectual property and the acquisition of practical knowledge based on an example.

/Textbooks

To be announced in class.

(　○　) /References　Available in the library: ○

To be announced in class.

(The Creation　Protection and Utilization of Intellectual Property)

/Class schedules and Contents

1
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15

1 About Intellectual property
2 A legal definition of the Invention and Patent system
3 Conditions for Patentability
4 Right to patent and Service invention
5 Patent application, Examination and Registration
6 Leagal effect, Infringement and License
7 Prior art search and Patent map
8 Research actibity and Intellectual property
9 Claim, Description 1
10 Claim, Description 2
11 Design Right
12 Trademark Right
13 Copyright 1
14 Copyright 2
15 Some others on Intellectual property

/Assessment Method

report 30%
mini examination 30%
efforts attitude to class 40%

/Preparation and Review

/Remarks

To prepare before class, and to review after class.
Positiveness and cooperativeness are asked for a member of a class.

/Message from the Instructor

/Keywords

Intellectual property
Patent

○Academic Presentation I

(Academic Presentation I)

/ Kiyomi OKAMOTO /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, ,

/Department

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	学術的な場面において、英語を用いてコミュニケーション活動ができる。
思考・判断・表現	Ⅲ	○	適切な英語表現を用いて研究成果を伝えることができる。
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※自コースのカリキュラムマップを確認してください。

Academic Presentation I

/Course Description

The ability to give a presentation is essential for both engineers and researchers. This course fosters the skills necessary for an effective presentation and explores strategies for academic success. By the end of this course students should
have a basic knowledge of how to give a presentation in English. They are also required to make a poster presentation.

/Textbooks

The Essential Guide for Academic Presentations. (by Makiko Tanaka) Macmillan Language House. ¥2,100.

(○) /References Available in the library: ○

To be announced in class

/Class schedules and Contents

Week 1. Course Introduction
Week 2. What is an Academic Presentation?
Week 3. Preparing for Presentations
Week 4. Understanding Your Audience
Week 5. Gathering Ideas
Week 6. Reading a Scientific Paper: Focusing on Grammar
Week 7. Reading a Scientific Paper: Focusing on Vocabulary
Week 8. Reading a Scientific Paper: Evaluation
Week 9. Reading a Scientific Paper: In-class Presentation
Week 10. Writing a Draft: Organizing the structure of a presentation
Week 11. Writing a Draft: Plagiarism
Week 12. Writing a Draft: Revising and Proofreading
Week 13. Creating Effective Poster Presentations
Week 14. Rehearsing Your Poster Presentation
Week 15. Final Poster Presentations

/Assessment Method

Participation: 20%
Assignments: 20%
In-class Presentation: 30%
Final Poster Presentation: 30%

/Preparation and Review

/Remarks

Each class of this course will be limited to about 15 students. Should more students apply for this class, they are expected to take a placement test or submit their score of an official test (TOEFL, TOEIC, IELTS, or GTELP etc) before their course registration, and each applicant will be alloted according to his or her English proficiency. Students need to prepare for the next class in advance. Prepare for the next class in advance and review each class.

○Academic Presentation I

(Academic Presentation I)

/Message from the Instructor
More and more Japanese companies move toward internationalization. This trend makes it even more important to acquire the presentation skills to persuade an audience. This course will help you give a more effective presentation in an international meeting and improve your academic English skills for your future success. Get ready for the next class theme, and review all the information.

/Keywords
academic presentations, English, international convention

○Academic Presentation II

(Academic Presentation II)

/ Kiyomi OKAMOTO /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, ,

/Department

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	学術的な場面において、英語を用いたコミュニケーション活動ができる。
思考・判断・表現	Ⅲ	○	適切な英語表現を用いて研究成果を発信し、内容について議論することができる。
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※自コースのカリキュラムマップを確認してください。

Academic Presentation Ⅱ

/Course Description

The ability to give a presentation is essential for both engineers and researchers. This course fosters the skills necessary for an effective presentation and explores strategies for academic success. By the end of this course students should
have a basic knowledge of how to give a presentation in English. They are also required to make a poster presentation.

/Textbooks

The Essential Guide for Academic Presentations. (by Makiko Tanaka) Macmillan Language House. ¥2,100.

(○) /References Available in the library: ○

To be announced in class

/Class schedules and Contents

Week 1. Course Introduction
Week 2. What is an Academic Presentation?
Week 3. Preparing for Presentations
Week 4. Understanding Your Audience
Week 5. Gathering Ideas
Week 6. Reading a Scientific Paper: Focusing on Grammar
Week 7. Reading a Scientific Paper: Focusing on Vocabulary
Week 8. Reading a Scientific Paper: Evaluation
Week 9. Reading a Scientific Paper: In-class Presentation
Week 10. Writing a Draft: Organizing the structure of a presentation
Week 11. Writing a Draft: Plagiarism
Week 12. Writing a Draft: Revising and Proofreading
Week 13. Creating Effective Power Point Presentations
Week 14. Rehearsing Your Power Point Presentation
Week 15. Final Power Point Presentations

/Assessment Method

Participation: 20%
Assignments: 20%
In-class Presentation: 30%
Final Poster Presentation: 30%

/Preparation and Review

/Remarks

Each class of this course will be limited to about 15 students. Should more students apply for this class, they are expected to take a placement test or submit their score of an official test (TOEFL, TOEIC, IELTS, or GTELP etc) before their course registration, and each applicant will be alloted according to his or her English proficiency. Students need to prepare for the next class in advance.

○Academic Presentation II

(Academic Presentation II)

/Message from the Instructor
More and more Japanese companies move toward internationalization. This trend makes it even more important to acquire the presentation skills to persuade an audience. This course will help you give a more effective presentation in an international meeting and improve your academic English skills for your future success. Prepare for the next class and review each class. Get ready for the next class theme, and review all the information.

/Keywords
academic presentations, English, international convention

(Business and Engineering Ethics)

/ Genji HOTTA / , / Hiroyuki TSUJII /
/Instructor

2 1
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	問題の発見とリスクの定量的見積り、業界や立場に応じた行動、周囲との協働や調整のような実務能力を獲得する。
思考・判断・表現	Ⅲ	○	業界や立場に応じた行動、周囲との協働や調整を行える。
関心・意欲・態度	Ⅳ	○	倫理を現実社会の中で展開できる。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

工学倫理特論

/Course Description

The aim of engineering ethics is to put ethics into practice in actual situation; that is it’s most important role.
Various skills are required by engineers to protect their colleagues, organization, and themselves from potential crises. These skills include problem finding, quantitative risk assessment, acting according to industry rules and ones position, and cooperating with others and adjusting to circumstances. This course fosters students’ ability to propose realistic ethical policies through case studies and case method learning.

-Participants will become to explain the difference of value between managers and engineers on products and services safety.
-Participants will become to explain the meaning of ethical attitude understanding limits of compliance on guaranteeing safety on products, services and production processes.
-Participants will become to understand and apply the method of risk assessment.
-Participants will become to find and analyze safety risk factors at campus, and suggest improvement.
-Participants will become to design the communication framework on the safety risk, and explain it.

/Textbooks

2008)

(○) /References Available in the library: ○

(2003)

(Business and Engineering Ethics)

/Class schedules and Contents

1.	4	16	1	-3
2.	4	23	1	-3
3.	5	14	1	-3
4.	5	21	1	-3
5.	6	4	1	-3

1. Safety and Ethics; Different Viewpoint between Managers and Engineers	Apr-16, Sat; 1-3 periods
2. Safety Law and regulation and Ethics	Apr-23, Sat; 1-3 periods
3. Ethical Risk Assessment	May-14, Sat; 1-3 periods
4. Workshop: Exploring Safety Risk Factors in Campus	May-21, Sat; 1-3 periods
5. Risk Communication	Jun-04, Sat; 1-3 periods

/Assessment Method

	1	20%
	5	25%
	4	20%
	4	20%
	1	15%

Final report on "Safety and Ethics"	20%
Reflection of each class work 5times	25%
Group presentation on preparation and questions (4times)	20%
Group presentation on in-class exercises (4times)	20%
Group presentation on in-class workshop's result (1time)	15%

	A4	12pt	2000
Final report	Format (A4 size	12pt	2000 charactors in Japanese

96+

90+

85+
80+
75+
70+
65+
60+
-59

Assessment standard for reports.
96+: Attained well understanding of engineer's view point and chose realistic solution policy based on extracting essence of the problem and its classification.
90+: Attained well understanding of the point of engineering ethics and tried to explore realistic solution policy based on thinking of focus social circumstances, status of casts of the question story, and extracting essence of the problem.
85+: Attained well understanding of the point of engineering ethics and considered ethical solution policy based on deliberating of status of cast of the question story.
80+: Attained considering ethical solution policy based on deliberating the point of engineering ethics and cast of the question story.
75+: Attained understanding the point of problem and considering solution policy in engineering ethics' sense.
70+: Attained understanding the point of problem and considering solution policy of one's own point of view.
65+: Attained understanding the point of problem and expressed one's own opinion on it.
60+: Attained understanding the point of problem, but just expressing impression like some others on it.
-59: Not Attained understanding engineering ethics, and just expressing one's own opinion and impression unrelated to questions. Nor understanding meaning of the question.

Evaluation Standard for in class practice and presentation are followed to the standard for report above.

/Preparation and Review

/Remarks

(Business and Engineering Ethics)

/Remarks

1 5
Given as intensive course on Saturday in 1st semester.

Read corresponding section of specified textbook before class.

Give notice to the instructor beforehand when you are absent for unavoidable reasons.

H29 2017
Course not given in 2017 semesters.

Japanese is language used in class.

/Message from the Instructor

It searches for the content of "Ethics" problem frequently caught up with media from the aspect of engineering that we major in recently. The event that actually occurs from progressing logic is made a teaching material in the lecture, and everyone thinks something to be an engineering ethics together.

/Keywords

○

(Environmental Principles)

/Instructor / Hiroyuki TSUJII / , / Tetsuya KUSUDA /
/ Masatsugu CHIJIIWA / , / Noritugu KIMURA /

/Year /Credits 2 /Semester 1 /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境問題を解決していくための思考の仕方を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	環境問題を正しく認識し、実践的活動に応用できる能力を身に付ける。
関心・意欲・態度	Ⅳ	○	環境問題に関心を持ち、技術者としての社会的責任・論理観を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境原論

/Course Description

How do we recognize the fact, pick up problem and try to resolve them, when we think of the Environmental Issues? At this course, we will learn several theories to consider the Environmental Issues essentially, and practice to think of problems deeper using theories. Then, we try to attain a way of own thinking, deconstructing existing flamework.

/Textbooks

Handouts are distributed if necessary.

(○) /References Available in the library: ○

Introduce some references in class.

○

(Environmental Principles)

/Class schedules and Contents

1. (1) ;
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4. (4)
5. (1)
6. (2)
7. (3)
8. (4)
9. (5)
10. (1)
11. (2)
12. (3)
13. (4)
14. (5)
15. (6)

1. Environmental philosophy (1) Environmental Principles; its structure and factors
2. Environmental philosophy (2) Environmental Problems and Mechanism of Economy, Technology, Religion and Culture
3. Environmental philosophy (3) Target of Sustainable Society
4. Environmental philosophy (4) Application Exercise and Presentation
5. Theory of Justice (1) Normative Thinking for Environmental Problems
6. Theory of Justice (2) Deontology and Teleology
7. Theory of Justice (3) Corrective Justice and Distributive Justice
8. Theory of Justice (4) Application Exercise
9. Theory of Justice (5) Presentation
10. Human Rights and Environmental Ethics (1) Human Dignity
11. Human Rights and Environmental Ethics (2) Environment and Our View-point of the World
12. Human Rights and Environmental Ethics (3) Rights to Life of Nature
13. Human Rights and Environmental Ethics (4) Inter-generational Ethics
14. Human Rights and Environmental Ethics (5) Application Exercise
15. Human Rights and Environmental Ethics (6) Presentation

/Assessment Method

1) 60% 3 A4 12pt 1200
Report 60% Three times in the term, Pattern (A4 size 12pt 1200 charactors in Japanese

90+
80+
70+
60+
-59
-49

Evaluation Standard for Report
90+ Be able to develop thinking over expectation of instructor
80+ Be able to develop thinking applying knowledge provided in class
70+ Be able to develop thinking in the scope of knowldge provided in class
60+ Understood basic knowledge provided in class
-59 Not understood knowledge provided in class
-49 Not attained knowledge in class

2) 40% 3
In class practice and presentation 40% Three times in the term

Evaluation Standard for in class practice and presentation
Followed to the standard for report above.

/Preparation and Review

/Remarks

○

(Environmental Principles)

/Remarks

Basic knowledge on Environment studies is required to participate in discussions.

2016 2017
Official language: Japanese in 2016 academic term *English in 2017 academic term

/Message from the Instructor

This course provides opportunities for deliberate thinking besides for acquisition of knowledge on environmental issues.

/Keywords

Sense of environment, Value of environment, Ethics, Sustainability, Human-being, Nature, Society.

(Internship)

/Instructor

/Year /Credits 2 /Semester 1 /2 /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

/Department

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		与えられた学外研修に必要な知識を身に付けるとともに、業界や企業等に対する理解を深める。
技能	Ⅱ		実践的学外研修を通して、各分野のスペシャリストとして必要な素養と技能を身に付ける。
	Ⅲ		実践的な場で求められる思考力、自己表現力、俯瞰的な視点に基づく判断力を身に付ける。
関心・意欲・態度	Ⅳ		就業に対して強い関心と意欲を持ち、現場で生起した課題に実践的に取り組むことで課題解決力を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

学外特別研修（インターンシップ）

/Course Description

The objective of this couse is to provide a structured setting for understanding the transition between academic education and functional practice so that the two experiences complement and reinforce each other's value.
Students are expected to develop basic levels of skill and knowledge.

/Textbooks

none

(○) /References Available in the library: ○

none

(Internship)

/Class schedules and Contents

The schedule will be decided on the consultation with the company and student. For more information, please see the couse guidelines.

1.

2.

3.

4.

* Architectural Design Couse　:To acredit this course as the credit for eligibility for admission to examination of Japanese first-class architect. Each student will spend more than 60 hours in a participating architectural office which deals with architectural design, designer's supervision, structural design, site supervision, work supervision, etc..
Follows are examples of architectural office,
1. Architectural Design firms with recognized design stature: Predesign, Planning, and Schematic Design, including programming, client contact, developing goals and concepts, site analysis, schematic design, code research, building cost analysis, and design development
2. Architectural Equipment Design firms with recognized design stature
3. Architectural Structure Design firms with recognized design stature
4. General Construction Company which deals with site supervision, work supervision

/Assessment Method

Evaluated by reports of each student and reports from the conpany

/Preparation and Review

/Remarks

It is necessary to survey on the work of company.

The schedule will be decided on the consultation with the company and student. For more information, please see the couse guidelines.

(　　)

The trainer must be first or second-class architect or registered architectural equipment engineer.

/Message from the Instructor

* Architectural Design Couse　:To acredit this course as the credit for eligibility for admission to examination of Japanese first-class architect. Each student will spend more than 60 hours in a participating architectural office .
ex) more than 10 days x 6 hours/day, more than 2 weeks x 5 days/week

/Keywords

( )

(Introduction to the Environment and Resource Systems)

/Instructor

/Year /Credits 2 /Semester 1 /2 /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

/Department

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境資源システムコースを学んでいく上で必要な基礎的知識・技術を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境資源システム基礎 （環境資源システム）

/Course Description

In this class, you will learn basic theories and techniques that are essential for pursuing in the Environment and Resources System course. Course materials may include environment related applied engineering (such as environmental chemical analysis and water quality engineering) and environmental management (such as environmental risk assessment and environmental policy & administration). Class content is chosen through a preliminary discussion with your research supervisor.

/Textbooks

Selection of the instructors

(○) /References Available in the library: ○

Selection of the instructors

/Class schedules and Contents

The class is intended to incubate basic knowledge and techniques that are essential for pursuing in the Environment and Resources System course. Therefore the course content will be customized for your own.

/Assessment Method

Your research supervisor evaluates your grade based on the quality of understanding as well as attitude at the class.

/Preparation and Review

( )

(Introduction to the Environment and Resource Systems)

/Remarks

Follow your research supervisor's instruction, and make efforts on class preparation and brush-up.

This course needs a separate application to the Teaching and Education Division other than the regular course subscription. Consult with your supervisor how you can join this course.

/Message from the Instructor

You need to make efforts outside of your class as well to master course materials and relevant matters, which are performed more than following your research supervisor's instruction.

/Keywords

○

(Chemistry of Energy: Reaction Kinetics)

/ Fumiaki AMANO / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	化学平衡と反応速度に関する深い知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	物質のエネルギー論の本質を的確に捉える思考力を修得する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ	◎	資源の有効利用や環境問題に関心をもち、化学技術者の立場から適切に対処する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

エネルギー化学

/Course Description

Electron transfer reaction is the most important process to take place in energy conversion processes, for example, in photosynthesis as well as in electrolysis and battery reactions. Knowledge of electron transfer chemistry, i.e. electrochemistry, is required for controlling a variety of energy conversion processes. Students learn fundamentals of electrochemistry in the viewpoints of chemical equilibrium and kinetics.
This lecture aims at understanding the following topics in electrochemistry: (1) electrode potential; (2) kinetics of electron transfers; and (3) relationship between current density and overpotential.

/Textbooks

— 3,675

(○) /References Available in the library: ○

2,500

1,800

2,200

/Class schedules and Contents

1 guidance
2 energy and chemical equilibrium
3 control of electrode potential
4 Nernst equation
5 standard electrode potential
6 photoexcitation and electron transfer
7 — photosynthesis—natural photoelectrochemical system
8 mid-semester test
9 reaction driving force and kinetics
10 kinetics of interfacial electron transfer
11 energy levels of molecules, reorganization energy
12 activation-free energy, Marcus theory
13 mass transport
14 cyclic voltammetry
15 terminal test

○

(Chemistry of Energy: Reaction Kinetics)

/Assessment Method

40% 60%

Grading will be based on active class participation (40%) and tests (60%).

/Preparation and Review

/Remarks

The students need knowledge of basic physical chemistry (thermodynamics and kinetics).
Bring the textbook into class and make good preparations.

/Message from the Instructor

Be interested in the issues of resources, energy, and environment and have a solid scientific foundation to clarify the essence of the issues from the viewpoint of chemical engineer.

/Keywords

energy, chemical equilibrium, electrode potential, electron transfer, activation energy

○

(Kinetics and Reaction Engineering)

/ Kenji ASAMI / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	化学プロセスの研究に必須な化学反応速度論、反応機構、界面現象などの基礎知識・技術を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	反応物から生成物への化学変化を支配する物理化学の本質を捉え、実際の反応を設計する論理的思考力を修得する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ	○	資源の有効利用や環境問題を解決する化学反応に対し、反応速度、反応機構の面からアプローチする意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

化学反応工学

/Course Description

1.
2.

The objectives of this class is :
1. Thorough study on the theory of chemical reaction kinetics and reaction mechanism for the students to apply it to their own research work.
2. Presentation by every student about his/her own research from the view point of reaction kinetics and mechanism and discussion with other students.

/Textbooks

1.
2.

(○) /References Available in the library: ○

Nothing specified

/Class schedules and Contents

1			Guidance Introduction
2	(1)		Theory of reaction kinetics (1) Rate equation
3	(2)		Theory of reaction kinetics (2) First order kinetics
4	(3)		Theory of reaction kinetics (3) Second order kinetics
5	(4)		Theory of reaction kinetics (4) Arrhenius equation
6	(1)		Theory of reaction mechanism (1) Elementary reaction
7	(2)		Theory of reaction mechanism (2) Steady state approximation
8	(3)		Theory of reaction mechanism (3) Chain reaction
9	(4)		Theory of reaction mechanism (4) Transition state theory
10	(1)		Theory of adsorptiom (1) Adsorption phanomenon
11	(2)		Theory of adsorptiom (2) Adsorption mechanism
12	(3)	L-H	Theory of adsorptiom (3) Langmuir-Hinshelwood rate equation
13	(1)		Presentation (1)
14	(2)		Presentation (2)
15			Discussion

/Assessment Method

(40%) (40%) (20%) Presentation(40%), Communication(40%), Contents(20%)

○

(Kinetics and Reaction Engineering)

/Preparation and Review

/Remarks

1.
2.

It is important to consider the relation between your own work and reaction kinetics and mechanism.

/Message from the Instructor

/Keywords

○

(Reaction Design and Engineering)

/ Hiroyuki IMAI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	物質の特性に基づいた反応設計に関する知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	化学反応の特性を捉え、反応設計において現出する問題を克服するための論理的思考力を修得する。
	Ⅲ－２	○	化学反応の特性に基づいた設計を最適化し、合理的に行うための能力を修得する。
	Ⅲ－３		
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

反応設計工学

/Course Description

The essences of chemistry and chemical engineering lead to any advanced technologies for environmental protection at outlet of social system in atmosphere, water, land and waste; eco-friendly engineering and design for energy, petrochemical and chemistry. In this class, synthesis methods and reaction designs for construction of eco-friendly processes will be shown on the basis of chemistry and chemical engineering.
The objective in this class is to learn knowledge on the basis of chemistry and chemical engineering in a variety of fields for dealing with environmental issues.

/Textbooks

Not designated

(○) /References Available in the library: ○

○ 2013 2,800

/Class schedules and Contents

1. guidance
2. unit
3. energy & resources
4. / hydration and dissolution (1)
5. / hydration and dissolution (2)
6. / hydration and dissolution (3)
7. presentation (1)
8. presentation (2)
9. adsorption and desorption
10. ion exchange
11. green chemistry
12. catalysis technology
13. / zeolite
14. presentation (3)
15. presentation (4)

/Assessment Method

/ active participation in class 20%
/ presentation & assignment 80%

○

(Reaction Design and Engineering)

/Preparation and Review

/Remarks

Prepare to knowledge for lecture item

/Message from the Instructor

Try to discuss

/Keywords

○

(Applied Catalysis)

/ Katsutoshi YAMAMOTO / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	石油精製・石油化学産業における代表的な触媒プロセスについて、用いられる触媒及び触媒反応についての知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	触媒反応に関する英語の最新の文献を読み、反応の本質を理解する能力を修得する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ	○	触媒反応に関する英語の最新の文献を、他の学生が理解できるように発表すると共に、他の学生の発表を聞き、その内容について質問・議論できる態度をもつ。

※◎：強く関連　○：関連　△：やや関連

※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。

※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

応用触媒工学

/Course Description

Catalysts are indispensable for chemical industries. In this course, the roles and the properties of various catalysts actually employed in industrial chemical processes will be studied.

/Textbooks

/Not designated

(○) /References Available in the library: ○

2013 2,800

/Class schedules and Contents

1 /Guidance
2 /Cracking -reactions process-
3 /Cracking -catalysts-
4 /Reforming -reactions process-
5 /Reforming -catalysts-
6 /Hydrodesulfurization -reactions process-
7 /Hydrodesulfurization -catalysts-
8 /Other catalytic processes
9 /Presentations and discussion 1
10 /Presentations and discussion 2
11 /Presentations and discussion 3
12 /Presentations and discussion 4
13 /Presentations and discussion 5
14 /Presentations and discussion 6
15 /Summary

/Assessment Method

/ Participation 20%
/ Presentation and Report 80%

/Preparation and Review

○

(Applied Catalysis)

/Remarks

At the final part of the schedule, you have to make a presentation on catalytic processes referring at least one scientific paper written in English.

/Message from the Instructor

Constructive participation is highly expected.

/Keywords

○

(X-ray Spectroscopy)

/ Takuya SUZUKI / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	固体試料に対する分光法を用いた構造解析手法についての知識を修得する。
技能	Ⅱ	△	結晶構造表記法を理解するとともに、ソフトウェアを用いて構造解析を行う手法を修得する。
思考・判断・表現	Ⅲ－１	○	構造解析を念頭に置いた結晶構造や対称性に関する思考力及び判断力を修得する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

分光分析論

/Course Description

X

X

International tables X

○International tables
○

When beginner analyst start to the structure analysis by X-ray diffraction, select of a space group is the first gateway.　At this class, the reading of International tables used as the foundations of a space group classification is studied first. After touching the theory of diffraction, fitting by the Rietveld method for actual powder X-rays data will be performed by themselves.

Purpose:
Study of how to read international tables
Study of how to measure the X-ray powder diffraction

/Textbooks

X – ( ), ( ), X ( )

(○) /References Available in the library: ○

○

○

(X-ray Spectroscopy)

/Class schedules and Contents

1
2 I
3 II
4 III
5 I
6 II
7 I
8 II International Tables
9 III
10 IV
11 RIETAN
12
13
14
15

1 Introdaction
2 Symmetry and crystallography (what is symmetry operation?)
3 Symmetry and crystallography (space group)
4 How to read the information of International tables
5 Review of quantum dynamics
6 X-ray diffraction intensity
7 Symmetry and a crystal stracture
8 Symmetry and a crystal stracture II
9 A structural change and diffraction pattern change
10 A powder X-rays setup for structure elaboration
11 The Rietveld method and fitting program RIETAN
12 Installation and initialization of a program
13 Pattern fitting
14. Parameter setting
15 Analysis procedure

/Assessment Method

Report:
theme: the result of analize for XPD data by Rietveld method

/Preparation and Review

/Remarks

X

This class base on to the textbook., so each student has to bring the textbook and reference, and to prepare for attending each class.

/Message from the Instructor

/Keywords

○

(Separation and Purification Engineering)

/ Syouhei NISHIHAMA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	物質の分離精製手法に関する知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	物質を分離精製するための問題点の本質を捉え、解決法を模索する論理的思考力を修得する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ	○	資源の有効利用や環境問題に対し、物質の分離技術の適用の可能性を探索する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

分離精製工学

/Course Description

Separation and purification of materials are one of the important technologies in the chemical industries. In this lecture, hydrometallurgical technology and process, especially ion exchange and solvent extraction, are introduced. The review of the latest literature related to the hydrometallurgy is also given.
Goal of this lecture is to learn principles of hydrometallurgical technologies and to understand thier role in actual processes.

/Textbooks

Textbooks are shown in the class.

(○) /References Available in the library: ○

References are shown in the class.

○

(Separation and Purification Engineering)

/Class schedules and Contents

1
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1. Outline of hydrometallurgical process
2. Outline of ion exchange
3. Ion exchangers
4. Solvent impregnated resins
5. Chromatographic separation
6. Application of ion exchange to water treatment
7. Application of ion exchange to hydrometallurgy
8. Literature review related to ion exchange
9. Outline of solvent extraction
10. Extractants for hydrometallurgy
11. Slope analysis method
12. Mixer-settler cascade
13. Solvent extraction combined with chemical reaction
14. Application of solvent extraction to hydrometallurgy
15. Literature review related to solvent extraction

/Assessment Method

60%
40%
Excersize 60%
Presentation 40%

/Preparation and Review

/Remarks

Knowledge of chemical engineering does be required.
Content shown in every class should be reviewed.

/Message from the Instructor

/Keywords

○

(Solid State Materials Chemistry)

/ Xiaohong LI / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	結晶化学に基づく「構造」、無機・物理化学に基づく「物性」、及び物理化学で取り扱われる化学反応など知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	原子・分子レベルから固体材料の特性を評価する思考力を修得する。
	Ⅲ－２	○	固体材料の構造と特性の関連性を思考する力を修得する。
	Ⅲ－３		
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

固体材料化学

/Course Description

This course provides fundamentals of solid-state chemistry and materials chemistry. Students can learn the chemical aspects of inorganic solid materials, based on structure of crystal chemistry, physicality of chemistry, and chemical reactions in phyciochemistry. The structure-physicality relationship will be revealed by instrumental analyses.

/Textbooks

L.Smart E. Moore

(○) /References Available in the library: ○

S. E. Dann

/Class schedules and Contents

1 / An introduction to Crystal Structures
2 /Close-Packing and Symmetry
3 / Lattices and Unit Cells
4 /Crystalline Solids
5 /Lattice Energy
6 X /X-ray Diffraction
7 /Preparative Methods-Ceramic Methods
8 /Preparative Methods-Sol-Gel Methods
9 /Preparative Methods-Hydrothermal Methods
10 /Bonding in Solids and Electonic Properties
11 /Lattice Defects
12 / low dimension Solid Properties
13 /Zeolites and Related Structures
14 / Magnetic and Dielectric Properties and Superconductor
15 /exercise

/Assessment Method

/report 50%
/presentation 50%

/Preparation and Review

○

(Solid State Materials Chemistry)

/Remarks

Bring a calculator.

Review the knowledge of inorganic chemistry.

/Message from the Instructor

/Keywords

○

(Process Design)

/ Kazuharu YOSHIZUKA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	化学反応プロセスと分離プロセスに関する知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	生産システムである反応プロセスと分離プロセスの個々の問題点及び連携することで生じる問題点を捉え、解決法を生み出す論理的思考力を修得する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ	○	化学反応プロセスと分離プロセスの最適化やこれらを連携したときの最適化によるエネルギーや資源の有効利用、環境問題への貢献の可能性を見出す意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

プロセス設計学

/Course Description

For production with chemical reactor and bio-reactor, The combination of each chemical process is mostly important, together with optimization of reaction process and separation processes. Since the cost of the total separation processes are occupied 2/3 in whole production processes, the choices of optimal separation processes as well as their efficiency improvement are the most important key factors. In this lecture, the overview of reaction and separation processes is mentioned, together with elemental technologies and their application fields.

Goals are as follows:
Understanding of the design methods of reactors
Understanding of the design methods of separation unit operations

/Textbooks

/ N.A.

(○) /References Available in the library: ○

/ Appropriate materials are introduced during a lecture.

○

(Process Design)

/Class schedules and Contents

1 / Overview of process design
2 / Fluid dynamics
3 / Heat transfer
4 / Mass balance and heat balance
5 / Overview of reaction process
6 / Reaction engineering
7 / Overview of separation process
8 / Distillation
9 / Extraction
10 / Ion exchange and adsorption
11 / Membrane separation
12 / Overview of production process
13 / Topics on production processes
14 / Engineering management
15 / Summary

/Assessment Method

/ report 50%
/ Presentation 50%

/Preparation and Review

/Remarks

/ The materials are hand out by printed matters.
/Prepare for attending every classes.

/Message from the Instructor

To constructing the efficient production process, combination optimization is quite important, together with selection of proper reaction and separation processes. We wish to become you talented engineered to correspond with the suitable design of production process in future.

/Keywords

/ Process design, Unit operation, Reaction engineering, Separation engineering

○

(Advanced Materials Systems I)

/ Seung-Woo LEE / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	先端材料の設計、構造・機能制御に関する知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	分子・原子レベルでの材料の構造と特性を理解するための理論的思考力を修得する。
	Ⅲ－２	○	情報通信、エネルギー、環境、医療などの分野に利用可能な先進マテリアルの構造解析と機能評価に必要な思考力を修得する。
	Ⅲ－３		
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

先端材料システム

/Course Description

Our life style has been greatly changed by the newly discovered and developed materials. The advancement of new technologies such as nanotechnology and biotechnology, which have changed the basis of the conventional material technology, have influenced a lot of fields such as telecommunication, energy, environment, and medical. This lecture has a goal to understand recent topics regarding advanced materials, including characteristics and functions at atomic or molecular levels and their structural accessment.

/Textbooks

Special text books are not used. Instead, materials for the lecture are handed out when they are needed.

(○) /References Available in the library: ○

References will be properly introduced during the lecture.

○

(Advanced Materials Systems I)

/Class schedules and Contents

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1 Introduction of the class
2 Current status and future of materials chemistry
3 What are advanced materials?
4 History of advanced materials
5 Classification and characteristics of advanced materials: Size and function
6 Classification and characteristics of advanced materials: Molecular recognition
7 Classification and characteristics of advanced materials: Supramolecular chemistry
8 Intermediate summary
9 Analysis of advanced materials: Surface assessment
10 Analysis of advanced materials: Nanostructure
11 Evaluation of advanced materials: Functions
12 Evaluation of advanced materials: Structures
13 Application of advanced materials: Molecular information
14 Application of advanced materials: Information processing
15 Summary

/Assessment Method

/Presentation 70%
/Report 30%

/Preparation and Review

/Remarks

English references are often used. Reference search and presentation are also included in the class.
SEM, TEM, SPM XPS
The analytical equipments such as SEM, TEM, SPM and XPS will be outlined. It is recommended to confirm them at the instrumental center.

/Message from the Instructor

The aim of this class is to learn the basis of design and analysis methods of nanomaterials in the molecular level.

/Keywords

Aadvanced materials, Classification and characteristics of materials, Analytical techniques

○

(Polymer Chemistry)

/ Isamu AKIBA / 19

/Instructor

/Year 2 /Credits 2 /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	高分子の合成、物性に関する知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	複雑な系を単純化し、材料特性の起源の本質を理解するための論理的思考力を修得する。
	Ⅲ－２	○	複雑な系ゆえに、その問題を解決するには多くの方法が考えられるが、その中から合理的なルートを見つけ出し、問題を解決する能力を修得する。
	Ⅲ－３		
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

高分子材料化学

/Course Description

1

This lecture explains an fundamental and advanced polymer syntheses, reactions and properties.
The target of this lecture is as follows.
(1) Understanding about configurational statistics of chain molecules
(2) Understanding about solution and solid properties of polymers, and their origins
(3) Understanding about principles of instrumentation for characterization

/Textbooks

Nothing in paticular

(○) /References Available in the library: ○

( )
Society of Polymer Science Japan ed. Fundamental Polymer Science (Tokyo Kagaku Dojin)

○

(Polymer Chemistry)

/Class schedules and Contents

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1 Chemical Structures of Polymers
2 Molecular Weight and Molecular Weight Distribution
3 Statistic Properties of Isolated Polymer Chain
4 Gaussian Chain
5 Lattice Theory
6 Osmotic Pressure, Vapor Pressure
7 Phase Equilibrium
8 Light Scattering
9 Viscosity of Polymer Solution
10 X-ray Scattering
11 Solid State Structure of Polymers
12 Crystallization of Polymers
13 Static Viscoelasticity
14 Dynamic Viscoelasticity
15 Rubber Elasticity

/Assessment Method

100%
Report 100%

/Preparation and Review

/Remarks

Prepare for attending every classes by studies by yourself.

/Message from the Instructor

/Keywords

I

(Advanced Chemical Processing for the Environment I)

○

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	化学反応や化学プロセスに関する専門的な学術、最先端の技術を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	化学プロセスを設計する上で必要な問題を認識し、解決する手法を理解する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ	○	環境問題に関して、化学技術者の立場から、問題の本質を明らかにし、対処する手法を理解する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境化学プロセス特論Ⅰ

/Course Description

This lecture aims to learn advanced science and engineering in chemistry and chemical processing.

/Textbooks

(○) /References Available in the library: ○

Distribution of documents when needed.

/Class schedules and Contents

1 / Guidance
2 / Lecture by Invited Lecturer 1 1 (Advanced Materials)
3 / Intensive Lecture 1 1 (Advanced Materials)
4 / Intensive Lecture 1 2 (Advanced Materials)
5 / Intensive Lecture 1 3 (Advanced Materials)
6 / Lecture by Invited Lecturer 1 2 (Advanced Materials)
7 / Exercise 1
8 / Lecture by Invited Lecturer 2 1 (Advanced Chemical Processing)
9 / Intensive Lecture 2 1 (Advanced Chemical Processing)
10 / Intensive Lecture 2 2 (Advanced Chemical Processing)
11 / Intensive Lecture 2 3 (Advanced Chemical Processing)
12 / Lecture by Invited Lecturer 2 2 (Advanced Chemical Processing)
13 / Exercise 2
14 / Report Preparation
15 / Summary

/Assessment Method

100%
Report 100%

/Preparation and Review

I

(Advanced Chemical Processing for the Environment I)

/Remarks

Improve understanding in class through self-directed learning.

/Message from the Instructor

Learn advanced science and technology in chemistry and process engineering.

/Keywords

II

(Advanced Chemical Processing for the Environment II)

○

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	化学反応や化学プロセスに関する専門的な学術、最先端の技術を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ－１	○	化学プロセスを設計する上で必要な問題を認識し、解決する手法を理解する。
	Ⅲ－２		
	Ⅲ－３		
関心・意欲・態度	Ⅳ	○	環境問題に関して、化学技術者の立場から、問題の本質を明らかにし、対処する手法を理解する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境化学プロセスコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境化学プロセス特論Ⅱ

/Course Description

This lecture aims to learn advanced science and engineering in chemistry and chemical processing.

/Textbooks

(○) /References Available in the library: ○

Distribution of documents when needed.

/Class schedules and Contents

1 / Guidance
2 / Lecture by Invited Lecturer 1 1 (Advanced Materials)
3 / Intensive Lecture 1 1 (Advanced Materials)
4 / Intensive Lecture 1 2 (Advanced Materials)
5 / Intensive Lecture 1 3 (Advanced Materials)
6 / Lecture by Invited Lecturer 1 2 (Advanced Materials)
7 / Exercise 1
8 / Lecture by Invited Lecturer 2 1 (Advanced Chemical Processing)
9 / Intensive Lecture 2 1 (Advanced Chemical Processing)
10 / Intensive Lecture 2 2 (Advanced Chemical Processing)
11 / Intensive Lecture 2 3 (Advanced Chemical Processing)
12 / Lecture by Invited Lecturer 2 2 (Advanced Chemical Processing)
13 / Exercise 2
14 / Report Preparation
15 / Summary

/Assessment Method

100%
Report 100%

/Preparation and Review

II

(Advanced Chemical Processing for the Environment II)

/Remarks

Improve understanding in class through self-directed learning.

/Message from the Instructor

Learn advanced science and technology in chemistry and process engineering.

/Keywords

○

(Environmental Biology)

/ Naoko UEDA /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境と生物の関わりを理解するために必要な基礎的かつ専門的知識を修得する。
技能	Ⅱ	○	環境と生物の関わりから発生する現実の諸問題の解決に、身に付けた専門的知識が適用可能であることを認識する。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	環境修復への生物機能の利用を現実的に考察し、解決策を導き出す力をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境生物学

/Course Description

In the water environment near the urban area, the excessive natural and artificial load by the human activities impact on the ecosystem. In this lecture, students will acquire practical knowledge of the phenomenon of eutrophication, the relationship between organic pollution and biological indicator, the conservation of environment, the material circulation and the recent research results.

/Textbooks

not specify

(○) /References Available in the library: ○

introduce as you think proper

○

(Environmental Biology)

/Class schedules and Contents

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1 Overview of environmental biology
2 Eutrophication and phytoplankton
3 Benthic organisms in coastal area
4 Organisms in intertidal zone
5 Organisms in tidal flat
6 Organisms in estuary
7 Organisms in river
8 Exercise(1)
9 Conservation and restoration in river environment
10 Bioremediation in coastal area
11 Urban fishery
12 Recent research result Indicator organisms)
13 Recent research result(bio-remediation)
14 Exercise(2)
15 Exercise(3)

/Assessment Method

40%
40%
20%
Assignments 40%
Mid-term Paper 40%
Active learning 20%
(based on attendance)

/Preparation and Review

/Remarks

Students are required the fundamental skills of biology, ecology and eco-engineering.

Official language for this subject: Japanese.
Request for English is necessary to talk over

/Message from the Instructor

/Keywords

○

(Introduction to Polymer Physics)

/ Kazuo SAKURAI /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	高分子物性を理解し、これを応用した新規な材料開発への知識を修得する。
技能	Ⅱ	○	高分子材料開発の基礎とその専門的応用能力を身に付ける。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	機能性材料や生体材料の研究開発への関心や意欲の向上を図る。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

高分子物性論

/Course Description

To conduct research on biopolymers and environmental materials, understanding physical properties of polymers is extremely important.This lecture explains physical properties of polymers.

Studying the several basic knowledge required in industrial field such as molecular distribution, crystallization, scattering, and rheology.

/Textbooks

/ ISBN-10: 4807906356

(○) /References Available in the library: ○

/Introduction to Polymer Physics (F. Tanaka) ISBN-10: 4785320567

○

(Introduction to Polymer Physics)

/Class schedules and Contents

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11
12 I
13 II
14 III
15

1 What is the Polymer
2 Single Chain Conformations
3 Configurations of Polymers
4 Conformations of Polymers
5 Crystalline State
6 Primary Crystallization
7 Secondary Crystallization
8 Rubber Elasticity
9 Viscoelasiticity
10 Dielectric Property
11 Interfacial Property
12 Polymer and Scattering I Colloid
13 Polymer and Scattering II Light scattering method
14 Polymer and Scattering III Molecular weight
15 Summary

/Assessment Method

100%
Report 100%

/Preparation and Review

/Remarks

Good preparations for classes and reviews after classes will enhance your performance.

/Message from the Instructor

/Keywords

○

(Computational Chemistry)

/ Kazuya UEZU / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
/Year of School Entrance									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	計算化学の分野を理解するために必要な基礎知識を修得する。
技能	Ⅱ	○	代表的な計算化学ソフトを使用して、その具体的な利用方法を修得する。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	計算化学がどのような課題に対して適用可能かについて、適宜、考えることができる。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

計算化学

/Course Description

Gaussian 09

Computational chemistry is a powerful tool that can provide increased insight and understanding of many complex topics. The rapid advances in computer hardware and software for computational chemistry over the last decade allow meaningful chemistry calculations to be performed on standard desktop computers. This lecture focuses on how we utilize the advantage of molecular modeling and related computational techniques to prepare the functional materials.

/Textbooks

Not specified.

(○) /References Available in the library: ○

ISBN 0-9636769-8-9
– ISBN 978-4-8079-0508-9
Introduction to COMPUTATIONAL CHEMISTRY JOHN WILEY & SONS ISBN 978-0-4700-1187-4

○

(Computational Chemistry)

/Class schedules and Contents

1
2
3
4
5 Gaussian03
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7
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9
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11 IR
12
13 NMR
14
15

1 Standard computational methods
2 Foundational principles for Quantum Mechanics
3 Approximate solution for the Schrödinger equation
4 Density Functional Theory
5 Software Gaussian03
6 Geometry optimization
7 Understanding the result files
8 Visualization of mocelular orbitals
9 Midterm exam
10 Vibrational frequencies
11 IR and Raman Intensity
12 Thermochemical analysis
13 NMR Shielding
14 Solvation models
15 Excited state

/Assessment Method

20%
30%
50%

Exercise 20%
Midterm exam 30%
Term exam & Final report 50%

/Preparation and Review

/Remarks

OS

Laptop computer with the Microsoft Windows Operating System.
To be announced in the first lecture.

Good preparations for classes and reviews after classes will enhance your performance.

/Message from the Instructor

Chemists and chemical engineers now have an additional tool available that is complementary to traditional experimental and theoretical techniques. So, I hope you can use the standard computational methods to deeply understand chemical phenomena.

/Keywords

○

(Computational Chemistry)

/Keywords
Quantum chemistry

○

(Biomaterials)

/ Koji NAKAZAWA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	生体材料の理解に必要な専門知識を修得する。
技能	Ⅱ	○	生体材料の設計や取り扱いに必要な技能を修得する。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	生体材料を用いるテクノロジーにおいて、問題の発見やその解決策を導き出す能力を修得する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

生体材料論

/Course Description

Biomaterial is any substance (other than drugs) or combination of substances synthetic and natural in origin, which can be used for any period of time, as a whole or as a system which treats, augments, or replaces any tissue, organ, or function of the body. In this lecture, we discuss the biomaterials.

/Textbooks

/ The materials are hand out by printed matters.

(○) /References Available in the library: ○

2011 2800
NTS 2012 52000

/Class schedules and Contents

1 / What are biomaterials ?
2 / Necessary conditions of biomaterials
3 / Biocompatibility
4 / Foreign matter reactions
5 / Biomaterials and biological reactions
6 / Surface design of biomaterials
7 / Safety testing
8 / Metals
9 / Ceramics
10 / Polymers
11 / Composites
12 1 / Presentation and Discussion 1
13 2 / Presentation and Discussion 2
14 / Discussion
15 / Summary

/Assessment Method

30%
Active participation to the class
70%
Report

/Preparation and Review

○

(Biomaterials)

/Remarks

/Official language for this subject　Japanese unless specified.

Good preparations for classes and reviews after classes will enhance your performance.

/ To be announced in the class.

/Message from the Instructor

This lecture supports a student studying the field of animal cell culture, tissue engineering, and DDS.

/Keywords

○

(Ecological Management)

/ Akira HARAGUCHI / 19 , / Yasuyuki HASHIDOKO /
/Instructor

2 1
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	各自の専攻分野と生態系管理学との接点に関して理解すること。
技能	Ⅱ	○	生態系管理学に関する簡単なレビューができること。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	各自の専門分野において、生態系管理学に関する知識を活用する手法について考察すること。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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生態系管理学

/Course Description

Methods for conservation and management of ecosystems based on ecological sciences will be explained with special reference to function of population and community, interaction between chemical environments and biological function, and mutualism between species. Interaction between biosphere and soil-hydrosphere, and interactive analysis between environment and organisms based on physiology and molecular biology will be discussed including recent research. The aim of this lecture is to get fundamental knowledges of ecology in order to express one's opinion for every environmental problem. Every student is required to present a mini review concerning ecological management in a seminar.

/Textbooks

/ Nothing

(○) /References Available in the library: ○

/ Show references within the lecture

○

(Ecological Management)

/Class schedules and Contents

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1 Structure and function of ecosystems (overview)
2 Population ecology (1) Theory for population growth
3 Population ecology (2) Factors affecting population growth
4 Community ecology (1) Competition and predation
5 Community ecology (2) Mutualism
6 Community ecology (3) Resources and niche
7 Ecosystems (1) Energy flow
8 Ecosystems (2) Matter cycling
9 Index of biodiversity and theory
10 Theory of production
11 Production of population
12 Matter cycle and chemical ecology
13 Mutualism in rhizosphere
14 Seminar (1) Presentation about population and community
15 Seminar (2) Presentation about ecosystem and biodiversity

/Assessment Method

100%
Seminar presentation 100%

Some are requested to submit a report instead of seminar presentation.

/Preparation and Review

/Remarks

Preperation for mini review is required. Official languages for this subject are English and Japanese.

Fundamental knowledge of biology and ecology is required.

You are recomemnded to check the title of every class in advance, and read again the document provided in every class.

/Message from the Instructor

Fundamental knowlegde of conservation and management of ecosystems will be explained easily. The knowledge is necessary for practical official management of environmental management and protection.

/Keywords

Ecosystem, Population, Community, Diversity, Matter production

○

(Biosensor Engineering)

/ Takaaki ISODA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	バイオセンサの基礎を理解し、これを応用した新規な生物検出系開発の知識を修得する。
技能	Ⅱ	○	生物応答、細胞認識、抗原抗体反応等の生物のしくみを応用したデバイス開発の専門的応用能力を身に付ける。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	最先端のバイオセンサやバイオデバイスの研究開発への関心や意欲の向上を図る。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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生物センサー工学

/Course Description

Attainment target is shown below :
This lecture explain an electrochemistry for measurement of biochemical substances and the mechanism of chemical reactions.

/Textbooks

A textbook is introduced at first guidance in this lecture.

(○) /References Available in the library: ○

–

○

(Biosensor Engineering)

/Class schedules and Contents

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1 Metabolism
2 Products and intermediates made from a metabolism
3 Cell function and the surface structure
4 Electrochemical measurement Enzyme electrode measurement
5 Electrochemical measurement QCM measurement
6 Electrochemical measurement SPR measurement
7 The principle of sensing Peptide modification
8 The principle of sensing DNA & RNA modification
9 The principle of sensing Protein & Antigen modification
10 Micromachining technology making of a semiconductor Photolithography
11 Micromachining technology making of a semiconductor Nanolithography
12 Use biomaterial for sensing Cytokine
13 Use biomaterial for sensing Protein & Peptide
14 Use biomaterial for sensing Cells & Tissue
15 Summary

/Assessment Method

90%
10%
Final exam 90%
Report 10%

/Preparation and Review

/Remarks

Good preparations for classes and reviews after classes will enhance your performance.

/Message from the Instructor

You will learn at this lecture that a biosensor is composed of a function of living matters and electronics. If you would like to get more knowledge, you had better review the foundation of the biology and the electrochemistry.

/Keywords

○

(Health and Environmental Sciences)

/ Takanori KIHARA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/Notice

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境衛生学等の専門的知識を修得する。
技能	Ⅱ	○	環境衛生学等の専門知識を利用し、既存問題点を整理して見出す能力を修得する。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	自立的に既存の問題点を見出し、それに対する解決策を導き出せるようにする。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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環境衛生学

/Course Description

In this class, students aim at deeply understanding the recent national projects for the health and environmental sciences area related with human body through survey, presentation, and discussion about the projects.

/Textbooks

Not specified.

(○) /References Available in the library: ○

Not specified.

○

(Health and Environmental Sciences)

/Class schedules and Contents

1. Guidance
2. Rhetoric of science
3. Writing technique of scientific proposal
4. National projects related with Health and Environmental Sciences
5. Research of the national projects
6. Presentation of the national projects
7. Discussion of the national projects
8. Discussion of new research projects
9. Presentation of new research projects
10. Research of the international projects
11. Presentation of the international projects
12. Discussion of the international projects
13. Discussion of new international research projects
14. Presentation of new international research projects
15. Summary

/Assessment Method

20%
40%
40%

Active participation to the class 20%
Presentation and discussion 40%
Reports 40%

/Preparation and Review

/Remarks

Students who want to take this class have to contact with Associate Prof. Kihara in advance.
When student doesn't contact me preliminary, I don't accept his class registration.

Students are required to be able to read science articles and reviews in English.
Students are required to survey and propose the scientific national projects related with Health and Environmental Sciences and Biology by themselves after the class.

/Message from the Instructor

Absence is not allowed.

/Keywords

○

(Functional Microbiology)

/ Hiroshi MORITA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	微生物機能の多様性に係る専門的知識を修得する。
技能	Ⅱ	○	微生物による環境浄化技術や物質変換技術について理解を深める。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	微生物をどのような形で活用していけば、発酵生産や環境浄化、有用資源の変換に役立つかを考える。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

微生物機能学

/Course Description

The aim of this lecture is to functional microbiology from the viewpoint of industrial fermentation technology; microorganisms and their activities associated with fermented food products, biocontrol science; the occurrence and activities of various spoilage and pathogenic bacteria, modern technology for food protection such as sterilization, prevention of growth of spoilage and pathogenic bacteria, environmental microbiology; application of microbial functions to conservation of environments.
To be able to outline the three topics shown below.
Screening and isolation of new microorganisms
Biogeochemical cycling with microbial function
Bioremediation and bioconversion using microorganisms

/Textbooks

/ None

(○) /References Available in the library: ○

Michael Madigan, John Martinko, David Stahl, David Clark, Brock Biology of Microorganisms (13th Edition), PEARSON Education, Inc., ISBN: 978-0-321-73551-5, 2012
Jacquelyn G. Black, Microbiology (8th Edition), JOHN WILEY & SONS, INC., ISBN: 978-0-470-64621-2, 2013

○

(Functional Microbiology)

/Class schedules and Contents

/ Fermentation Technology Microbial Nutrition
/ Fermentation Technology Screening
/ Fermentation Technology Fermentation Control
/ Nitrogen Cycles and Microorganisms Nitrification
/ Nitrogen Cycles and Microorganisms Denitrification
/ Nitrogen Cycles and Microorganisms Nitrogen Fixation
/ Sulfur Cycles and Microorganisms
/ Carbon Cycles and Microorganisms
/ Bioremediation in situ method
on site / Bioremediation on site method
/ Bioremediation Applications
/ Application of Microorganisms Japanese Sake
/ Application of Microorganisms Beer and wine
/ Application of Microorganisms Other products
/ Final review

/Assessment Method

/ Examination 80
/ Report 10
/ Class Participation 10

/Preparation and Review

/Remarks

Students are requested to more understand by review learning and preparation for next class.

/Message from the Instructor

Students are requested to get the idea of how to apply microbial potential activities to fermentative production, environmental technology and bioconversion.

/Keywords

Fermentation, Bioremediation, Bioconversion

○

(Ecological and Environmental Physiology)

/ Tomonori KAWANO / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	講義と討論さらには論文紹介などの課題を通じて、環境と生物との相互作用を、細胞、個体、生体系の各視点から理解する。
技能	Ⅱ	○	多くの専門文献データベースの中から興味のある研究トピックスに関する論文を探し出し、内容を理解する技能を修得する。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	先端研究トピックスの文献から情報を整理し、プレゼンを通じて座学や文献から学んだ知識と自らの研究テーマとの関係を客観的に見ることができる学究的態度を修得する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境応答生理学

/Course Description

(1) Recent research topics in biochemical, cell biological and molecular biological approaches to understanding of the responses of living plants and microbes to the changing environments and (2) the modes of interaction among different organisms will be covered in the lectures.

/Textbooks

N.A.

(○) /References Available in the library: ○

N.A.

○

(Ecological and Environmental Physiology)

/Class schedules and Contents

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1 Plants and microorganisms (an introduction)
2 Plant Eco-Physiology (1)　Physiological back-ground
3 Plant Eco-Physiology (2)　Ecological back-ground
4 Protozoa and Environment (1)　Environmental factors affecting the microflora
5 Protozoa and Environment (2)　Ecotoxicity assays
6 Plants and infectious microbes (1)　Biological back-ground
7 Plants and infectious microbes (2)　Protection of plants
8 Cellular signaling (1)　Mechanism
9 Cellular signaling (2)　Control
10 Controls in gene expression
11 Metabolic regulations
12 Oral presentations and discussion (1)
13 Oral presentations and discussion(2)
14 Oral presentations and discussion (3)
15 Summary

/Assessment Method

50%
50%

Reports50%
Oral presentation50%

/Preparation and Review

/Remarks

Students are encouraged to bring about hot discussion based on the uptodate knowledges. Upon request, lecture will be given in English. Even to Japanese students, some tasks will be given in English.

/Message from the Instructor

Students who wish to take this lacture are encourage to take "Ecological Management" by Prof. Haraguchi and Hashidoko at the same time, since some topics in above two lectures are tightly related and joint presentation and discussion are planned.

/Keywords

○

(Environmental Materials Engineering)

/ Masami SHIOZAWA /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境材料工学に係る専門的知識を修得する。
技能	Ⅱ	○	生物のしくみや生態環境を理解し、環境材料についての専門的知識を深める。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	最先端の環境材料への関心や意欲の向上を図る。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境材料工学

/Course Description

This lecture introduces typical technologies to reduce environmental polution, not to give environmental burdens or to improve environment by using industrial materials, such as metals, polymer materials, fiber materials and various inorganic materials.

/Textbooks

Papers will be distributed in class.

(○) /References Available in the library: ○

Texts will be introduced by the lecturer if necessary.

○

(Environmental Materials Engineering)

/Class schedules and Contents

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1 Environment and Materials (Orientation)
2 Environment and Materials (Environment and Social Care and related Laws)
3 Environment and Materials (LCA)
4 Design for Materials considering Environment (Basic Concept)
5 Design for Materials considering Environment (Metals)
6 Design for Materials considering Environment (Polymers)
7 Design for Materials considering Environment (Inorganics)
8 Design for Materials considering Environment (Fibers)
9 Design for Materials considering Environment (Miscellaneous)
10 Future Materials Harmonized with Environment
11 Future Materials Harmonized with Environment
12 Future Materials Harmonized with Environment
13 Presentation on Research
14 Presentation on Research
15 Summary

/Assessment Method

Report of Research (oral presentation with Power Point and submission of report)

/Preparation and Review

/Remarks

Appropriately directed by lecturer.
Review with appropriate text is required to understand this lecture.

/Message from the Instructor

This lecture concerns with metals, polymers, various inorganic materials, and fiber materials. They have been used for electronics, energy, medical, construction, and so on. Research groups conduct research for specified themes and have a presentation for research results. In addition, each student prepares and submits a report on the research.

/Keywords

○

(Geochemistry)

/ Fumihiko NISHIO /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	地球規模での物質移動や、生態系における現象を化学の視点で理解できるようにする。
技能	Ⅱ	○	地球化学に関する知識を修得し、生態系保全や環境修復への応用へ繋がるようにする。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	◎	最先端の地球化学への関心や意欲の向上を図る。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

地球化学

/Course Description

How does the climate system in the future Earth change with progress of global worming? Changes of climate in the Earth have been recorded in the core excavated from ice sheets of Green Land and South Pole. We can concider the future Earth from the Earth history. To clarify mystery of the Earth history, geochemical knowledge and technology are required.
This lecture explains interests to know the Earth history discovered from ice sheets.

/Textbooks

Texts will be introduced by the lecturer if necessary.

(○) /References Available in the library: ○

Texts will be introduced by the lecturer if necessary.

○

(Geochemistry)

/Class schedules and Contents

100

1 Introduction to Geochemistry
2 History of the Earth
3 Fundamentals of Isotope
4 Utilization of Isotope in Geochemistry
5 Geochemical Analysis of Ice Sheet in the South Pole and Green Land
6 What is revealed from CO2 concentration in atmosphere remained in ice sheet.
7 What is revealed from CH4 concentration in atmosphere remained in ice sheet.
8 What is revealed from impurities remained in ice sheet.
9 What is revealed from volcanic ash remained in ice sheet.
10 Relation between the recored remained in ice sheet and Earth system
11 Relation between the recored remained in ice sheet and chage of climate
12 Change of the Earth system in the past 100 million years
13 Geochemical clarification of change of the Earth system
14 Summary
15 Exercise

/Assessment Method

45%
55%
Review 45%
Report 55%

/Preparation and Review

/Remarks

Read the textbook and/or any references before the classes.

Review and report must be required.

/Message from the Instructor

How does the climate system in the future Earth change with progress of global worming? We can consider the future Earth from histrory of the Earth. It is grad to learn the interests to know the Earth records and history discovered from ice sheets.

/Keywords

I

(Introduction to Environmental Biosystems I)

○

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	研究を遂行するための計画、実行、評価、改善を適切に行える。
思考・判断・表現	Ⅲ	◎	研究の目的、背景、理論、実験、結果をプレゼンテーションで表現し、質疑応答に理論的に回答できる思考と判断力を修得する。
関心・意欲・態度	Ⅳ	○	研究目標に対して強い関心を持ち、その目標を達成するための強い意欲がある。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

バイオシステム特論Ⅰ

/Course Description

This class is jointly implemented by research groups in the Biosystem course. The styles of this class are meeting to introduce the recent research, and presentation and discussion for current research of a student.

/Textbooks

/None

(○) /References Available in the library: ○

/Academic journals specified by advisors

I

(Introduction to Environmental Biosystems I)

/Class schedules and Contents

1	1		
2			1
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14			7
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1 Reading Academic Journals 1
2 Presentation and Discussion of Research 1
3 Reading Academic Journals 2
4 Presentation and Discussion of Research 2
5 Reading Academic Journals 3
6 Presentation and Discussion of Research 3
7 Reading Academic Journals 4
8 Presentation and Discussion of Research 4
9 Reading Academic Journals 5
10 Presentation and Discussion of Research 5
11 Reading Academic Journals 6
12 Presentation and Discussion of Research 6
13 Reading Academic Journals 7
14 Presentation and Discussion of Research 7
15 Summary

/Assessment Method

50%
50%
Active participation to the class 50%
Report 50%

/Preparation and Review

/Remarks

Prepare for presentation.

According to circumstances, there is a training camp in this course.
Students who belong the group must join the training camp.

/Message from the Instructor

/Keywords

II

(Introduction to Environmental Biosystems II)

○

/Instructor

/Year 2 /Credits 2 /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	研究を遂行するための計画、実行、評価、改善を適切に行える。
思考・判断・表現	Ⅲ	◎	研究の目的、背景、理論、実験、結果をプレゼンテーションで表現し、質疑応答に理論的に回答できる思考と判断力を修得する。
関心・意欲・態度	Ⅳ	○	研究目標に対して強い関心を持ち、その目標を達成するための強い意欲がある。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境バイオシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

バイオシステム特論Ⅱ

/Course Description

This class is jointly implemented by research groups in the Biosystem course. The styles of this class are meeting to introduce the recent research, and presentation and discussion for current research of a student.

/Textbooks

/ Nothing

(○) /References Available in the library: ○

/Academic journals specified by advisors

II

(Introduction to Environmental Biosystems II)

/Class schedules and Contents

1	1	
2		1
3	2	
4		2
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14		7
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1 Reading Academic Journals 1
2 Presentation and Discussion of Research 1
3 Reading Academic Journals 2
4 Presentation and Discussion of Research 2
5 Reading Academic Journals 3
6 Presentation and Discussion of Research 3
7 Reading Academic Journals 4
8 Presentation and Discussion of Research 4
9 Reading Academic Journals 5
10 Presentation and Discussion of Research 5
11 Reading Academic Journals 6
12 Presentation and Discussion of Research 6
13 Reading Academic Journals 7
14 Presentation and Discussion of Research 7
15 Summary

/Assessment Method

50%
50%
Active participation to the class 50%
Report 50%

/Preparation and Review

/Remarks

Prepare for presentation.

According to circumstances, there is a training camp in this course.
Students who belong the group must join the training camp.

/Message from the Instructor

/Keywords

○

(Environmental Economics)

/ Takaaki KATO / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境問題の分析に不可欠な経済学的知識を身に付ける。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	環境問題を経済学的な視点から分析するための枠組みを理解する。
関心・意欲・態度	Ⅳ	○	環境問題について、社会との関わりをモデルを用いて考える態度を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境経済論

/Course Description

Students will acquire practical knowledge of economic modeling and then explore two central issues of environmental economics. First, various economic methods of mitigating environmental pollutions are introduced and their relative strengths and weaknesses are discussed. Second, innovative methods of estimating the values of saving the environment are introduced. The final target level of this course is to obtain a sense of economics that engineering students should have in better understanding the relationship between environmental issues and technologies.

/Textbooks

Handouts are provided in each lesson

(○) /References Available in the library: ○

(2007) 5184

Krugman, P. and Wells, R., Microeconomics, Worth Publishers

○

(Environmental Economics)

/Class schedules and Contents

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13 1
14 2
15 3

1 Overview of environmental economics
2 Demand curve and consumer behavior
3 Supply curve and firm activity
4 Competitive market and social surplus
5 Environmental externality
6 Example: solid waste and microeconomic analysis
7 Example: recycling and microeconomic analysis
8 Environmental taxation
9 Emissions trading, Minimization of abatement cost
10 Emissions trading, Initial alocation
11 Comparison: Direct regulations and economic tools, Respones of firms
12 Comparison: Direct regulations and economic tools, Uncertainty
13 Case study and presentation for student group 1
14 Case study and presentation for student group 2
15 Case study and presentation for student group 3

/Assessment Method

40%
60%
Mini exam 40%
Presentation 60%

/Preparation and Review

/Remarks

Knowledge on elementary mathematical analysis is required.

Related literature is introduced for students' deeper understanding.

Official language for this course: English

/Message from the Instructor

/Keywords

○

(Environmental Policy and Administration)

/ Katsushi FUJII /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境政策について批判的に議論・討論するのに必要となる専門知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	環境政策・施策が社会に及ぼす影響を理解し、自らの専門分野における行動・判断に活用でき、他者に的確に伝えることができる。
関心・意欲・態度	Ⅳ	○	現在進行形の環境問題・環境政策に関心を持ち、自ら情報取得ができ、その評価ができる。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境政策論

/Course Description

The lecture reviews the history of the environmental problems in Japan, and explains political measures taken to resolve them. An objetive of environmental policy is to establish an institutional system avoiding the occurrence of an environmental problem and/or minimizing its undesirable effects. Students will study political principles and methodology to attain the objective, and acquire a capability to critically evaluate current and proposed policies.

/Textbooks

Not specified.

(○) /References Available in the library: ○

Hidefumi Kurasaka, "Environmental Policy", Shinzansha Publisher Co.,Ltd. (in Japanese)

/Class schedules and Contents

1 Overview of the class and lecture
2 Necessity of environmental policy
3 Economical interpretation of environmental problem
4 Review of environmental problem and policy 1: Dawn of Environmental Policy
5 Review of environmental problem and policy 2: Basic Law for Environmental Pollution Control
6 Review of environmental problem and policy 3: Pollution Control Measures
7 Basic Environment Law
8 Student's interim presentation 1
9 Classification of environmental policies
10 Pollution-related Health Damage Compensation Law
11 Direct regulations and economic instrument
12 Environmental Right
13 Student's final presentation 1: The first half
14 Student's final presentation 2: The last half
15 Summary

/Assessment Method

Attendance record and participation 40%
Mini quizes 30%
Student's presentation 30%

○

(Environmental Policy and Administration)

/Preparation and Review

/Remarks

Class languages are Japanese and English.

Students have to review the lessons for their deeper understanding.

/Message from the Instructor

/Keywords

○

(Sustainable Management Systems)

/ Tohru FUTAWATARI / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境経営に関する各種手法に関して専門的かつ創造的・実践的知識をもつ。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	社会の中の環境問題に関して、その環境経営的な立場からの思考・判断・表現ができるようになる。
関心・意欲・態度	Ⅳ	◎	環境経営に関する各課題について、専門的な研究を実践する関心・意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境経営システム論

/Course Description

Practical methods of sustainable management for environment will be explained, and are based on actual action in companies. Students will acquire practical knowledge of environmental management.
Attainment targets are as follows:
To get the professional, creative and practical knowledge on various methods of sustainable management,
To be able to make enforcement, judgment and representation from the standpoint of environmental management to environmental issues in the society,
To have the interest and motivation in conduction of specialized research on various issues of sustainable management.

/Textbooks

Distribute printing

(○) /References Available in the library: ○

Introduce in lecture

○

(Sustainable Management Systems)

/Class schedules and Contents

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9 NGO NPO
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1 Overview of sustainable management for environment
2 Environmental management system
3 Environmental accounting
4 Environmental reporting
5 Environmental labeling
6 Environmental rating
7 Environmental risk and risk management
8 Environmental management for social sector
9 Environmental management of NGO/NPO
10 Environmental evaluation and decision making
11 Environmental policy and economical methods
12 Environmental management and environmental business
13 Presentation of short research by students #1
14 Presentation of short research by students #2
15 Review

/Assessment Method

50%
50%
Active learning 50%
Report of short research 50%

/Preparation and Review

/Remarks

Follow teacher's instruction, and make efforts on class preparation and brush-up by yourself.

This subject is taught in a bilingual style. Official language for this subject is both English and Japanese.

/Message from the Instructor

/Keywords

○

(Environmental Information Technology and Computer Simulation)

/ Atsushi NOGAMI / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	環境モニタリング手法や環境情報システムについて学び、環境アセスメントで用いる専門的知識を修得する。
技能	Ⅱ	◎	環境アセスメントに用いられる代表的な計算機シミュレーションの技能を演習を通して修得する。
思考・判断・表現	Ⅲ	○	環境情報システムの実例調査やシミュレーションの自由課題の発表を通して思考及び表現能力を向上させる。
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境情報システム論

/Course Description

Students will acquire technological knowledge of environmental monitoring and environmental information system for a large area environmental management. Also, various computer simulation methods for environmental assessment are introduced by the case study of actual environmental assessment and students will acquire practical technique of computer simulations by business software exercises.

/Textbooks

The releated references will be distiributed.

(○) /References Available in the library: ○

Useful references will be suggested ,if necessary.

○

(Environmental Information Technology and Computer Simulation)

/Class schedules and Contents

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1 Overview of environmental information technology
2 Environmental impact assessment, I(Environmental information)
3 Environmental impact assessment, II(Environmental consideration actions)
4 Environmental monitoring methods
5 Examples of actual environmental information map
6 Environmental estimation methods
7 Case study 1 (environmantal information system), I
8 Case study 1 (environmantal information system), II
9 Computer simulation methods for environmental assessment, I(air pollutant dispersion)
10 Computer simulation methods for environmental assessment, II(thermal and fluiid flow analysis)
11 Computer simulation exercise, part I
12 Computer simulation exercise, part II
13 Case study 2 (computer simulation), part I
14 Case study 2 (computer simulation), part II
15 Review

/Assessment Method

40%
40%
20%
Case study 1 40%
Case study 2 40%
Active learning 20%

/Preparation and Review

/Remarks

Prepare for the lecture by reading references such as Environmental Consideration Policy of Kitakyushu city provided in advance.

Class language for this subject: Japanese and English. English class will be open separately if there are many English student.

/Message from the Instructor

Have a strong interest in environment-related information and information technology, and bewilling to study.

/Keywords

○

(Urban Environmental Assessment and Planning)

/ Toru MATSUMOTO /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	都市環境計画の基礎となる環境評価分野、意志決定手法において、専門的かつ創造的・実践的知識をもつ。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	現実の都市環境問題に対応するために、国内のみならず途上国の都市環境問題に広い視野をもって問題に対処することができる思考力と判断力をもつ。
関心・意欲・態度	Ⅳ	○	都市環境問題に関わる資源、エネルギーと、都市の発展のバランスに対して関心を持ち、高度な研究を実践する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

都市環境評価・計画論

/Course Description

LCA

Students will acquire practical knowledge of environmental assessment and planning methods for urban environmental control. First, various environmental assessment methods such as indicators, LCA and MFA are introduced and their relative strengths and weaknesses are discussed. Second, future forecasting and optimization methods based on the case studies are introduced.

/Textbooks

T. E. Graedel and B.R. Allenby, Industrial Ecology, Prentice Hall

(○) /References Available in the library: ○

○

(Urban Environmental Assessment and Planning)

/Class schedules and Contents

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1 Environmental load & indicators of human activities (background)
2 Environmental load & indicators of human activities (new development)
3 Environmental evaluation methods in physical aspects (MFA)
4 Environmental evaluation methods in physical aspects (basic concept of LCA)
5 Environmental evaluation methods in physical aspects (application of LCA)
6 Environmental evaluation methods in economic aspects (basic concept)
7 Environmental evaluation methods in economic aspects (TCM, HA)
8 Environmental evaluation methods in economic aspects (CVM)
9 Future forecast & optimization for environmental planning (future forecasting)
10 Future forecast & optimization for environmental planning (optimization)
11 Future forecast & optimization for environmental planning (EIA, SEA)
12 Case study of environmental planning (student presentation)
13 Case study of environmental planning (student presentation)
14 Case study of environmental planning (student presentation)
15 Review

/Assessment Method

20
40
40
Positive participation 20
Case study & Discussion 40
Final report 40

/Preparation and Review

/Remarks

To be noticed before each class.

The term paper of this course requires students apply the knowledge from the class to understand actual social issues.

Students have to review the lessons for their deeper understanding.

/Message from the Instructor

Environmental planning is a approach for the national/local government and the enterprise to aim at the achievement of the desired relationship of human and the environment. Students will learn that the tool to evaluate and to plan how to form or to restructure the urban area in this global environment era.

/Keywords

○ I

(Development & Environment Studies on Developing Countries I)

/ HIROYUKI MIYAKE /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

/ Notice / Biennial class.

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	高度専門職業人として活躍するために必要な、途上国の開発分野の知識を修得する。
技能	Ⅱ	○	地域社会の諸課題（または特定の政策的課題）について、必要な情報を収集・分析し、政策を立案・評価（または実践的に提言）することができる。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ	○	途上国開発に関心を持ち、主体的に取り組むための動機付けを得る。

※◎：強く関連 ○：関連 △：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

途上国開発論Ⅰ

/Course Description

1990

GDP

It is found that developing countries changed themselves in political, economical and social dimensions, since globalization started in 1990s. Natural resouces are discoverd in African nations which have faced big poverty problems after the beginning of this century. Asian nations have continuous rise in GDP by over 7%, Therefore, urban areas have a plenty of high rise buildings in construction boom. This course focuses on such dynamic activity of the developing countries in terms of development study. This economic trend does not necessarily bring economic and social satisfaction to all of citizens. It is said that economic disparity has been expnaded. Taking up Bangladesh for a case study can make the students understand more easily.

/Textbooks

2001

(KIKUCHI Kyoko, To peprsons who want to study about developopment study, Sekai-Shisosha, 2001)

2008

MIYAKE Hiroyuki, Urban Environment of developing countries ~ Djhaka, Bangladesh with hope of making Sustainable Society, Akashi shoten, 2008

(○) /References Available in the library: ○

Diana Mitlin & David Satterthwaite, Urban Poverty in the Global South - Scale and nature, Routledge, 2013

& 2006

Matsui & Ikemoto eds., Development and poverty in Asia, Akashi shoten, 2006

○ I

(Development & Environment Studies on Developing Countries I)

/Class schedules and Contents

1	Introduction of goals and contents
2	What is development for developing countries
3	measurement of poverty
4	social development
5	history of development studies
6	human development
7	International migration
8	urban problem
9	rural problem
10	governmance
11	economic situation of Bangladesh
12	urban and rural area of Banaladesh
13	Bangladeshi migrant workers in the world
14	Social consideration to waste management
15	summing up

/Assessment Method

… 50 … 50

attitude to course --- 50%, course work paper submission --- 50%

/Preparation and Review

/Remarks

English efficiency, especially reading is highly required.

Study by yourself and read your textbook and notebook many times.

The class is opened at Kitagata campus .

/Message from the Instructor

Changing Views of urban area in developing countries. The important is to go directly to the field and observe carefully.

/Keywords

Poverty, Bangladesh, Human development, Social development

II

(Development & Environment Studies on Developing Countries II)

/ HIROYUKI MIYAKE /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice / Biennial class.

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	途上国における経済開発の環境や社会への影響について、論理的な議論し、解決策を模索する方法を身に付ける。
思考・判断・表現	Ⅲ	○	途上国の経済開発に伴う課題を自分自身に関わるものとして捉えられる。
関心・意欲・態度	Ⅳ	○	途上国における環境的・社会的課題の解決に取り組む主体的な意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

途上国開発論Ⅱ

/Course Description

PM2.5 ESD
1990
ESD

The developing countries now face serious environmental problems as only economic growth has been given top priority. Air pollution like PM2.5 of Chinese bigger cities which gives a bad influence to Japan, water pollution of river and ocean, waste manament problem and forest destruction are typical ones. Environmental Education (EE) and Education for Sustainable Development (ESD) seem to surely contribute to solve problems in environment and poverty. These are introduced to school curricurum since 1990s. In this course, we will understand the reasons of such problems in the beginning, and then study about conceptual frame work of EE and ESD. In the last, its result will be verified.

/Textbooks

2012 JSEE, Environmental Education, Kyoiku-shuppan, 2012
2005
ASAOKA Yukihiko ed., Starting new Environmental Education, Kobundo shuppan
ESD 2012 ABE & TANAKA eds., Opening of ESD in Asia & Pacific region, Akashi-shoten, 2012

(○) /References Available in the library: ○

○ 2009
MISHIROGAWA & SEKI eds., To those who study Environmental Education, Sekai shisosha, 2009
2005
Japanese Association of Holistic Education ed., Beginning of Holistic Education, Seseragi shuppan,2005

II

(Development & Environment Studies on Developing Countries II)

/Class schedules and Contents

1	Aim of this course and its contents
2	Environemntal Problem in the world ~ global warming
3	Environmental Problem in the world ~ bio-diversity
4	Environmental Problem in the world ~ waste
5	Environmental Problem ~ food and water
6	What is EE?
7	History and Ethics of EE
8	Aim and methodology
9	How to make EE plan
10	ESD ESD a shift from EE to ESD
11	ESD History of ESD and concepts
12	Holistic Education
13	ESD ESD EE and ESD of developing countries ~ India
14	ESD ESD EE and ESD of develooung countries ~ china
15	summing up

/Assessment Method

…50 …50

attitude to the course --- 50%, course work paper submission --- 50%

/Preparation and Review

/Remarks

Review and prepare before and after the class start.

The class is opened at Kitagata campus .

/Message from the Instructor

ESD

Education leads to awareness and action, which can cntribute to solve environmental problem.

/Keywords

ESD

ESD, Holistic Education, Environemental Education(EE), India & China

IA

(Regional Economics 1A)

/ MINAMI Hiroshi /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境に密接で多様な関係を持つ地域経済に関する専門的・実践的知識をもつ。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	地域経済の構造をとらえ、諸問題に対処する思考力・判断力をもつ。
関心・意欲・態度	Ⅳ	○	地域経済及び関連する政策に関心を持ち、高度な研究を実践する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

地域経済論研究ⅠA

/Course Description

In this lecture, we aim at the point that the impoverishment of the regional economy and the regional disparity become a big social problem in Japan. Then, we consider about the ideal way of the regional economic policy which supported in the decentralization times from the viewpoint of the regional economic revitalization. By this lecture, we think of the policy mainly in the unit in the municipalities. With it, we can think of the concerning by the regional economic policy and the environment from a familiar point.
The arrival target of this lecture is as follows.
- To have specialized and practical knowledge about the regional economy.
- To understand structure of the regional economy, and to have an intellectual power, judgement power to deal with various problems
- To be interested in regional economy and associated policies, and have will to practice a high study

/Textbooks

There is no specification. The related references will be distributed in this lecture.

(○) /References Available in the library: ○

2014

Ryohei NAKAMURA (2014) Nihon-kajo
When necessary, I introduce some literature in this lecture.

IA

(Regional Economics 1A)

/Class schedules and Contents

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1 Guidance
2 Relations with economy and human being
3 Basic structure of the regional economy
4 Relations with population movement and the regional economy
5 Relations with location of industries and the regional economy(1) Theory
6 Relations with location of industries and the regional economy(2) Case of Kitakyushu
7 Relations with location of commerce and the regional economy
8 Relations with decentralization and regional economy
9 Relations with Industry-university-government cooperation and regional economy
10 Relations with international contribution and regional economy
11 Relations with sports and regional economy
12 Relations with events and regional economy
13 Case study (1) charge of regional revitalization
14 Case study (2) rebuilding from the disaster
15 The final summary

/Assessment Method

30%
70%

- positive participation 30%
- final report 70%

/Preparation and Review

/Remarks

This subject is taught in Japanese.
I distribute the document about contents of the next week. It is necessary to read a document before a class respectively.
I distribute a document by a class. It is necessary to review it after a class respectively.

/Message from the Instructor

You can register even if you don’t have some training in economics.

/Keywords

Regional Economics, Regional activation, Policy, Decentralization, Circulation Structure

IB

(Regional Economics 1B)

/ MINAMI Hiroshi /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境に密接で多様な関係を持つ地域経済に関する専門的・創造的知識をもつ。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	地域経済の構造をとらえ、諸問題に対処する思考力・判断力・表現力をもつ。
関心・意欲・態度	Ⅳ	○	地域経済及び関連する政策に関心を持ち、高度な研究を実践する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

地域経済論研究ⅠB

/Course Description

2016

The purpose of this lecture is to study the various arrangement analytical skills about regional economy.
We read the newest white papers about regional economy, and discuss about them.
We may perform a field work.
The arrival target of this lecture is as follows.
- To have specialized and creative knowledge about the regional economy.
- To understand structure of the regional economy, and to have an intellectual power, judgement power, power of expression to deal with various problems
- To be interested in regional economy and associated policies, and have will to practice a high study

/Textbooks

2016 Web

1) 2016
2) 2016
3) 2016
4) 28

We use a white paper that will be published in the spring and autumn of 2016. We will be able to obtain the documents in the Web. There is a possibility to change the white paper.I order it about the acquisition method during class.
1) Kyushu Economic Research Center “Economic Survey of Kyushu 2016”
2) Kitakyushu City “Environment of Kitakyushu City 2016”
3) The Small and Medium Enterprise Agency “White Paper on Small and Medium Enterprises in Japan 2016”
4) Ministry of Land, Infrastructure, Transport and Tourism “White Paper on Tourism in Japan 2016”

(○) /References Available in the library: ○

There is no specification. When necessary, I introduce some literature in this lecture.

IB

(Regional Economics 1B)

/Class schedules and Contents

1
2
3 2016
4 2016
5 2016
6 2016
7 2016 A
8 2016 B
9 2016
10 2016 C
11 2016 D
12 2016
13 2016
14 28
15 28

1 Guidance
2 Viewpoint of a regional economic analysis
3 Reading “Economic Survey of Kyushu 2015” (1) General remarks
4 Reading “Economic Survey of Kyushu 2015” (2) Particulars, Discussion
5 Reading “Environment of Kitakyushu City 2015” (1) General remarks
6 Reading “Environment of Kitakyushu City 2015” (2) Particulars
7 Reading “Environment of Kitakyushu City 2015” (3) Fieldwork A
8 Reading “Environment of Kitakyushu City 2015” (4) Fieldwork B
9 Reading “Environment of Kitakyushu City 2015” (5) Discussion 1
10 Reading “Environment of Kitakyushu City 2015” (6) Fieldwork C
11 Reading “Environment of Kitakyushu City 2015” (7) Fieldwork D
12 Reading “Environment of Kitakyushu City 2015” (8) Discussion 2
13 Reading “White Paper on Small and Medium Enterprises in Japan 2016”
14 Reading “White Paper on Tourism in Japan 2016” (1) General remarks
15 Reading “White Paper on Tourism in Japan 2015” (2) Particulars, Discussion

In addition, based on the number of the students, I may change a content.

/Assessment Method

60%
40%

- positive participation (presentation and discussion) 60%
- final report 40%

/Preparation and Review

/Remarks

This subject is taught in Japanese.
You must participate in a field work.
You must review the document(White papers) in a week to discuss it.

/Message from the Instructor

You can register even if you don’t have some training in economics.

/Keywords

Regional Economics, Regional activation, Policy, Statistics data

IB

(Regional Economics 1B)

/Keywords

(The Urban Economy)

/ TAMURA DAIJU /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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/Department , ,

/Notice

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	経済活動と都市との複雑な関わりを理解することができる。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	都市に関わる経済活動を立地との関わりの観点から検討することができる。
関心・意欲・態度	Ⅳ	○	都市経済の仕組みを踏まえ、課題の解決と将来像の設計に関心をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

都市経済論研究

/Course Description

Students will learn complicated relationship between economic activities and cities.
Through the survey of birth and growth process of city, they will deepen their knowledge of todays city.
I will start this course at explanations of location issues of various economic activities in cities.

/Textbooks

To be introduced in the first lecture.

(○) /References Available in the library: ○

To be suggested in the course.

(The Urban Economy)

/Class schedules and Contents

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14 21
15

1. What is city?
2. City as the place of economic activities
3. The flows of man, substance and information
4. Trade and city
5. Goods production and city
6. The development of urbanization
7. From industrial city to informational city
8. Economic activities in city
9. The central theory
10. Industry location theory
11. Office location theory
12.The theory of system ofcities
13. Computer network and city
14. The future of cities
15. Conclusion

/Assessment Method

50%
50%
Attitude of participation 50%
Final exam 50%

/Preparation and Review

/Remarks

There is no specification.

This course is taught in Japanese.
When class is small, the course focuses on discussions among participants and no final examination is held.
The course is taught in Kitagata campus and may not open when no student from Kitagata campus joins the course.

/Message from the Instructor

I do not expect students to heve preliminary knowledges, but have active interests about economic matters.

/Keywords

○

(Analysis of Toxic Chemicals in the Environment)

/ Kiwao KADOKAMI /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境中の微量化学物質分析に用いられる分析手法や分析装置の原理、働き、特徴及び微量分析に必要な精度管理を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	公表された分析法や分析データなどの妥当性や信頼性を判断することができる。
関心・意欲・態度	Ⅳ	○	化学物質問題に関心を持ち、科学的な立場からその解決に意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境化学物質計測学

/Course Description

Environmental data is essential for evaluating environmental safety and predicting current and future status. Students will study knowledge and methods related to micro-pollutant analysis of environmental samples. The final goals of this subject are as follows; (1) development of simple analytical methods through learning methods and knowledge of sampling and pretreatment, (2) selection of a suitable analytical instrument for targets by learning theory and feature of various instruments, and (3) evaluation of analytical results through learning analytical quality control and quality assurance (QC/QA).

/Textbooks

Distribution of an original textbook

(○) /References Available in the library: ○

Suggestion of suitable references

○

(Analysis of Toxic Chemicals in the Environment)

/Class schedules and Contents

1
2
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9 (GC-MS
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1 (LC-MS)
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1 Introduction to environmental chemical analysis
2 Environmental sampling
3 Extraction of water samples
4 Extraction of solid and air samples
5 Clean-up procedures (Column chromatography)
6 Clean-up procedures (Others)
7 Gas chromatography (Theory and column)
8 Gas chromatography (Injector and detector)
9 Gas chromatography-Mass spectrometry
10 High performance liquid chromatography
11 Liquid chromatography-Mass spectrometry
12 Quality control/quality assurance
13 Practice (The first half of presentation)
14 Practice (The latter half of presentation)
15 Review

/Assessment Method

25%
25%
50%
Positive participation, question 25%
Oral Presentation 25%
Final report 50%

/Preparation and Review

/Remarks

Students have to prepare and review the lessons using the text distributed in the first class.
2016 15

Official language for this subject changes every other year: Japanese and English. The year of 2016 is English. Students will make a presentation in the final class.

/Message from the Instructor

/Keywords

○

(Environmental Preservation Engineering)

/ Masahide AIKAWA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	環境保全の基礎となる大気環境（大気汚染）分野において、専門的・実践的知識をもつ。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	現実の環境問題に柔軟に対応し、国際環境社会でも広い視野で対処することができる。
関心・意欲・態度	Ⅳ	○	大気汚染の解決に関心を持ち、高度な研究を実践する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境保全工学

/Course Description

PM2.5

Continental scale environmental pollution such as particulate matter typically represented by PM2.5 and acid deposition issue recently have a great concern. In this class, we make it a goal to recognize and understand the followings; 1) the current status of air pollution issue and acid deposition issue, and 2) the physical and chemical mechanism to produce the issues from the viewpoint of emission, diffusion/transportation, chemical reaction, and deposition.

/Textbooks

Hand out

(○) /References Available in the library: ○

, , (1993)
, , (2003)
( ) , , (1990)

R. M. Harrison and R. E. van Grieken (1998) Atmospheric Particles. Wiley

○

(Environmental Preservation Engineering)

/Class schedules and Contents

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1. Overviews and brushup of atmospheric science
2. History, structure and composition of earth’s atmosphere
3. Parameters to control the concentration and its mathematical representation
4. Vertical and horizontal transportation of air
5. Geochemical cycle of elements
6. Current situation of air pollution of Japan and Kitakyushu
7. Kinetics of a chemical reaction
8. Origin and measurement on tropospheric ozone
9. Physics and chemistry of ozone stratospheric ozone
10. Physics and chemistry of ozone tropospheric ozone
11. Law and government on air pollution in Japan
12. Oxidizing power of troposphere
13. Particulate matter
14. Chemistry on acid rain
15. Global warming

/Assessment Method

80
20

Report 80%
Examination 20%

20-30
Please do a presentation on preparation and review for 20-30 minutes in each class.

/Preparation and Review

/Remarks

2

I give you homework on next lecture.
Also wrap up each lecture in 2 slides (Power Point).
Official language: Biennial lecture of English and Japanese
(Japanese language may be used in case of no applicant for English in the English-year)

/Message from the Instructor

Learn on your own and think for yourself.

/Keywords

Atmospheric environment, air pollutants, ozone, particulate matter, acid deposition

○

(Recycling Engineering)

/ Hidenari YASUI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	生物学的排水処理における微生物の反応を数式によって理解する。
技能	Ⅱ	◎	排水処理プロセスシミュレータの基礎的な操作を修得する。
思考・判断・表現	Ⅲ	○	物質収支や反応速度に基づいてプロセス反応を表現することができる。
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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資源循環技術

/Course Description

The class accesses biological waste/wastewater treatment systems through focusing on chemistry, biology and mathematics. Since recycling engineering is an integration of environmental sciences with logical insights, state-of-the-art know-how obtained from the subject will strengthen your skills in this field. A process simulator for wastewater treatments (GPS-X) is used in the class.

/Textbooks

Handout

(○) /References Available in the library: ○

– (,1996), (, 2005), (, 2009)

Wastewater Engineering (McGraw-Hill, 2003), Activated Sludge Models (IWA publishing, 2000), ADM1 (IWA publishing, 2002), Mathematical Modelling and Computer Simulation of Activated Sludge Systems (WA publishing, 2010)

○

(Recycling Engineering)

/Class schedules and Contents

1
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7 (1)
8 (1)
9 2
10 (2)
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12 (3)
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14 (4)
15 (5)

1 Overview of environmental pollution
2 Microbial reaction (material balance)
3 Technical tour (Hiagari municipal wastwater treatment plant)
4 -ditto-
5 Microbial reaction (structured-model concept)
6 Introduction of computer simulation (creating layouts of activated sludge process)
7 Aerobic processes (1) (energy from oxidation/reduction reactions)
8 Computer simulation (1) (biomass growth and decay)
9 Aerobic processes (2) (sludge settling)
10 Computer simulation (2) (secondary calrifier)
11 Microbial reaction (growth and decay)
12 Computer simulation (3) (nutrient removal processes)
13 Anaerobic processes (methane fermentation system)
14 Computer simulation (4) (model development)
15 Computer simulation (5) (model evaluation)

/Assessment Method

50%
5 50%

Active learning 50%
Five sets of computer simulation 50%

/Preparation and Review

/Remarks

(Windows)

2 ×7 1

Prepare your own laptop computer to install the process simulator (Windows only).
Official language : English unless specified.
Two slots (3 hrs /week) x seven weeks plus 1.5 hrs.
The composition of the text (handout) must be carefully understood prior to your participation in the class.
Be familiar with the process simulator. You can access the software even at student-rooms.

/Message from the Instructor

Enjoy Environmental Engineering.

/Keywords

Chemical engineering, microbial reaction, physico-chemical reaction, wastewater enginerring,

○

(Aquatic Environment Engineering)

/ Mitsuharu TERASHIMA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	水圏の環境修復の基礎となる環境水の性質や挙動について専門的な知識及び考え方を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	現実の水圏環境の問題に対して、適切に評価し、対処する能力を身に付ける。
関心・意欲・態度	Ⅳ	○	水圏の環境問題に関心を持ち、工学的立場から解決する使命感を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

水圏環境工学

/Course Description

The hydraulic transport processes affecting water quality in ecosystem and engineered system are explained with modelling and data analysis. integrated. Integrated methods are also explained with hydraulics, aquatic chemistry, and aquatic biology

/Textbooks

Handouts

(○) /References Available in the library: ○

References are introduced in lecture, if necessary.

○

(Aquatic Environment Engineering)

/Class schedules and Contents

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8. (1):
9. (2):
10. (1)
11. (1)
12. (1)
13. (2)
14. (1)
15. (2)

1. Introduction of Aquatic Environment Engineering
2. Organic wastewater treatment systems (1): fundamental
3. Organic wastewater treatment systems (2): application
4. Multiphase flow patterns and Solid separation in wastewater treatment systems (1): fundamental
5. Multiphase flow patterns and Solid separation in wastewater treatment systems (2): application
6. Food waste and wastewater treatment systems (1): fundamental
7. Food waste and wastewater treatment systems (2): application
8. Industrial wastewater and treatment systems (1): fundamental
9. Industrial wastewater and treatment systems (2): application
10. Food waste and wastewater treatment systems: method and application (1) fundamental
11. Food waste and wastewater treatment systems: method and application (2) application
12. Hydraulic in the wastewater treatment system (1) fundamental
13. Hydraulic in the wastewater treatment system (2) practice
14. Application of hydraulic analysis in the wastewater treatment system (1) fundamental
15. Application of hydraulic analysis in the wastewater treatment system (2) practice

/Assessment Method

100%

Report 100%

/Preparation and Review

/Remarks

Fundamental knowledge of physics and mathematics are essential.

Homework will be assigned in every class.

2015 2016
Official languages for this subject are English and Japanese. English is used even year and Japanese is the odd.

/Message from the Instructor

Incorporate skills for water environment protection from engineering point of view.

/Keywords

○

(Soil and Groundwater Remediation)

/ Yo ITO / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/Notice H28

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	地圏の環境修復の基礎となる土壌汚染に関する法律、基準、調査・対策手法に関する専門的知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	実際の土壌汚染問題について柔軟に対応することができる思考力を身に付ける。
関心・意欲・態度	Ⅳ	○	汚染土壌浄化技術のみならず土地売買におけるリスクなどを含め幅広い分野に関心をもち、レベルの高い研究を実践する姿勢を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

地圏環境修復

/Course Description

In this program, students will learn about the current state of artificially polluted soil in Japan and the techniques used for soil treatment. First, the background and the law associated with soil contamination will be introduced, and the theory of transport processes of soil contaminants will be explained. Thereafter, various techniques used for the treatment of soil polluted by heavy metals and VOCs will be presented to the students. Finally, risk management of the private enterprise that owns the soil pollution land will be discussed.The performance target of this lecture is to be able to explain about the outline of the current state ,the risk management and the treatment method of the contaminated soil in Japan.

/Textbooks

None

(○) /References Available in the library: ○

None

○

(Soil and Groundwater Remediation)

/Class schedules and Contents

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1 Introduction
2 Background of soil contamination
3 Classification of soil contaminants
4 Survey of soil contamination counter measurements law
5 Case study of soil contamination problem
6 Transportation process of contaminants in soil , part
7 Transportation process of contaminants in soil , part
8 Approach to measure methods of contaminated soil
9 Treatment of heavy metal pollution soil
10 Treatment of VOCs and oil pollution soil
11 Case study of treatment techniques
12 Risk management (enterprise risk)
13 Risk management (case study)
14 Case study of treatment techniques
15 Summary

/Assessment Method

40%
60%
Regular assignments 40%
Mini quizzes 60%

/Preparation and Review

/Remarks

The case study may be training outside the university. And study outside the class(prior study and study after the fact).
2016 , 2017 2017
Official language for this subject: Japanese in 2016, Guest lecturers would teach risk management sessions in Japanese., English and Japanese in 2017.

/Message from the Instructor

Soil pollution is not only an important environmental concern but also a hindrance in real estate transactions. The participating students will learn about soil pollution from the basics of the problem to its effects on actual business.

/Keywords

○

(Production Process Engineering)

/ Shinichiro NAKAO / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	高効率に生産する取り組みを実施事例を踏まえながら理解する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	新しく開発するべき技術・工法についての方向性を検討することができる。
関心・意欲・態度	Ⅳ	○	生産工程の改善、開発に主体的に取り組む態度を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

生産工程学

/Course Description

In this class, we will learn high-efficient production by explaining the importance of basic technologies and technologies recently being worked on, through examples. Being able to discuss the direction of newly-developed technologies and methods which will be needed in future, will be the attainment targets.

/Textbooks

Materials will be handed out

(○) /References Available in the library: ○

None

○

(Production Process Engineering)

/Class schedules and Contents

1
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1 Overview of production processes
2 Process design, overview
3 Process design, molding/forming/surface treatment/machining/special- processing/assembling
4 Process design, development of process method
5 Process design, development of machine design
6 Production design, simultaneous designing
7 Production system, overview
8 Production system, production leveling for synchronization
9 Production system, flow of process
10 Production system, takt time production
11 Production system, flexible manpower line and flexible machining line
12 Production system, pull system (physical distribution)
13 Production system, pull system (method of indication)
14 Production system, automation-intelligence(automation) and process management
15 Review

/Assessment Method

( ) 30%
70%

Normal marks (Class behavior) 30%
Marks of reports or tests 70%

/Preparation and Review

/Remarks

All of the time schedules will be intensive course, due to special lecturers invitation.

/Message from the Instructor

Because production process covers wide variety of technique such as product design, production engineering and manufacturing etc., the class will be vary wide-ranging.

/Keywords

Production system, Production synchronization, Production leveling, Multiproduct production

○

(Recycling-System Engineering)

/ Hitoshi OYA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/Notice H28

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	リサイクルの必要な知識を取得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	環境、リサイクルに必要な考え方を独自で作り、それを表現する。
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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リサイクル工学

/Course Description

The recycling technologies are introduced and their principles are explained in the view of engineering. The actual recycling process is introduced such as rare metal and precious metal recycling. The understanding of the recycling oriented society is the target.

/Textbooks

Study materials are distributed on a necessity basis at each lecture

(○) /References Available in the library: ○

nothing

○

(Recycling-System Engineering)

/Class schedules and Contents

1
2
3 1( )
4 2( )
5 1( )
6 2( )
7 3( )
8 4( )
9 1( )
10 2( )
11 3( )
12 1( )
13 2( )
14 3( )
15

1 Overview of recycling
2 Idea of recycling
3 size reduction as a pre-treatment 1(crushing)
4 size reduction as a pre-treatment 2(grinding)
5 Separation technology1(sorting)
6 Separation technology2(gravity)
7 Separation technology3(magnetic)
8 Separation technology4(electric)
9 Refinement technology1(iron)
10 Refinement technology2(aluminum)
11 Refinement technology3(copper)
12 Introduction of recycling process1(automobile)
13 Introduction of recycling process2(electric appliance)
14 Introduction of recycling process3(package)
15 Summary

/Assessment Method

100%

Active learning 100%

/Preparation and Review

/Remarks

Ways of the preparation and review for the class are suggested from the teacher.

/Message from the Instructor

The participant will search, present and discuss the recent technology and information in the majority of the lectures.

/Keywords

○

(Environmental issues in Asia)

/ Mitsuharu TERASHIMA / 19 , / Daisuke SANO /
/Instructor
/ Shinsuke TAKEUCHI / , / Chang-Jin MA /

2 1
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	○	アジア地域における環境課題について、自ら情報収集し、加工した上で、説明することができる。
思考・判断・表現	Ⅲ	○	アジア地域各国の経済・社会発展の現状に沿って、課題の解決を検討することができる。
関心・意欲・態度	Ⅳ	◎	技術者・管理者として活躍するキャリア・フィールドとしてのアジア地域の環境課題への関心を深める。

※◎：強く関連 ○：関連 △：やや関連
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アジアの環境問題

/Course Description

The purposes are to be able to understand a wide range of environmental phenomena in Asia and to be able to apply results of the studies to analyze and solve environmental phenomena.

/Textbooks

Handouts are distributed if necessary.

(○) /References Available in the library: ○

References are introduced in lecture, if necessary.

/Class schedules and Contents

1. Water and wastewater issues in Asian countries
2. Waterborne diseases
3. Toxins and pathogens in water
4. Management approaches (1): (Extraction of elements)
5. Management approaches (2): (Systemization)
6. Solid waste management in Asian countries
7. Landfill leachate water
8. Case (1): Surabaya City
9. Case (2): Nairobi City
10. Review of waste management
11. Air pollution in Asian countries
12. Diffusion of air pollutants in Asian countries
13. Air pollutant control (1): (Extraction of elements)
14. Air pollutant control (2): (Integration)
15. Review of Air pollution

/Assessment Method

Report 100%

/Preparation and Review

/Remarks

Official language is English.

/Message from the Instructor

○

(Environmental issues in Asia)

/Keywords

○

(Sustainable Sanitation Engineering)

/Instructor / Hidenari YASUI / 19 , / Tsuyoshi IMAI / / Takayuki SHIMAOKA /

/Year 2 /Credits 1 /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

/Department , , , ,

/ Notice/Intensive course

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/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	上下水プロセスの発展経緯や特徴を把握することで、省資源となる衛生工学技術を比較参照することができる。
思考・判断・表現	Ⅲ	○	社会インフラにおける衛生工学技術の意義や技術区分を説明することができる。
関心・意欲・態度	Ⅳ	○	論理的に技術を比較する際に必要となる基礎的な思考様式を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

省資源衛生工学

/Course Description

- - - -

Engineering theories and modern technologies for solid waste management and wastewater treatments are instructed. Students will obtain essential knowledge to tackle environmental problems in the world as practitioners, engineers and researchers. For the solid waste management, key factors, challenges and approaches to the solutions are shown based on steps from the planning of collection system till operation of final disposal facilities. For the wastewater treatments, sustainable sanitary engineering is especially focused that may meet the needs in developing countries/emerging countries. The experiences in Japan are critically discussed to develop comparative considerations with your origin/country. Based on this discussion, a logical insight to identify trade-off relationships on system implementation is incubated.

/Textbooks

Handout

(○) /References Available in the library: ○

Wastewater Engineering (McGraw-Hill, 2003)

○

(Sustainable Sanitation Engineering)

/Class schedules and Contents

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12) (1),
13) (2),
14) (1),
15) (2),

1) Theories for solid waste management and material recycle
2) Implementations for solid waste management and material recycle
3) Theories for recycling of solid waste
4) Implementations for recycling of solid waste
5) Theories for intermediate treatments of solid waste
6) Technologies of intermediate treatment of solid waste
7) Theories for solid waste disposal
8) Technologies for solid waste disposal
9) Implementations for solid waste disposal
10) Overview and challenges for sustainable solid waste managements
11) Overview of decentralised wastewater treatment system (Japanese Johka-so)
12) Wastewater treatments in Asian developing countries (1), outline for selected countries/region
13) Wastewater treatments in Asian developing countries (2), comparative study on sewage works
14) Sustainable wastewater treatments (1), Advanced Technologies in Japan
15) Sustainable wastewater treatments (2), Recent Researches and Developments

/Assessment Method

50%
(13) 50%

Active learning (based on attendance) 50%
Thirteen sets of report 50%

/Preparation and Review

/Remarks

Official language for this subject: English unless specified.
To find out appropriate solutions to meet individual needs in your country, students are requested to provide current relating information and problems, which may be used for the discussion at the class. Also the consequences of the discussion should be critically reviewed.

/Message from the Instructor

For sustainable societies, elaboration of waste/wastewater teratment systems are crucial. Incubate your vivid insights from seeing on-going approaches.

/Keywords

,

Solid waste management, developing low-cost wastewater treatment technologies

○

(Environmental Pollution and Health Risks)

/Instructor / Takaaki KATO / 19 , / Chang-Jin MA / / Kimiko HARAGUCHI /

/Year 2 /Credits 1 /Semester /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	◎	環境に起因するリスクについて、人の健康への影響を見積もるための代表的な手法を身に付ける。
思考・判断・表現	Ⅲ	○	リスクと便益の比較など、リスクを社会的に管理するための思考ツールを使えるようにする。
関心・意欲・態度	Ⅳ	○	リスクについて科学的に判断するために必要な基礎的な思考様式を身に付ける。

※◎：強く関連 ○：関連 △：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

健康リスク学

/Course Description

Participants of this course will acquire theoretical and practical knowledge of understanding and mitigating health problems related to environmental pollutions. Targets of this course are government officials, environmental practitioners in firms, and environmental researchers.

/Textbooks

Handouts are prepared by lecturers.

(○) /References Available in the library: ○

Maude Barlow "Blue Covenant: The Global Water Crisis and the Coming Battle for the Right to Water "
The New Press New York USA.

○

(Environmental Pollution and Health Risks)

/Class schedules and Contents

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1 Introduction
2 Overview of Japan's waterworks
3 Water purification and water quality
4 Water purification and facilities
5 Practice of water quality tests
6 Life, energy and pollution
7 Links between environment & health
8 Air pollution & health risk
9 Air pollutants derived from authomobile and their health risk
10 Indoor Air Pollution & Health Risk
11 Land Pollution & Health Risk
12 Protecting Our Bodies from Pollution
13 Student presentation (Group 1)
14 Student presentation (Group 2)
15 Policy and health risk

/Assessment Method

50%
( ) 50%

Active learning and presentation 50%
Assignments 50%

/Preparation and Review

/Remarks

Active participation to discussions is highly valued.
Official language is English.
Study visits to waste/water treatment facilities in or near Kitakyushu may be included. Transportation fees are payable by students.
Related literature is introduced for students' deeper understanding.

/Message from the Instructor

/Keywords

○

(Advanced Fluid Dynamics)

/ Masashi KASHITANI /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	圧縮性流体力学に関する基礎知識を修得する。
技能	Ⅱ－１		
	Ⅱ－２		
思考・判断・表現	Ⅲ－１		
	Ⅲ－２	○	与えられた課題について、独自に調査し、まとめる能力を身に付ける。
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

流体力学特論

/Course Description

'Compressibility' is especially noticeable in high-speed gas flows observed in high-speed fluid machineries, for example turbo and ram jet engines, steam turbines, supersonic nozzles and gas pipelines etc. Therefore, the flow analysis taken account into compressibility is essential for investigating the flow in these fluid machineries. In class, the analysis method of compressible flows and the phenomena caused by compressibility are learned.

Attainment target
Students can explain about the various phenomenon observed in compressible flows.
Students can perform the analysis of a steady one-dimensional compressible flow.

/Textbooks

John D. Anderson, Jr., Fundamentals of Aerodynamics Fifth Edition, 2011, McGraaw-Hill.
, , 2014,

The materials will be distributed in class.

(○) /References Available in the library: ○

To be announced in class.

○

(Advanced Fluid Dynamics)

/Class schedules and Contents

1 Introduction
2 Conservation laws
3 Continuity and momentum equation
4 Steady flow energy equation
5 Use of the one-dimensional flow equations
6 Isentropic flow in a streamtube
7 Speed of sound and Mach wave
8 Presentation 1
9 One-dimensional isentropic flow
10 Stagnation condition
11 Shock wave
12 Stationary normal shock wave
13 Normal shock wave relations in terms of Mach number
14 The Pitot tube in supersonic flow
15 Presentation 2

/Assessment Method

Presentation 60%
Reports 40%

60%
40%

/Preparation and Review

/Remarks

It is desirable to do preparations for lessons and a review.

Basic knowledge of fluid dyanmics and thermodynamics is required.

/Message from the Instructor

/Keywords

Aerodynamics, fluid dynamics, thermodynamics, compressible flows, speed of sound, Mach number, shock wave

○

(Advanced Combustion Theory)

/ Sadami YOSHIYAMA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	燃焼工学の応用分野に必要な専門的知識を修得する。
技能	Ⅱ－１		
	Ⅱ－２	△	燃焼工学の応用分野において利用される計測技術を修得する。
思考・判断・表現	Ⅲ－１	◎	燃焼工学の応用分野において問題解決のための思考力や判断力を修得する。
	Ⅲ－２	○	燃焼工学の応用分野における文献を調査し、文書にまとめ、発表する能力を向上させる。
関心・意欲・態度	Ⅳ	◎	燃焼工学における最新の技術動向に触れることで研究意欲を向上させる。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

燃焼工学特論

/Course Description

In heat power engines and combustion devices, gas flow, species concentration and flame front in chamber must be measured during the combustion process. In the class the traditional or new techniques for measuring these properties will be introduced and discussed. The objective of this class is to obtain the ability to investigate the new measuring technique, to understand the principle of measurement, and to use them for your own research.

/Textbooks

To be announced in class

(○) /References Available in the library: ○

To be announced in class

○

(Advanced Combustion Theory)

/Class schedules and Contents

(

LIF

PV

Course overview
2. Measurement of gas flow (HWA, LDA, PIV, etc.)
3. Measurement of flame front (Ion current, Schlieren method, etc.)
4. Measurement of concentration (IR, LIF, etc.)
5. Example 1: Fractal analysis of turbulent premixed flames
6. Example 2: Development of combustion sensors using ion current
7. Experiment 1 Measurement of disk speed using LDA
8. Experiment 2 Measurement of gas flow using LDA
9. First report and short presentation
10. Combustion Measurements in Internal Combustion Engines
(PV-diagram, Indicated Mean Effective Pressure, Thermal Efficiency)
11. Combustion Measurements in Internal Combustion Engines
(Thermal Analysis of Heat Release and Heat Loss)
12. Experiment 3 Test of power performance of internal combustion engine
13. Experiment 4 Measurement of In-cylinder pressure in internal combustion engine
14. 2nd report and short presentation
15. Summary

/Assessment Method

2 100%
Two reports 100%

/Preparation and Review

/Remarks

Recommended to have mastered Thermodynamics and Combustion Engineering.
Recommended to practice by yourself after a lecture.

/Message from the Instructor

/Keywords

○

(Advanced Optical Diagnostics for Compressible Flows)

/ Yoshiaki MIYAZATO / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	流れの光学的可視化法についての知識を修得する。
技能	Ⅱ－１	○	光学的手法を用いた流体の可視化計測を行う技能を身に付ける。
	Ⅱ－２		
思考・判断・表現	Ⅲ－１		
	Ⅲ－２	△	光学的手法を流体の可視化計測に応用することができる能力をもつ。
関心・意欲・態度	Ⅳ		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

流動光計測特論

/Course Description

It has been widely recognized that the schlieren technique is one of the most useful method to visualize the density gradients in a transparent medium. One of the most popular applications is in the experimental study of supersonic flows because of its simple optical arrangement with a high degree of resolution and ability to easily observe such structures as shock waves, Prandtl-Meyer compression and expansion fans in supersonic jet flows. Also, this method for flow visualization does not require the introduction of additives into the flow field and is capable of providing useful qualitative information on the variations in fluid density, temperature, and static pressure. The purpose of this course is to provide students with a clear explanation of the physical phenomena encountered in compressible flows, to develop and understand optical measurements of compressible flows.

/Textbooks

To be announced in class.

(○) /References Available in the library: ○

To be announced in class.

/Class schedules and Contents

1 Introduction
2 Geometrical optics
3 Excercies on geometrical optics
4 Shadowgraph techniqes
5 Grey scale and color schlieren techniques
6 Excercies on schlieren optical system
7 Experiments on schlieren techniques
8 Application of schlieren techniques for supersonic jets
9 Application of schlieren techniques for compressible internal flows
10 Introduction to rainbow schlieren deflectometry
11 Experiments on rainbow schlieren deflectometry
12 Excercies on rainbow schlieren deflectometry
13 Rainbow schlieren tomography
14 Other optical flow visualization
15 Concluding remarks

/Assessment Method

Reports 100%

/Preparation and Review

○

(Advanced Optical Diagnostics for Compressible Flows)

/Remarks

It is desirable to do preparations for lessons and a review.
It is desirable for there to be basics knowledge about compressible fluidmechanics and giemetrical optics.

/Message from the Instructor

As for the student attending a lecture of this course, it is raised reading and understanding ability of specialty English.

/Keywords

geometrical optics, optical measurements, schlieren techniques, fluidmechanics, compressible flows.

○

(Advanced Heat Transfer)

/ Koichi INOUE / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	伝熱工学に関する専門的学力を備えるとともに、実践的な課題を解決することができる能力を修得する。
技能	Ⅱ－１		
	Ⅱ－２	△	機械システム工学に関連する課題の解決に伝熱工学の知識を活用することができる。
思考・判断・表現	Ⅲ－１	◎	環境への影響を踏まえた広い視野を有し、伝熱工学の観点から新たな問題に対処することができる能力を修得する。
	Ⅲ－２	○	調査・学習した内容を発表し、報告書にまとめることができる。
関心・意欲・態度	Ⅳ	◎	環境・エネルギー問題に関心をもち、伝熱工学の基礎知識に基づいた視点で、それらを正しく理解する能力を修得する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

伝熱工学特論

/Course Description

Fundamental knowledge and latest research topics for phase change heat transfer and heat exchangers are investigated.

/Textbooks

None

(○) /References Available in the library: ○

Two-Phase Flow and Heat Transfer, P. B. Whalley, Oxford University Press
Compact Heat Exchangers, W. M. Kays and A. L. London, Krieger Publishing Company

○

(Advanced Heat Transfer)

/Class schedules and Contents

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1	Introduction of two-phase flow and heat transfer
2	Flow pattern maps
3	Pressure drop
4	Flooding
5	Pool boiling (1) [boiling curve]
6	Pool boiling (2) [nucleate boiling and film boiling]
7	Flow boiling (1) [heat transfer pattern map]
8	Flow boiling (2) [critical heat flux]
9	Film condensation (1) [Nusselt's liquid-film theory]
10	Film condensation (2) [inundation]
11	Presentation on future power generation [fossil fuel]
12	Presentation on future power generation [nuclear power]
13	Presentation on future power generation [solar power]
14	Heat transfer augmentation
15	Review

/Assessment Method

Reports 50%
Presentation 50%

/Preparation and Review

/Remarks

Students are required to have the fundamental knowledge of hydrodynamics and heat transfer.
Preparations and reviews for the lectures are necessary.

/Message from the Instructor

/Keywords

boiling, condensation, heat exchanger

○

(Advanced Thermodynamics)

/ Masaaki IZUMI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	機械工学のエネルギーシステム分野における熱力学の実践的な知識を修得する。
技能	Ⅱ－１		
	Ⅱ－２	○	エネルギー機器の技術開発において、熱力学を応用することができる能力を身に付ける。
思考・判断・表現	Ⅲ－１	○	エネルギー機器の設計・運用にあたって、環境との調和に配慮することができる思考力・判断力を養う。
	Ⅲ－２		
関心・意欲・態度	Ⅳ	◎	既存のエネルギー機器の技術に習熟し、新たなエネルギー機器の技術開発に強い関心と意欲を持つ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

熱力学特論

/Course Description

It is difficult to analyze the cycle performance of an actual power engine because of the presence of complicating effects. However a simple idealized model enables to understand the effects of the majour parameters that dominate the perfromance of power cycle. This course is designed to learn the methods of simplified analysis for various power cycles. The aim of this cource is to acquire the methods of thermodynamical analysis.

/Textbooks

Handout (in English)

(○) /References Available in the library: ○

To be announced in class

○

(Advanced Thermodynamics)

/Class schedules and Contents

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1 Introduction
2 Basic Consideration in the Analysis of Power Cycles
3 The Carnot Cycle and its Value in Engineering, Air-Standard Assumptions
4 An Overview of Reciprocating Engines, Otto Cycle
5 Diesel Cycle
6 Stirling and Ericsson Cycles
7 Brayton Cycle (Ideal Cycle)
8 Brayton Cycle (Regeneration, Intercooling, Reheating)
9 Fuel Cells (Outline)
10 Fuel Cells (Efficiency and Open Circuit Voltage)
11 Fuel Cells (Operational Voltage)
12 Polymer Electrolyte Fuel Cells
13 Residential Fuel Cell System and Fuel Cell Vehicle
14 Exercise (Measurement of Thermal Engine Performance)
15 Exercise (Measurement of Fuel Cells Performance)

/Assessment Method

30%
20%
50%

Participation 30%
Report 20%
Examination 50%

/Preparation and Review

/Remarks

20

Students are required to read the handouts (in English) and prepare for the class and to solve review exercises.
Students are requrired to have completed 'Thermodynamics (including Entropy)'.
The upper limit of student numbers is 20.

/Message from the Instructor

” ”

This class includes the thermal efficiency improvement of various engines in the basis, that is, "What should we do in effective use for energy?".

/Keywords

○

(Advanced Control Engineering)

/ Takanori KIYOTA / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	制御工学に関する専門的、実践的な知識を修得する。
技能	Ⅱ－１		
	Ⅱ－２		
思考・判断・表現	Ⅲ－１	△	環境を踏まえて、制御工学分野の新たな問題に対処することができる思考力･判断力を身に付ける。
	Ⅲ－２	○	研究成果を論文としてまとめ、発表することができる能力を身に付ける。
関心・意欲・態度	Ⅳ	△	制御工学に関連した新技術と研究開発に関心をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

制御工学特論

/Course Description

The aim of this course is to study basic knowledge on control engineering which is necessary for mechanical engineers.
In this course, fundamentals of the modern control theory based on the state-space method, the optimal control, the digital control, and the robust control are learned. Furthermore, English papers on control engineering are read.

/Textbooks

(○) /References Available in the library: ○

Text used in undergraduate course.

/Class schedules and Contents

1 Introduction
2 Review of Control Engineering
3 Expression of Systems
4 Modeling
5 State Space Method
6 Regulator and Pole Assignment
7 Observer
8 Servo System
9 Fundamentals of Optimization Theory
10 Optimal Control
11 Digital Control
12 Discrete-Time System
13 English Paper Reading (1)
14 English Paper Reading (2)
15 Conclusions

/Assessment Method

40% Examination 40%
30% Reports 30%
30% Homework and Exercise 30%

○

(Advanced Control Engineering)

/Preparation and Review

/Remarks

It is required to have studied "Control Engineering" in undergraduate course.
As it is prerequired to have basics on "Control Engineering" in undergraduate course, review it again before lecture.
In review of each class, it is required not only to do the homework, but also to understand the theory.

/Message from the Instructor

Various types of control have an important role in mechanical systems such as robots, automobiles, plants.
To learn control theory, fundamentals of mathematics are required.

/Keywords

design of control system, transfer function, state-space method, state feedback control

○

(Advanced Mechatronics)

/ Motoji YAMAMOTO /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	メカトロニクスに関する専門的、実践的な知識を修得する。
技能	Ⅱ－１		
	Ⅱ－２	◎	メカトロニクスに関する実践的な技能を活用した研究開発を行う能力を修得する。
思考・判断・表現	Ⅲ－１	○	メカトロニクスの知識を活用して新たな課題の探求と解決を行うための能力を修得する。
	Ⅲ－２		
関心・意欲・態度	Ⅳ	○	メカトロニクスに関連した新技術と研究開発に関心をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

メカトロニクス特論

/Course Description

These days, most machines such as cars, home electronic appliances, machine tools, robots, and automation machines are controlled by computers. These machines become intelligent ones by the computer's program. Such machines are called as "mechatronics" machines. We will learn basic ideas of the computer and interface techniques between the computer and the machines, which are very important in the mechatronics. For an efficient learning the mechatronics, this course also gives some experiments of some digital electronic circuits.

/Textbooks

(○) /References Available in the library: ○

To be announced in the class.

○

(Advanced Mechatronics)

/Class schedules and Contents

FET
NAND TTL CMOS IC
I
II
I
II A/D D/A

DC AC

1 Introduction of mechatronics
2 Passive devices (resistance, capacitor, coil)
3 Active devices (diode, transistor, FET)
4 Logic circuit and NAND circuit, TTL, CMOS, and digital IC
5 Digital circuit 1 (Flip-flop)
6 Digital circuit 2 (Counter, Register)
7 Analog circuit 1 (Op amp)
8 Analog circuit 2 (A/D, D/A converter)
9 Basics of microcomputer
10 Interface of microcomputer
11 DC motor, AC motor, Stepping motor
12 Motor control circuit and sensor interface
13 Interruption and hardware program
14 Sequence control and feedback control
15 Summaries

/Assessment Method

Assignment 40%, Report 60%.

/Preparation and Review

/Remarks

To be announced in the class.

/Message from the Instructor

The objective of the course is to provide students with the basic knowledge and understanding for designing automatic machines and computer controlled experimental setups necessary in student's laboratory or in student's future job.
Please take this course if students have an interest in this field.

/Keywords

Mechatronics, Computer, Hardware, Actuator, Sensor

○

(Advanced Manufacturing Processes)

/ Hiroshi MURAKAMI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	超精密加工法や超精密測定法など精密加工に必要な実践的知識を修得する。
技能	Ⅱ－１		
	Ⅱ－２	△	加工分野での実践的な技術開発能力を修得する。
思考・判断・表現	Ⅲ－１	△	環境対応加工技術などの実践的知識を修得し、環境を踏まえて広い視野で新たな問題に対処することができる思考力・判断力を養う。
	Ⅲ－２	○	研究活動で得られた成果を論文としてまとめ、発表できる能力を養う。
関心・意欲・態度	Ⅳ	○	加工分野での省エネルギー技術を修得し、新たな省エネルギー関連技術の開発への強い関心と意欲を養う。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

加工学特論

/Course Description

The aim of this course is to study fundamental knowledge and latest research topics for precision machining and precision measurement. The principle of the ultra precision and micro machining using cutting, grinding, electric discharge machining, and laser machining are learned. Furthermore, various no-contact and contact measurement methods are introduced.

Achievement targets are as follows:
Understanding the principle and characteristic of the ultra precision machining and micro machining
Understanding the principle and characteristic of the precise measurement

/Textbooks

The print is distributed.

(○) /References Available in the library: ○

None

○

(Advanced Manufacturing Processes)

/Class schedules and Contents

1
2
3 CMP
4
5 FIB
6
7 CMM CMM
8
9 SPM
10 CAD
11 CAE
12 CAM
13
14
15

1. Introduction
2. Precision machining (1) Cutting
3. Precision machining (2) Grinding, CMP
4. Mirco machining (1) Cutting, Grinding
5. Mirco machining (2) Laser machining, FIB
6. Mirco machining (3) EDM
7. Precision measurement (1) CMM, µCMM
8. Precision measurement (2) Surface roughness, Roundness
9. Precision measurement (3) SPM
10 CAD
11 CAE
12 CAM
13. Meeting for reading research papers (1) Group1
14. Meeting for reading research papers (2) Group2
15. Meeting for reading research papers (3) Group3

/Assessment Method

20%
80%

Participation 20%
Report 80%

/Preparation and Review

/Remarks

20

Prepare and review the contents of a lecture.
Maximum Number of Students, 20.

/Message from the Instructor

The production processing technology is a basic technology indispensable to produce the machine section that satisfies demanded function, quality, and cost.

/Keywords

Ultra precsion machining, Micro machining, Precise measurement

○

(Machine Element Design)

/ Ryoichi MATSUNAGA /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	機械工学の専門的学力を有するために、様々な機械要素に関する知見を深める。
技能	Ⅱ－１		
	Ⅱ－２	△	設計に関する実践的な手法を修得する。
思考・判断・表現	Ⅲ－１	△	機械要素に関する知識の利用方法を修得する。
	Ⅲ－２	○	新たな適用事例について調査する。
関心・意欲・態度	Ⅳ	○	現物に触れ、その構造に対する理解を深める。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

機械要素設計特論

/Course Description

It is the course objective that the student understands a processing principle, a processing machine style, and a processing phenomenon in order to process various machine parts, and can judge now exactly the selection of the processing method according to a function or cost.

/Textbooks

2,592

(○) /References Available in the library: ○

4,428

○

(Machine Element Design)

/Class schedules and Contents

1
2
3
4
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7
8
9 3D-CAD
10 3D-CAD
11 3D-CAD
12 3D-CAD
13 3D-CAD
14 3D-CAD
15

1 About a Phenomenon as Plasticity
2 Stress and Strain
3 Yield Condition
4 Elementary Solution
5 Finite Element Method
6 Rolling
7 Review
8 The forefront of sheet metal forming
9 Outline of 3D-CAD
10 The example of practical use 3D-CAD
11 Discussion about the example of practical use 3D-CAD
12 The practice of 3D-CAD
13 Forming form 3D-CAD
14 Discussion about the practice of 3D-CAD
15 Conclusion

/Assessment Method

40%
60%

Participation 40%
Report 60%

/Preparation and Review

/Remarks

20 people of capacit

Review and prepare for the area indicated before and after a lecture.

/Message from the Instructor

The production processing technology is a basic technology indispensable to produce the machine section that satisfies demanded function, quality, and cost.

/Keywords

○

(Advanced Systems Engineering)

/ Nobuhiro OKADA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	システム工学に関する専門的、実践的な知識を修得する。
技能	Ⅱ－１	△	システム工学に関する専門的技能を修得する。
	Ⅱ－２	○	システム工学に関する実践的な技能を活用した技術開発や研究開発を行う能力を修得する。
思考・判断・表現	Ⅲ－１	◎	システム工学の知識を活用して新たな課題の探求と解決を行う能力を修得する。
	Ⅲ－２	○	研究で得た成果を論文・資料などにまとめるとともに、それらを発表する能力を修得する。
関心・意欲・態度	Ⅳ	○	システム工学に関連した新技術と研究開発に関心をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

システム工学特論

/Course Description

3D 3D
3D 3D 3D

In the past several years, the shape measurement by 3D scanner and the manufacturing technology by 3D printer of arbitrary shape parts are explosively developed.
At this lecture, The course focuses on the 3D parts designing by computer and the parts manufacturing by 3D printer, adopting mobile robot as a subject.
The evaluation of manufactured parts by 3D scanner is also mentioned.

/Textbooks

None. Documents will be served as needed.

(○) /References Available in the library: ○

SolidWorks 3 CAD 2 2012

○

(Advanced Systems Engineering)

/Class schedules and Contents

1
2 3D CAD
3 3D CAD
4 3D CAD
5 3D CAD
6
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8 3D CAD
9 3D CAD
10 3D CAD
11
12 3D
13
14 3D
15

1 Guidance
2 Tutorial of 3D CAD
3 Tutorial of 3D CAD
4 Tutorial of 3D CAD
5 Tutorial of 3D CAD
6 Mobile robot design by 3D CAD Outlines
7 Mobile robot design by 3D CAD Outlines and Review
8 Mobile robot design by 3D CAD Details
9 Mobile robot design by 3D CAD Details
10 Mobile robot design by 3D CAD Details
11 Review of detailed design
12 3D printer, Parts manufacturing
13 Fabrication of mobile robots
14 Evaluation of the mobile robots, 3D scanner
15 Summary and Presentation

/Assessment Method

50 50 7 15

Presentation 50%, Report 50% (Reports are imposed on final of the 7th and 15th lessons).
The points will be subtracted by absence.

/Preparation and Review

/Remarks

20

By the number of licenses of using software, the participants are restricted to 20 students.
It may ask for a certain amount of cost on the mobile robot parts.
Students are required to do practice on the software, and designing and consideration on the robot, except the lectures.

/Message from the Instructor

3D

Introduction of 3D printer is progressing in the domain of not only the field of robot and mechatronics but also many field of research and industry.
Touching the basis of the technology, please study system engineering through manufacture of a robot.

/Keywords

3D CAD 3D
3D CAD, 3D printer, Mobile robot

○

(Advanced Dynamics of Machinery)

/ Takumi SASAKI / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	機械力学の応用分野に関する学力を身に付ける。
技能	Ⅱ－１		
	Ⅱ－２	◎	機械力学に関する知識を応用した実践的な問題解決法を身に付ける。
思考・判断・表現	Ⅲ－１	○	環境関連技術に、機械力学の知識を応用する能力を身に付ける。
	Ⅲ－２		
関心・意欲・態度	Ⅳ	△	省エネルギー技術の開発に向けて、機械力学の知識を応用することに関心をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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機械力学特論

/Course Description

This course provides the explanation of an equilibrium point of system and its stability, bifurcation phenomenon, the vibration characteristics of linear / nonlinear systems. These explanations are given using some specific examples. Some literatures are provided to promote an understanding.
Attainment target:
- Able to derive an equilibrium point and determine the stability from the equation of motion of a dynamic system.
- Able to understand the bifurcation phenomenon of a dynamic system.
- Able to understand the effect of the nonlinearity of a system on the response of a system.
- Able to understand the vibration characteristics of linear / nonlinear systems.

/Textbooks

Handout

(○) /References Available in the library: ○

None

○

(Advanced Dynamics of Machinery)

/Class schedules and Contents

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1 Overview of the course
2 Equilibrium point of a system
3 Stability of the equilibrium point
4 Bifurcation of the equilibrium point
5 Types of bifurcations
6 Bifurcation of a dynamic system
7 Vibration of a linear system
8 Vibration of a nonlinear system
9 Vibration analysis methods for a nonlinear system
10 Reading technical papers
11 Reading technical papers
12 Reading technical papers
13 Reading technical papers
14 Reading technical papers
15 Summary

/Assessment Method

60%
40%

Reports, Exercises, Presentation 60%
Term examination 40%
Absence, subtractive point

/Preparation and Review

/Remarks

The fundamental knowledge on mechanical vibration is required. Prepare for the class by a designated textbook and review notes and textbooks after the class.

/Message from the Instructor

/Keywords

○

(Tribology)

/ Kenji MATSUDA / , / Kazuto TAKASHIMA /
/Instructor

2 2
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	トライボロジーに関する専門的、実践的な知識を修得する。
技能	Ⅱ－１		
	Ⅱ－２	◎	トライボロジーに関する実践的な技能を活用した技術開発や研究開発を行う能力を修得する。
思考・判断・表現	Ⅲ－１	○	トライボロジーの知識を活用して新たな課題の探求と解決を行う能力を修得する。
	Ⅲ－２		
関心・意欲・態度	Ⅳ	○	トライボロジーに関する新技術と研究開発に関心をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※機械システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

トライボロジー特論

/Course Description

Tribology is the science and technology of interacting surfaces in relative motion. This includes study and application of the principles of friction, lubrication and wear. Tribology is one of the key technologies crucial to improve functions, performance and reliability of the machine. The purpose of this course is to help students master the basic concepts of Tribology, as well as that role in biological systems.

/Textbooks

ISBN 4274069540

(○) /References Available in the library: ○

– ISBN 4782840691
ISBN 4842500719
ISBN 484250157X
ISBN 4844527142

/Class schedules and Contents

1 Introduction
2 Contact between Solids
3 Possible Mechanism for Sliding/Rolling Friction
4 Design Concept of Coatings
5 Principle of Fluid Lubrication
6 Sliding Bearing
7 Elastohydrodynamic Lubrication
8 Boundary Lubrication
9 Midterm Exam
10 Biotribology 1
11 Biotribology 2
12 Biotribology 3
13 Lubricants
14 Surface Damages
15 Conclusions

/Assessment Method

50 Midterm Exam 50%
50 Final Exam 50%

○

(Tribology)

/Preparation and Review

/Remarks

It is desirable or recommended for the students to have basics on “Mechanical Engineering” in the undergraduate course. The students are expected to read the text and assigned materials before and after the lecture carefully.

/Message from the Instructor

‘ ’

Although the word ‘Tribology’ may not sound familiar to us, ‘Tribology’ is essential study for the understanding and the design of the mechanical system.

/Keywords

Tribology, Friction, Wear, Lubrication, Design, Biotribology, Artificial Joint

(Architectural Design Program)

/Instructor / Hiroatsu FUKUDA / 19 , / Bart DEWANCKER / 19
/ Takao AKAGAWA / , / Noriko OKAMOTO /

/Year 2 /Credits 2 /Semester /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	デザインプロジェクトに関する高度な専門知識を修得する。
技能	Ⅱ	○	プロジェクトを遂行するために必要なデザインツール運用能力を修得する。
思考・判断・表現	Ⅲ	○	プロジェクトを完成するための課題を分析しプログラムを作成する能力を修得する。
関心・意欲・態度	Ⅳ－１	○	スタジオワークにおいて他者との協調性やコミュニケーション能力を修得する。
	Ⅳ－２	○	環境との調和や倫理観に基づくプログラム作成能力を修得する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

建築デザインプログラム

/Course Description

CAD　CG

This course will set practical problems of architectural designs, and aim for the improvement of a high order and a wide design skill and the acquisition of the knowledge by practicing the confirmation of the building law; the making of the architectural confirmation application documents; the expression using CAD / CG technology; thermal environmental simulation that the practical use of the natural energy, etc. Students will be required to set and compile a project in each instructor's studio.

/Textbooks

Not specified

(○) /References　Available in the library: ○

To be announced in studio

(Architectural Design Program)

/Class schedules and Contents

/Class schedules and Contents
1
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1 Guidance / Assigning to studio
2 Studio work / Case Research
3 Studio work / Case Research and analysis
4 Studio work / Project planning and discussion
5 Studio work / Project work
6 Studio work / Preparation for Midterm presentation
7 Midterm presentation
8 Studio work / Research work and discussion
9 Studio work / Project work
10 Studio work / Project work and discussion
11 Studio work / Project work
12 Studio work / Project work and discussion
13 Studio work / Project work
14 Studio work / Preparation for presentation
15 Joint final presentation

/Assessment Method

50%
50%
Midterm presentation 50%
Final handed work 50%

/Preparation and Review

/Remarks

Students should set concretely the building design skill that oneself wants to improve, ang get information about the design competition.

It is important that students set the theme (a program) at an early stage by receiving guidance from an instructor.
The students who wish to take this class should enrol the course of "Architectural Internship".

/Message from the Instructor

Students are required to improve the design skill and the ability of writing sentence and presentation through the midterm presentation and final work. It is necessary to let a portfolio for job hunting enrich.

/Keywords

○

(Ecological Design for the Urban Environment)

/ Bart DEWANCKER / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	省資源・省エネルギー、自然との共生を考慮した都市づくりに関する実践的で高度な専門知識を修得する。
技能	Ⅱ	△	環境共生都市に関連した調査資料やデータを高度にまとめ解析する技能を身に付ける。
思考・判断・表現	Ⅲ	◎	環境共生都市に係わる国際的な事例を自分で探し、研究し発表することにより、思考力・判断力・表現力を身に付ける。
関心・意欲・態度	Ⅳ－１	○	都市環境の国際的な実例を共有することにより、他者の様々な価値観や考え方を学ぶ。
	Ⅳ－２	○	事例研究課題を通し、倫理観に基づく問題解決の重要性を理解する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境共生都市づくり論

/Course Description

Globally, there are two trends in urban development, shrinking cities and compact cities in developed countries on the one hand, and expanding cities in developing countries on the other hand. In the first series of sessions we will deal with
research on actual sustainable urban cities, in the second series, we will search on compact and shrinking cities.

/Textbooks

Not specified

(○) /References Available in the library: ○

Not specified

○

(Ecological Design for the Urban Environment)

/Class schedules and Contents

1
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3 1
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6 2
7 1
8 2
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1 Guidance
2 Definition of Environmental City
3 Environmental City Case study 1: redevelopment of inner city 1
4 Environmental City Case study 2: redevelopment of inner city 2
5 Environmental City Case study 3: urban fringe studies 1
6 Environmental City Case study 4: urban fringe studies 2
7 Environmental City Case study 5: foreign cities 1
8 Environmental City Case study 6: foreign cities 2
9 Sustainable city and Compact city 1
10 Sustainable city and Compact city 2
11 Sustainable city and Compact city 3
12 Sustainable city and Compact city, project study 1
13 Sustainable city and Compact city, project study 2
14 Sustainable city and Compact city, project study 3
15 Presentation

/Assessment Method

20%
20%
20%
40%
Positive Collaboration and Questioning on Lectures 20%
Evaluation of Case Study Research 20%
Evaluation of Project Study Research 20%
Evaluation of Final Presentation 40%

/Preparation and Review

/Remarks

Gathering information on sustainable cities is a must and will be helpful to understand better the lectures.
URL
You have to specify sources such as URL or authority of your report.

/Message from the Instructor

We offer participatory class in which you have to take the initiative in assignments of case study and exercise lessons.

/Keywords

(Advanced Trans-Generational Architecture)

/Instructor / Hidehiro KOYAMADA / 19 , / Hiroki SUYAMA / 19

/Year 2 /Credits /Semester 1 /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	過去から未来へ空間形成する建築の持続可能性に関する専門的な知識を修得する。
技能	Ⅱ	○	広い視野を持ち、正確な情報を収集し、まとめる技能を身に付ける。
思考・判断・表現	Ⅲ	△	授業で得られた知識や技能を社会で発揮するための判断力・表現力を身に付ける。
関心・意欲・態度	Ⅳ－１	○	他者とコミュニケーションをはかり、課題を解決し、説明する能力を修得する。
	Ⅳ－２	○	理論・経験などの根拠に基づいた信頼性の高い資料を作成する倫理観を持てるようにする。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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世代間建築特論

/Course Description

, , ,

In this advanced lecture, what sustainable environment-conscious and resources circulation-oriented buildings and cities, considering resources circulation and the preservation of the environment should be is discussed from the viewpoints of building materials/components/systems and design/production/construction. As the results attenders are expected to learn the bases of environment-conscious materials and life-cycle design (eco-material design and eco-life-cycle design). Especially, the object of this lecture is to acquire the knowledge of design and systems of sustainable buildings using resources circulation-oriented materials, and highly durable buildings having long service life, through the examples of the contents of design of really constructed long life houses.

/Textbooks

Not designated

(○) /References Available in the library: ○

1)
Perfect Recyclable House 1 Wooden House
2
Perfect Recyclable House 2 Steel House
3
Perfect Recyclable House 3 Living Experiment

(Advanced Trans-Generational Architecture)

/Class schedules and Contents

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1. Trans-generational architecture. Guidance
2. Trans-generational architecture. Design Philosophy
3. Trans-generational architecture. Moral Philosophy
4. Trans-generational architecture. Intellect
5. Sustainable consumption
6. Design of houses for recycle/reuse 1 (the state of demolished materials in construction)
7. Design of houses for recycle/reuse 2 (perfect recycle house)
8. The present condition of social capital and maintenance management (presentation)
9. Case research 1: Recycling building material
10. Case research 2: High durability building material
11. Long service life and information transmission
12. Resource circulation and recycle design
13. Sustainability and eco balance performance
14. Environment conscious materials and lifecycle design
15. Trans-generational material of architecture (presentation)

/Assessment Method

2 2×100 /2
Points of evaluation of reports about the contents of lectures by two teachers
(Individual evaluation by each teacher : (2×100)/2))

/Preparation and Review

/Remarks

In case graduate students want to receive the training cources of design and/or design management in the internship, they are expected to attend this lecture.

/Message from the Instructor

You have to be conscious of durability and long life span of buildings on a regular basis.

/Keywords

Trans-generation, Sustainability, Recycle, Reuse,

○

(Environmental and Spatial Design)

/ Takao AKAGAWA /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	建築理論の基礎について文献を読解し、議論することによって建築理論の基礎知識を修得する。
技能	Ⅱ	◎	建築設計実務に必要な建築ディテールを理解する能力、設計案をまとめる技能を修得する。
思考・判断・表現	Ⅲ	△	妥当な建築計画案について判断し、表現することができる。
関心・意欲・態度	Ⅳ－１	○	図面を通してのコミュニケーションをはかり、課題を提案する能力を修得する。
	Ⅳ－２	○	建築計画理論の学習、計画案の作成、建築実務に対する理解を深めることによって実社会において建築設計者が持つべき倫理観を修得する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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環境空間設計学

/Course Description

The profession of an Architect not only requires technical skills, but requires understanding of our socio-economic environment etc. In this course, fundamental texts in Architectural theory will be covered and fundamental architectural details will be explored through lectures and exercises, to explore the idea and philosophy behind details and nurture deeper understanding toward the profession. In the first half of the course, the thought process of Architectural realization, the relationship between the Architect and the social background will be lectured. In the latter half, fundamental Architectural details (roofs, openings, interior etc.) will be covered by lecturing the design philosophy behind the details and through exercises by drawing these details.

/Textbooks

To be assigned in class.

(○) /References Available in the library: ○

To be assigned in class.

○

(Environmental and Spatial Design)

/Class schedules and Contents

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2 1
3 2
4 3
5 4
6 5
7 1
8 2 (1) RC
9 3 (2)
10 4 (3)
11 5 (1)
12 6 (2)
13 7 (1)
14 8 (2)
15 9 (3)

1 Introduction
2 Architectural Theory 1: Ornament and Crime
3 Architectural Theory 2: Towards a new architecture
4 Architectural Theory 3 Complexity and Contradiction in Architecture
5 Architectural Theory 4: The Mathematics of the Ideal Villa
6 Architectural Theory 5: Delirious New York
7 Introduction to Architectural practice
8 Fundamentals of Architectural details 1 : details of RC structures
9 Fundamentals of Architectural details 2 : details of wooden structures
10 Fundamentals of Architectural details 3 : detail observation of details
11 One day design exercise 1 :conducting the excercise
12 One day design exercise 2 :critique of the excercise
13 Investigations in Creative Details 1 : introduction of the excercise
14 Investigations in Creative Details 2 : presentation and critique
15 Investigations in Creative Details 3 : presentation and critique

/Assessment Method

30%
60%
10%
Oral exams in class 30%
Assignment 60%
Participation 10%

/Preparation and Review

/Remarks

Reading assignments before class is mandatory.

Attendance is mandatory. Interactive communication in class will be not possible without reading assigned documents. If taking internship courses in design descipline, it is recommended that this course be completed.

/Message from the Instructor

Reading and understanding of fundamental texts and practical training for being an Architect is not easy, but it is a necessary process.

/Keywords

(Construction Engineering and Management)

/ Kazuaki HOKI / 19 , / Koji TAKASU /
/Instructor 19

2 1
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	建築生産管理に必要となる理論と実践的な知識を修得する。
技能	Ⅱ		
思考・判断・表現	Ⅲ	○	建築生産管理における社会的事項に対して問題点を見つけ、解決する能力とともに、自らの考えを伝える能力を修得する。
関心・意欲・態度	Ⅳ－１	○	建築生産管理を効率的に実践するため、他者と協力してプロジェクトをまとめ上げる能力を修得する。
	Ⅳ－２	○	建築生産管理を実践する技術者としての倫理観に基づく問題解決の意欲、態度を修得する。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

建築生産管理論

/Course Description

Building industry has different characteristics compare to manufacturing industry and sometimes they cause problems.
To overcome these problems the construction management technologies are introduced, which realizes safety work,
good quality, appropriate cost and construction period in each construction project. The lecture provides the newest
technologies which are applied in all building activity processes which begin with material product to building maintenance.
The lecture also provides latest innovations in construction industry such as application of information technologies.

/Textbooks

Papers will be distributed.

(○) /References Available in the library: ○

Y. Tamura et al.: Building Construction Methos - Construction Planning and Management -, Maruzen co., Ltd.

Architectural Institute of Japan: Japanese Architectural Standard Specification, JASS 5 Reinforced Concrete Work,
Maruzen co., Ltd.

(Construction Engineering and Management)

/Class schedules and Contents

1
2 JASS5
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1 Introduction of quality control
2 Reinforced concrete work (JASS5) concrete work
3 Reinforced concrete work (JASS5) quality control of concrete
4 Wooden house work
5 Steel house work
6 Brick house work
7 Students' presentation
8 Construction processes and organization
9 Systematization in construction process (1) Theory
10 Systematization in construction process (2) Examples
11 Construction planning and process simulation
12 Work study in construction
13 Application of information technologies in construction management
14 Latest innovation in construction management
15 Students' presentation

/Assessment Method

10%
60% 1 7 8 14
30% 1 7 8 14

Participation 10% Participation
Mid term paper 60% Once each in 1-7 and 8-14
Presentation 30% Once each in 1-7 and 8-14

/Preparation and Review

/Remarks

Review is necessary.

The lecture is carried out that students have basic knowledge on building materials and construction.

/Message from the Instructor

Since now construction projects are not considered to introduce the industrial engineering ideas and technologies because of difference of conditions to manufacturing industry. The lecture delivers basic way of thinking and techniques to manage construction projects scientifically by introducing real project examples. Through the lecture students' scientific viewpoint are cultivated.

/Keywords

(Construction Engineering and Management)

/Keywords

(Advanced Environmentally Conscious Materials Engineering)

/Instructor / Hiroki SUYAMA / 19 , / Kazuaki HOKI / 19

/Year 2 /Credits /Semester 2 /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

/Department , , , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	△	環境調和型材料のより実践的な専門知識を修得する。
技能	Ⅱ	◎	環境調和型材料に関連する調査資料や数値データをまとめる技能を身に付ける。
思考・判断・表現	Ⅲ	○	授業で得られた技能を社会で発揮するための表現力を身に付ける。
関心・意欲・態度	Ⅳ－１		
	Ⅳ－２	○	理論・経験などの根拠に基づいた信頼性の高い資料を作成する倫理観を持てるようにする。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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環境調和型材料工学特論

/Course Description

In order to make a soft landing on the sustainable buildings, cities, and societies, growing out of west type materials civilization characterized by the mass production, mass consumption, and mass waste, it is necessary and indispensable to make the environment-conscious and resources circulation-oriented production, processing, construction, and design of materials, components, products, and buildings. The objective of this special lecture is to make attenders to acquire the way of thinking and technologies of "Eco-materials" and "Eco-construction" in buildings, based on various types of methods such as exercises and presentations.

/Textbooks

Not specified

(○) /References Available in the library: ○

To be announced in class

(Advanced Environmentally Conscious Materials Engineering)

/Class schedules and Contents

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10. 2
11. 1
12. 2
13. 3
14. 4
15. 5

1. Eco-material for building
2. Quality and management of reproduction material
3. Extension of life of building
4. Highest construction material
5. Presentation 1 / Building material
6. Treatment of material in building construction
7. System and construction considering reuse of material
8. Way of thinking of Eco-construction
9. Examples of Eco-construction
10. Presentation 2 / Building construction
11. Case study 1 / Wood
12. Case study 2 / Metal
13. Case study 3 / Concrete
14. Case study 4 / Cladding
15. Case study 5 / Interior material

/Assessment Method

20
80

Attendance and participation: 20%
Presentation and result of seminar: 80%

/Preparation and Review

/Remarks

Review the lecture.

/Message from the Instructor

Nothing particular

/Keywords

(Structural Analysis)

/ Keigo TSUDA / , / Masae KIDO / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	建築構造解析法に関して、主として仕事、エネルギの原理を修得し、理解する。
技能	Ⅱ	○	建築構造物の応力、変形解析において理論解を導出する技能を得る。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ－１		
	Ⅳ－２		

※◎：強く関連　○：関連　△：やや関連
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構造解析学

/Course Description

Mechanics of building structures are categorized such as structural mechanics, strength of materials and theory of plasticity. Equilibrium equations, stress-strain relations and strain-displacement relations are reviewed, and after that principles of work (divergence theorem, unit load method, principle of virtual work and so on) and energy principles (principle of minimum potential energy and principle of minimum complementary energy) are explained. The objective of this class is to acquire the structure of structural analysis.

/Textbooks

(○) /References Available in the library: ○

A first course of energy priciple

(Structural Analysis)

/Class schedules and Contents

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10 2
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1 Fundamental concept of structural analysis
2 Governing equations and assumptions
3 Load, stress and stress resultant
4 Equilibrium and natural boundary conditions
5 Assumption of deformation
6 Strain-displacement relations, geometric boundary conditions
7 Stress-strain relations
8 Differential equations of equilibrium
9 Divergence theorem 1 Fundamental equaiton
10 Divergence theorem 2 Application
11 Unit load method, Principle of virtual work 1
12 Principle of virtual work 2, Principle of complementally virtual work
13 Principle of minimum potential energy
14 Principle of minimum complementally energy
15 Practice

/Assessment Method

20%
80%
Discussion 20%
Paper 80%

/Preparation and Review

/Remarks

It is desirable for students who take the Architectural Internship and study at structural design field to take this course. Preprint papers should be examined before this class. After class, you should review of this lessons by running the workshop.

/Message from the Instructor

Scope of structural analysis should be understood.

/Keywords

(Advanced Building Materials)

/ Koji TAKASU / 19 , / Hidehiro KOYAMADA /
/Instructor 19

2 2
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	建築材料のより実践的な専門知識を修得する。
技能	Ⅱ	◎	建築材料に関連する調査資料や数値データをまとめる技能を身に付ける。
思考・判断・表現	Ⅲ	△	授業で得られた専門技能を駆使し、建築材料に関する国際的な課題を抽出し、その解決策を社会に発信する表現力を身に付ける。
関心・意欲・態度	Ⅳ－１		
	Ⅳ－２	○	理論・経験などの根拠に基づいた信頼性の高い資料を作成できる倫理観を養う。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

建築材料特論

/Course Description

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The building is composed of structural materials, functional materials, and finish materials, etc. This course understands the feature of building materials more deeply, seizes the current state of the process of manufacture, production, and the cost, etc. in addition, and learns the technique of the architectural materials design. The building materials needed in architectural practice of the supervision of construction work and the construction management, etc. is learnt, and basic knowledge necessary for the internship in those fields is acquired.

Objective
It comes to be able to understand the point of unclarification for building materials to design it.

/Textbooks

To be announced in class

(○) /References Available in the library: ○

JASS5 2009
Japanese Architectual Standard Specification JASS5 Reinforced Concrete Work

(Advanced Building Materials)

/Class schedules and Contents

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1 Introduction of building materials
2 Introduction of building materials (structual materials and finishing materials)
3 Special building materials (silicic materials)
4 Special building materials (calcareous materials)
5 Special building materials (metal materials)
6 Special building materials (organic materials)
7 Special building materials (concrete)
8 Presentation of assignments 1
9 Design of building function matarials(fire-preventive, fire resistive, waterproofing material)
10 Design of building function matarials(thermal insulation, vaporproofing material)
11 Design of building function matarials (soundproof material)
12 Design of building element materials (roof material)
13 Design of building element materials (exterior wall material)
14 Design of building element materials (interior wall material)
15 Presentation of assignments 2

/Assessment Method

30%
70%
Attendance and Participation 30%
Presentation of assignments 70%

/Preparation and Review

/Remarks

Students are required to prepare the basic knowledge of building materials taken up by a usual lecture.

It lectures on the basic knowledge of the building material to possess.

/Message from the Instructor

Not only the form of the building but also the material always noticeable. The designof building materials is an important business for designing a building. I believe this course will help students understand the design of building materials just like an architectural design.

/Keywords

Concrete
Mechanical Properties
Physical Proterties

(Structural Design for Buildings)

/ Fumiya ESAKI /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	建築構造設計に関する耐力・剛性・変形性能についての知識を修得し、理解する。
技能	Ⅱ	○	建築構造物の耐力・剛性・変形性能を算定する技能を得る。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ－１		
	Ⅳ－２		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

建築構造設計

/Course Description

The aim of this course is to show the seismic design methods of buildings. The historical review and theoretical background of Japanese building seismic design standard are explained. Moreover, the evaluation method of seismic capacity and seismic retorofitting of existing reinforced concrete buildings constructed under the old standard is described.
The aim of level of attainmennt is as follows.
1) To be able to explain the content of existing Japanese building seismic design standard.
2) To be able to explain the content of evaluation method of seismic capacity and seismic retrofitting of existing reinforced concrete builidings.

/Textbooks

Give out the supporting materials in lecture.

(○) /References Available in the library: ○

Introduce the references related to lecture.

(Structural Design for Buildings)

/Class schedules and Contents

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1 Design method of building structures (1) History of structural design of buildings
2 Design method of building structures (2) Concept of structural design of buildings
3 Design method of building structures (3) Outline of seismic design standards
4 Design method of building structures (4) Method of structural calculation
5 Design method of building structures (5) Concept of second level seismic design
6 Design method of building structures (6) Second level seismic design of R/C building structures
7 Design method of building structures (7) Calculation of response and limit strength
8 Design method of building structures (8) Calculation of energy balance based seismic resistant design
9 Design method of building structures (9) Time history response analysis
10 Seismic evaluation method of existing R/C buildings (1) Outline of seismic evaluation and concept of basic seismic index of structure
11 Seismic evaluation method of existing R/C buildings (2) Basic seismic index of structure and ultimate state of structure
12 Seismic evaluation method of existing R/C buildings (3) Strength index
13 Seismic evaluation method of existing R/C buildings (4) Ductility index
14 Seismic retrofit method of existing R/C buildings (1) Concept of seismic retrofit
15 Seismic retrofit method of existing R/C buildings (2) Strengthening strucural member design

/Assessment Method

20%
80%
Paticipation 20%
Paper 80%

/Preparation and Review

/Remarks

You need to review the basic knowledge on strucure mechanics and on failure and resistance mechanism of strucural members.

It is desirable to take this course for students who take the Architectural Internship and study at structural design field.

/Message from the Instructor

Theoretical background of the seismic design methods of building are explained clearly.

/Keywords

building structural design, seismic design, seismic evaluation

(Seismic Structure Design)

/ Masae KIDO / 19 , / Keigo TSUDA /
/Instructor

2 1
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	耐震構造に関する理論、専門知識を修得する。
技能	Ⅱ	○	耐震設計に関する技能を身に付ける。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ－１		
	Ⅳ－２		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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耐震構造学

/Course Description

1) 2) 3)

The aim of this course is to learn the basic theory, of plastic design, buckling and calculation of yield strength and ultimate strength for structural design of steel structure.
We explain the outline of steel material, steel frames and structural design.
Calculation method for plastic collapse loads of beams and frames by using the plastic analysis are acquired.
We treat the buckling problems which must be considered. After you learn the buckling theory, you learn the calculation method of yield strength and ultimate strength of compression members, flexural members and beam-columns.
The attainment targets are : 1) understanding the theory of plastic analysis and acquiring ability to design the simple frame subjected to vertical and horizontal load, 2) understanding the buckling phenomena and theory, 3) acquiring ability to design the beam or the beam-column in buildings.

/Textbooks

Steel Structure -theory and design- by Kazuo INOUE and Keiichiro Suita
Documents will be distributed in class

(○) /References Available in the library: ○

- THeodre V. Galambos
[S×RC×]

Steel Structure by Chiaki Matsui
Steel Structure by Minoru Wakabayashi
Structural Members and Frames by Theodore V. Galambos, Translated by Yuji Fukumoto and Fumio Nishino
Structural Design [Steel, Reinforced concrete and Timber structures] by Research group of building structural techniques

(Seismic Structure Design)

/Class schedules and Contents

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1 Guidance. Steel materials and steel frame.
2 Outline of seismic design in Japan
3 allowable stress design and horizontal load-carrying capacity
4 yield condition of steel. Full plastic moment 1 (axial symmetrical section and composite beam)
5 Full plastic moment 2 (effect of axial load on full plastic moment)
6 Plastic collapse of bending members and frames
7 Proposition of plastic collapse
8 Calculation methods of plastic collapse load 1(frames)
9 Flexural buckling of a member 1 (elastic buckling)
10 Flexural buckling of a member 2 (inelastic buckling)
11 Buckling deflection method
12 Column bracing
13 Lateral buckling
14 Compression members and bending members
15 Beam-column design

/Assessment Method

80%
20%
Assignments 80%
Paticipation 20%

/Preparation and Review

/Remarks

(1)
(2)
(3)
Preparation and review are necessary.
Bring a scientific calculator.
Basic knowledge of differential and integral, differential equations, linear algebra and vector calculus should be acquired.

It is desirable for students to take this course when they take the Architectural Internship and study at structural design field.

/Message from the Instructor

/Keywords

(Building Facilities Systems)

/ Shintaro ANDO / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	△	建築設備のより実践的な専門知識を修得する。
技能	Ⅱ	◎	建築設備に関連する調査資料や数値データをまとめる技能を身に付ける。
思考・判断・表現	Ⅲ	○	授業で得られた技能を社会で発揮するための表現力を身に付ける。
関心・意欲・態度	Ⅳ－１	△	他者とコミュニケーションをはかり、課題を解決する能力を取得する。
	Ⅳ－２	○	理論・経験などの根拠に基づいた信頼性の高い資料を作成する倫理観を持てるようにする。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

環境設備システム論

/Course Description

1.
2.

This course introduces technologies for saving energy and utilizing new energy source which are applied to buildings and building services. Additionally, simulation skills to predict installation effect of the technologies are educated though practices. Personal computers are used in the practices.

Course Objectives

1.Acquire skill for performance prediction and analysis of energy saving technology.
2.Learn the verification method of building facility system.

/Textbooks

/ Not specified

(○) /References Available in the library: ○

/ Will be introduced during the lecture appropriately

(Building Facilities Systems)

/Class schedules and Contents

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15 - -

1 Guidance and introduction
2 Actual examples of environmental building service system -1-
3 Actual examples of environmental building service system -2-
4 Actual examples of environmental building service system -3-
5 Actual examples of environmental building service system -4-
6 Passive methods applied to buildings for energy saving-1-Insulation-
7 Passive methods applied to buildings for energy saving-2-Solar insolation-
8 Passive methods applied to buildings for energy saving-3-Others-
9 Solar energy utilizations-1-Technology of solar energy utilization-
10 Solar energy utilizations-2-Calculation of solar energy-
11 Solar energy utilizations-3-Calculation of solar energy-
12 Practice on building facilities systems-1-Guidance-
13 Practice on building facilities systems-2-Research-
14 Practice on building facilities systems-3-Preparing presentation-
15 Practice on building facilities systems-4-Presentation-

/Assessment Method

/Report 60%
( )/Practice, etc 40%

/Preparation and Review

/Remarks

Preparation is necessary.
If you will take part in the internship provided by the company that relates to building service, it is desirable to take this class.

/Message from the Instructor

People commonly think that simulation and programming skills are difficult to learn. However, if you educate the skills, you have great advantages as a engineer.

/Keywords

○

(Theories of Urban and Building Energy Systems)

/ Weijun GAO / 19 , / Hidetoshi NAKAGAMI /
/Instructor

2 1
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	都市エネルギーに関する実践的な専門知識を修得する。
技能	Ⅱ	△	都市エネルギーに関連する調査資料をまとめる技能を身に付ける。
思考・判断・表現	Ⅲ	◎	授業で得られた技能を社会で発揮するためのプレゼンテーション能力を身に付ける。
関心・意欲・態度	Ⅳ－１	○	他者とコミュニケーションをはかり、課題を解決する能力を取得する。
	Ⅳ－２	○	理論・経験などの根拠に基づいた信頼性の高い資料を作成する倫理観を持てるようにする。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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建築・都市エネルギー論

/Course Description

In this lecture, you will develop an understanding – and a real working knowledge – of our energy technologies, policies and options. This will include analysis of the different opportunities and impacts of energy systems that exist within and between buildings and citiesgroups. Analysis of the range of current and future energy choices will be stressed, as well as the role of energy in determining local environmental conditions and the global climate.

/Textbooks

/A Framework for Action on Energy

(○) /References Available in the library: ○

/will be introduced during the lecture appropriately.

○

(Theories of Urban and Building Energy Systems)

/Class schedules and Contents

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1 Outline
2 Energy Key Isuues and Challenges
3 Energy and Water
4 Energy and Health
5 Energy and Biodiversity
6 Energy and Agriculture
7 Energy Efficiency
8 Renewable Energy
9 Advanced Fossil Fuel Technologies
10 Energy and Transport
11 Eneryg Accessibility
12 Addressing the Challenges in Energy
13 Modern Energy Services
14 Frameworks of Energy for Action
15 Future of Energy

/Assessment Method

/Report 40% /In each lecture, one subject will be presented.
/Theme 40% 2 /Twice
/Presentation 20% 1 /Once

/Preparation and Review

/Remarks

In each lecture, one subject will be presented. The studets will need to prepare the subject before the lecture in order to have a presentation in the class.

English material will be used. Students need to translate or present in English.

/Message from the Instructor

Energy services are essential for sustainable development. The way in which these services are produced, distributed and used affects the social, economic and environmental dimensions of any development achieved. Although energy itself is not a basic human need, it is critical for the fulfilment of all needs.This lecture try to provide a broad view of existing normative and programmatic frameworks in energy area, to highlight interlinkages among the sectors, to identify key gaps and challenges and to highlight areas where further action is needed.

/Keywords

Energy Water Health Biodiversity Agriculture Renewable Energy Transportation

(Advanced Architectural Acoustics and Lighting Design)

/ Noriko OKAMOTO /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	音環境デザイン及び 光環境デザインに関する高度な専門知識を修得する。
技能	Ⅱ	◎	音響設計や照明計画に関する高度な技能を身に付ける。
思考・判断・表現	Ⅲ		
関心・意欲・態度	Ⅳ－１		
	Ⅳ－２		

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

音と光の環境デザイン特論

/Course Description

In the first half, the acoustical / vibrational environmental planning are lectured as follows; the aim of the plan, basic plan, wide area propagation and environment plan, the prevention of noise and vibration in the general and special building and environment plan, acoustical environment and a disaster prevention systematically, and also learn the acoustical simulation technique.By the latter half, the lighting environmental planning is lectured as follows; the evaluation and the planning of the visual space, the sunshine / sunlight, lighting, and impose a problem of the lighting simulation.

/Textbooks

To be distributed some lecture document appropriately

(○) /References Available in the library: ○

Will be introduced during the lecture appropriately

(Advanced Architectural Acoustics and Lighting Design)

/Class schedules and Contents

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7 (3)
8 (1)
9 (2)
10 (3)
11 (1)
12 (2)
13 (3)
14 (4)
15

1 Guidance
2 Room acoustical planning (1) / goal, planning of room shape
3 Room acoustical planning (2) / planning of reverberation
4 Room acoustical planning (3) / case study
5 Acoustical design (1) / explaining of subjects
6 Acoustical design (2) / design of room shape
7 Acoustical design (3) / caluculation of reverberation time
8 Visual environmental planning (1) / goal, lighting source, light planning
9 Visual environmental planning (2) / visual planning, lighting equipments
10 Visual environmental planning (3) / environmental lighting and lighting pollution, estimate and assessment
11 Lighting simulation (1) / explaining of subject
12 Lighting simulation (2) / study on subjective space
13 Lighting simulation (3) / selecting of lighting source and equipments
14 Lighting simulation (4) / preparating for presentation
15 Presentation

/Assessment Method

50%
50%
Work on acoustical design 50%
Work on lighting design 50%

/Preparation and Review

/Remarks

It is necessary to confirm and understand the basic matter at the department level about the acoustics and the lighting.

Students are required to participate this class for training the field of the architectural design and the buildimg equipments in the course of "Architectural Internship".

/Message from the Instructor

Students are encouraged to understand enough the relation between the phenomenon and the theory on the acoustics and the lighting in the architectural space.

/Keywords

Architectural Acoustics, Lighting Planning

(Advanced Thermal and Air Environmental Design)

/Instructor / Yasuyuki SHIRAISHI / 19 , / Yuji RYU / 19

/Year 2 /Credits 2 /Semester /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	△	熱環境及び空気環境の形成維持メカニズムに関する専門知識を修得する。
技能	Ⅱ	◎	熱環境及び空気環境を支配する基礎方程式の数値解析・予測手法に関する技術を身に付ける。
思考・判断・表現	Ⅲ	○	授業を通じて得られた知識や技能を応用するための思考、判断力を身に付ける。
関心・意欲・態度	Ⅳ－１		
	Ⅳ－２	△	熱環境及び空気環境に配慮した建築・設備の必要性、それらを設計・提供する技術者の倫理観について学ぶ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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熱と空気の環境デザイン特論

/Course Description

IAQ　Indoor Air Quality　　IEQ　Indoor Environmental Quality

This course aims at improving students' understanding about physics of the various physical phenomena of architectural indoor and outdoor space, especially about heat and air as physical elements. Furthermore, it also aims to help students acquire technical knowledge about the mechanism for forming and maintaining an architectural and urban environment. Professors Ryu and Shiraishi will give lectures on thermal and air environment, respectively. Professor Ito, as a special lecturer, will give lectures on IAQ　Indoor Air Quality　and IEQ　Indoor Environmental Quality　.

/Textbooks

Some printed materials are distrebuted in the class.

(○) /References　Available in the library: ○

CFD / /
Computational Environment Design for Indoor and Outdoor Climates/Shuzo Murakami/University of Tokyo Press

(Advanced Thermal and Air Environmental Design)

/Class schedules and Contents

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2 CFD
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7 CFD
8 IAQ EAQ
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1 Thermal and Air Environment in Architectural Space, Course Overview
2 Air Environment 1, Overview of CFD Analysis
3 Air Environment 2, Characteristics of CFD Analysis
4 Air Environment 3, Govering Equations of Fluid
5 Air Environment 4, Laminar Flow and Turbulent Flow
6 Air Environment 5, Discretization of Equations
7 Air Environment 6, Various Indicies and Air Environment Design based on CFD Analysis
8 Air Environment 7, IAQ and EAQ
9 Thermal Environment 1, Mechanism of Thermal Environment
10 Thermal Environment 2, Non-Steady Heat Conduction(1)
11 Thermal Environment 3, Non-Steady Heat Conduction(2)
12 Thermal Environment 4, Solar Radiation and Window
13 Thermal Environment 5, Calculation of Heat Load and Estimation of Thermal Environment
14 Thermal Environment 6, Thermal Environmanetal Design and Review
15 Review

/Assessment Method

20%
80%
Participation 20%
Papers 80%

/Preparation and Review

/Remarks

To be assigned in class.

Attending class every week is crucial for enhancing your understanding and knowledge. Students who have taken or plan on taiking internship courses in design and mechanical discipline are encouraged to enroll in this course.

/Message from the Instructor

Understanding of heat transfer and air transportation phenomena in architectural space is becoming more and more important when considering the energy-saving performance and the comfortable indoor environment of a building. This course aims to help you understand them and utilize what you learn in your future work (environmental planning and mechanical design, etc.) and research.

/Keywords

Air Environment CFD Analysis IAQ Thermal Environment Heat Load

(Architectural Engineering Practice)

/Instructor / Weijun GAO / 19 , / Yuji RYU / 19
/ Keigo TSUDA / , / Koji TAKASU / 19
/ Yasuyuki SHIRAISHI / 19 , / Masae KIDO / 19
/ Hiroki SUYAMA / 19 , / Hidehiro KOYAMADA / 19
/ Kazuaki HOKI / 19 , / Shintaro ANDO / 19

/Year 2 /Credits 2 /Semester /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	○	建築に関する専門知識を修得する。
技能	Ⅱ	△	建築に関する課題を解決する技術を身に付ける。
思考・判断・表現	Ⅲ	◎	課題に取り組むことによって成果を得るための思考、判断力を身に付ける。
関心・意欲・態度	Ⅳ－１	◎	他者とコミュニケーションをはかり、課題を解決する能力を取得する。
	Ⅳ－２	◎	理論・経験などの根拠に基づいた信頼性の高い資料を作成する倫理観を持てるようにする。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※建築デザインコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

建築エンジニアリングプラクティス

/Course Description

This course aims at improving students' problem-solving abilities by tackling practical and complex problems in the field of architectual engineering, such as building construction methods, structural analysis, building materials, building services and environmental design.
This class is one of the authorized courses for first-class registered architect.

/Textbooks

/No text is required for this course.

(○) /References Available in the library: ○

/To be announced in class

(Architectural Engineering Practice)

/Class schedules and Contents

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1 Guidance and forming study groups for subject No.1
2 Information gathering for each subject No.1
3 Surveying and research(1)
4 Interim report(1)
5 Surveying and research(2)
6 Surveying and research(3)
7 Interim report(2)
8 Work for conclusion and suggestion
9 Preparation for presentation
10 Presentation in subject No.1
11 Information gathering for individual subject No.2
12 Investigation of literature
13 Preparation for presentation
14 Presentation in subject No.2
15 Review

/Assessment Method

10%
20%
70%

Participation 10%
Reports 20%
Presentation 70%

/Preparation and Review

/Remarks

Review is necessary.

The selections of concrete subject, the methods of investigation and the detailed scheduling are entrusted to the independency of stutents.The students who wish to take this class should enrol the course of "Architectural Internship".

/Message from the Instructor

/Keywords

○

(Visual Information Processing)

/ Masayuki SATO / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	視覚情報処理に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	視覚情報処理技術を情報通信・メディア処理システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	視覚情報処理に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	視覚情報処理に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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視覚情報処理

/Course Description

To study recent topics on human and machine vision, every student should give a presentation about a chapter of designated textbooks in turn and discussion about the topic among all attended students will follow.

The goal is that all students understand the recent trends in research on human vision and image processing and explain about them cleary.

/Textbooks

2004
2006
2011

Visual Psychophysics, The Journal of the ITE, 2004
How does Computer-Vision Imitate Human-Vision with the Latest Techniques? The Journal of the ITE, 2006
3D that Everyone Understands, The Journal of the ITE, 2011

(○) /References Available in the library: ○

2007/12

Perception and Cognition of Car-Drivers, The Journal of the ITE, Dec., 2007

○

(Visual Information Processing)

/Class schedules and Contents

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1 Guidance
2 Structure of the Eye and Visual Pathway
3 Neural Mechanisms of Visual Information Processing
4 Color Vision
5 Visualization of Human Brain Activity
6 Stereopsis and Space Perception
7 Motion Perception
8 Virtual Reality
9 Attentional Influences on Visual Sensitivity
10 Face Recognition
11 Human and Machine Vision
12 Basics of Computer Vision
13 Future Three-Dimensional Display
14 Biometrics Authentication
15 Conclusion

/Assessment Method

100%
Participation in the discussion 100%

/Preparation and Review

/Remarks

All students should read the chapter of the textbook and send report before the class.

/Message from the Instructor

Please participate in the discussion actively.

/Keywords

○

(Image Processing)

/ Masahiro OKUDA / 19 , / Masaaki NAGAHARA /
/Instructor

2 1
/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,
/Department , ,

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/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	画像処理に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	画像処理技術を情報通信・メディア処理システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	画像処理に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	画像処理に関する知識を深め、新しい技術を開発する意欲をもつ。

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画像処理

/Course Description

Objectives are to introduce computer technology for multimedia integration including image processing and signal processing. The advanced topics as well as fundamental concepts are trained in lectures such as color spaces, filters, and image restoration.

/Textbooks

n/a

(○) /References Available in the library: ○

MATLAB–

○

(Image Processing)

/Class schedules and Contents

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10 (L2)
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12 (L1)
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1 Introduction
2 First course in linear algebra
3 First course in Probability theory
4 First course in Signal processing (DFT, sampling theory, ADC)
5 Review on digital filters
6 Fundamental image processing (filters)
7 Matrix representation by using matrices
8 Image processing based on least squares method
9 Programming exercise
10 Image processing based on convex optimization (Image Restoration by L2 regularization)
11 Programming exercise
12 Image processing based on convex optimization (Image Restoration by L1 regularization)
13 Programming exercise
14 Final exercise
15 Review

/Assessment Method

50% Exam 50%
30% Assignments30%
20% Discussion 20%

/Preparation and Review

/Remarks

MATLAB We use C and MATLAB for programming exercise
MATLAB
Students are supposed to learn MATLAB program given in the lecture by themselves after the class.

5
The students are supposed to participate discussion. Assignments are given to some of the students and they make a few minute presentation in every class.

/Message from the Instructor

Fundamental image processing based on mathematical approaches are introduced, which will be beneficial to students who do not major in images.

/Keywords

(Soft Computing)

/ Takayuki FURUZUKI /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	ソフトコンピューティングに関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	ソフトコンピューティング技術を情報システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	ソフトコンピューティングに関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	ソフトコンピューティングに関する知識を深め、新しい技術を開発する意欲をもつ。

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ソフトコンピューティング

/Course Description

This course aims to understand Soft Computing including neural networks, fuzzy systems and genetic algorithms. Soft Computing is a new kind of information processing technologies learned from living things. In the course, those technologies are introduced in an easy-understanding way. Especially for neural networks, the motivation, the network structure and the learning algorithm are explained from the basic in details.

/Textbooks

, 1994

(○) /References Available in the library: ○

L. Fausett, Fundamentals of Neural Networks: Architectures, Algorithms, and Applications, Prentice-Hall, Inc., New Jersey, 1994

(Soft Computing)

/Class schedules and Contents

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5 (I)
6 (II)
7 (I)
8 (II)
9 (I) BP
10 (II)
11 (III)
12 (IV)
13 RBF
14
15

1 Technologies learned from living things
2 Fuzzy theory introduction
3 Fuzzy inference system
4 Genetic algorithms
5 Brain and neural network (I) Biological Neural Network
6 Brain and neuarl network (II) Neuron Model
7 Simple neural networks (I) Regression
8 Simple neural networks (II) Classification
9 Multilayer perceptron (I) BP Algorithm
10 Multilayer perceptron (II) Implementation
11 Multilayer perceptron (III) Local minimum problem
12 Multilayer perceptron (IV) Overfitting problem
13 RBF Network
14 Support Vector Machine
15 Summary

/Assessment Method

/ Attitude of participation 15%
/ Homework 15%
/ Report 20%
/ Final examination 50%

/Preparation and Review

/Remarks

It is desirable to have good knowledge of vector and matrix algebra, as well as differentiation. And it is required to review and practice after each class.

/Message from the Instructor

/Keywords

/Neural network, Fuzzy system, Genetic algorithm

(Network Architecture)

/ Hiroyuki KOGA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	ネットワークアーキテクチャに関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	ネットワークアーキテクチャ技術を情報通信・メディア処理システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	ネットワークアーキテクチャに関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	ネットワークアーキテクチャに関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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ネットワークアーキテクチャ

/Course Description

In this course, students systematically learn function structure of computer networks used for information communications such as the Internet from a viewpoint of network architecture. This course provides basic components of network architecture including layer model, communication protocol, and routing technology. It also covers advanced network architecture and network programming. The goal of this course is to enable students to acquire basic skills to design information systems on computer networks.

/Textbooks

Lecture materials

(○) /References Available in the library: ○

S BP 2003

Andrew S. Tanenbaum, Computer Networks, Prentice Hall, 2002.

(Network Architecture)

/Class schedules and Contents

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11 1 10
12 API
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1 Overview
2 Layer Model
3 Physical and Data Link Layers
4 Network Layer 1 Communication Model
5 Network Layer 2 Routing Technology
6 Network Layer 3 Communication Protocol
7 Transport Layer 1 Communication Model
8 Transport Layer 2 Communication Protocol
9 Application Layer
10 Advanced Network Architecture
11 Review & Mid-term Examination
12 Network Programming 1 Socket API
13 Network Programming 2 Communication Protocol
14 Network Programming 3 Exercise
15 Final Review

/Assessment Method

50%
50%

Mid-term Examination 50%
Report 50%

/Preparation and Review

/Remarks

C

This course supposes C programming skills.
Students should read assigned lecture materials before class.

/Message from the Instructor

I believe that this course will help students to understand operation principle of computer networks through network programming.

/Keywords

TCP/IP

Layer Model, Communication Protocol, TCP/IP

○

(Mobile Communications Systems)

/ Akihiro KAJIWARA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
								○	○	○	○

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/Department , ,

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/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	移動通信に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	移動通信技術を情報通信・メディア処理システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	移動通信に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	移動通信に関する知識を深め、新しい技術を開発する意欲をもつ。

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移動通信

/Course Description

ASK PSK

LAN OFDM UWB

ITS 70

This class is designed for the student who is already familiar with communication engineering thory in undergraduate course. Prior to understanding the mobile communication systems, the technical concepts such as probability, communication thory and basic electromagnetics are reviewed. Next the student understands the mobile communication engineering issues by the emperical seminar and discussions. Also curent topics of wireless LAN and mobile phones such as CDMA and OFDM technologies can be understood including vehiculat radar technologies.The students must attain more than 70 % of the score for the semester test.

/Textbooks

1 4

Communications systems for undergraduate student

5 14

Privately Power-Point presentation materials

(○) /References Available in the library: ○

High Speed Wireless Access Technologies Coronasha

/Class schedules and Contents

1 1 Intorduction to mobile communication systems
2 2 Mobile radio channels
3 3 Digital communications fundamentals 1 ASK and FSK
4 4 Digital communications fundamentals 2 PSK and QAM
5 5 Fading channel
6 6 Anti-fading technologies 1 Antenna diversity
7 2 Anti-fading technologies 2 Modulation schemes
8 3 Anti-fading technology 3 Signal processing
9 9 Exercise and review
10 CDMA 10 Spread spectrum & CDMA technologies
11 OFDM 11 Orthgonal frequency division multiple technologies
12 12 Short distance High speed communications
13 13 Wireless network systems
14 14 Wireless sensors
15 15 Exercize and conclusions

/Assessment Method

50% 50%

Semester exam 50%, reports 50%

○

(Mobile Communications Systems)

/Preparation and Review

/Remarks

This class is designed for the student familiar with communication engineering theory in undergraduate course.
2/3
10 classes 2/3 presense at least required.

/Message from the Instructor

/Keywords

Digital communications, Wireless Communications

○

(Information and Communication Theory)

/ Satoshi UEHARA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	情報と符号の理論に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	情報と符号の理論を情報通信・メディア処理システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	情報と符号の理論における課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	情報と符号の理論に関する知識を深め、新しい技術を開発する意欲をもつ。

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情報通信論

/Course Description

This course deals with the fundamentals of information and coding theory. Topics include mathematical definition and properties of information, data compression, error correcting code and pseudorandom sequence for communication systems.

/Textbooks

/ No assigned textbook

(○) /References Available in the library: ○

1973

1990

○

(Information and Communication Theory)

/Class schedules and Contents

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14 RS
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1 Introduction to sets and functions
2 Algebra(Group/Ring/Field)
3 Galois field
4 Bases and fast calculation methods over Galois field
5 Trace function
6 Pseudo random sequences
7 Construction of pseudo random seq nces
8 Randomness of pseudo random seq nces
9 Applications
10 Entropy
11 Source coding
12 Linear codes
13 Cyclic codes
14 RS codes
15 Final review

/Assessment Method

/ Reports 40%
/ Examination 60%

/Preparation and Review

/Remarks

Before each class, review the previous lecture's notes.

Students are required to have learned linear algebra and discrete mathematics.

/Message from the Instructor

Codes used for error detection and error correction are techniques that enable reliable delivery of digital data over unreliable communication channels. Students are expected to understand such techniques and apply them to their own research field.

/Keywords

, , ,
Information theory, Coding theory, algebraic, Galois field, Source cording, Error correcting code

○

(Applied Pattern Recognition)

/ Yasushi YAMAZAKI / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	パターン認識に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	パターン認識技術を情報通信・メディア処理システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	パターン認識に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	パターン認識に関する知識を深め、新しい技術を開発する意欲をもつ。

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パターン認識応用

/Course Description

This course introduces students to the recent trends and issues in pattern-recognition-based applications, such as speech and character recognition systems. In the first part, we provide some fundamental approaches to pattern recognition issues. In the second part, we introduce how to design the speech and character recognition systems. Also, we introduce a biometric recognition technology which is recently focused as a promising application to information security issues. The course goals are as follows:

Understanding the basic approach of statistical pattern recognition and enabling to explain the discriminant function and Bayesian decision theory

Enabling to explain some examples of the utilization of the pattern recognition technologies in the real world

/Textbooks

To be distributed in class

(○) /References Available in the library: ○

To be announced in class

○

(Applied Pattern Recognition)

/Class schedules and Contents

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1 Introduction
2 Discriminant function design I Introduction
3 Discriminant function design II Linear discriminant function
4 Discriminant function design III Neural networks
5 Discriminant function design IV Learning algorithms for neural networks
6 Bayesian decision theory I Introduction
7 Bayesian decision theory II Discriminant functions for the normal density
8 Transformation of feature space
9 Speech recognition I Introduction
10 Speech recognition II Speech analysis
11 Speech recognition III HMM
12 Character recognition Introduction, Algorithms
13 Biometric recognition I Introduction
14 Biometric recognition II Algorithms and applications
15 Advanced topics

/Assessment Method

20%
80%

Participation 20%
Final paper 80%

/Preparation and Review

/Remarks

Basic knowledge on analysis, linear algebra, and probability theory is required.

Students are expected to review the course materials by solving some exercises set in class.

/Message from the Instructor

Due to the wide coverage of pattern recognition issues, students are encouraged to make a review after each class. In this course, the latest research and utilization trends will be presented. Students are expected to attend the class with continuous interests in how the pattern recognition technologies are utilized in our daily life.

/Keywords

discriminant function, Bayesian decision theory, speech recognition, character recognition, biometric recognition

○

(Information Security)

/ Takashi SATOH / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	情報セキュリティに関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	情報セキュリティ技術を情報通信・メディア処理システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	情報セキュリティに関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	情報セキュリティに関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※通信・メディア処理コース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

情報セキュリティ論

/Course Description

This course focuses cryptographic algorithms and protocols related to design secure communication systems. This course consists of two parts: The first part covers the basic theory of cryptography and cryptographic primitives, especially, encryption schemes, key establishment and signature schemes. In the second part, we provide selected research-oriented topics and up-to-date cryptographic protocols. By the end of this course, students should be have knowledge of information security needed for engineers who are able to work in this technical area.

/Textbooks

No textbook

(○) /References Available in the library: ○

D. R. Stinson, CRYPTOGRAPHY Theory and Practice (3rd Edition), Chapman & Hall / CRC Press, 2006.

/Class schedules and Contents

1 Introduction
2 Mathematical Background
3 Classical Cryptography
4 Pseudo-Random Sequences
5 Public-Key Cryptography (1) RSA
6 Public-Key Cryptography (2) Discrete Logarithms and Elliptic Curves
7 Hash Functions
8 Identification
9 Digital Signatures
10 Key Establishment
11 Key Management
12 Secret Sharing Schemes
13 Copyright Protection
14 Cloud Computing Case Studies
15 Presentation

○

(Information Security)

/Assessment Method

40%
60%
2/3

Report/Reading Assignment & Presentation 40%
Final Exam 60%
Students are required to attend at least 2/3 of the classes.

/Preparation and Review

/Remarks

Most course materials in English.

Students are expected to have taken a course in introductory cryptography for undergraduates.

Students are required to read assigned articles prior to the class and to complete homework assignments after the class.

/Message from the Instructor

/Keywords

Conventional encryption, digital signature, authentication, public-key cryptography, hash function, key management

○

(Adaptive Signal Processing)

/ Lianming SUN / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	適応信号処理に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	適応信号処理技術を情報システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	適応信号処理に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	適応信号処理に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※情報工学専攻以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

適応信号処理

/Course Description

Adaptive signal processing takes an important role in real time signal processing when the characteristics of signal and system change with time. The fundamentals and practical techniques of adaptive signal processing are discussed in the lecture. Several typical adaptive signal processing algorithms are investigated, and their principles, convergence properties, numerical implementations are studied in detail. Moreover, both the fundamentals of theory and application techniques are experienced through some numerical examples such as design of adaptive filter, interference canceller and processing of instrumentation data.

/Textbooks

Electronic materials

(○) /References Available in the library: ○

Adaptive Filter Theory, S. Haykin, Prentice Hall

○

(Adaptive Signal Processing)

/Class schedules and Contents

1.
2. MATLAB
3. (1)
4. (2)
5. (1)
6. (2)
7.
8.
9.
10. LMS
11. LMS LMS
12. LS RLS
13. RLS
14. LMS RLS
15.

1. Adaptive system and its structure
2. Implementation of adaptive system in MATLAB
3. Mathematical fundamentals (1) Signal and its properties
4. Mathematical fundamentals (2) System and model
5. Optimization algorithms for adaptive signal processing (1)
6. Optimization algorithms for adaptive signal processing (2)
7. Principles of steepest descent algorithm and its convergence
8. Application examples of steepest descent algorithm
9. Exercise of steepest descent algorithm
10. Introduction to LMS algorithm and its implementation
11. Convergence property of LMS and NLMS algorithms
12. Principles of LS and RLS algorithms
13. Application examples of RLS algorithm
14. Comparison of steepest descent algorithm, LMS and RLS algorithms
15. Numerical exercise

/Assessment Method

50%
50%

Exercises 50%
Reports 50%

/Preparation and Review

/Remarks

It is desired to have mastered Signal, Linear System and Numerical Analysis.

Understand the fundamental algorithms and computational techniques through confirming the algorithms and programs used in exercises after the lectures.

/Message from the Instructor

Adaptive signal processing is essential in signal processing and communication systems. It is expected to master both the fundamental theory and implementation techniques through the lectures and numerical exercises, and make use them into practical applications.

/Keywords

LMS RLS
Adaptive system, adaptive algorithm, steepest descent algorithm, LMS algorithm, RLS algorithm

(Software for Embedded Systems)

/ Susumu YAMAZAKI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	組込みソフトウェアに関連する概念・用語を自分の言葉で説明することができる。
技能	Ⅱ	○	組込みソフトウェアの開発手法・管理手法に関する技能を身に付ける。
思考・判断・表現	Ⅲ	△	組込みソフトウェアに関する問題を自立的に解決することができる。
関心・意欲・態度	Ⅳ	○	組込みソフトウェアの設計品質とは何かを常に考える習慣を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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組込みソフトウェア

(Software for Embedded Systems)

/Course Description

LED

This class introduces how to develop simple embedded software. The target system is a single-board microcomputer, which has Light Emitting Diodes, pushed buttons and so on. It includes an essencial knowledge of embedded system development.
This class also regards reading reference materials and solving problems autonomously as important because it is strongly needed to learn not only technology but also how to learn technology because a technology is evolved rapidly and becomes obsolescent.

(Course Objectives)
1. 1 3 1 3

/ Given reference materials, a single-board microcomputer with between one and three types of hardware devices, and requirements specifications of software that have between one and three functions, the student will generate rules and procedures for solving problems to design and implement embedded software satisfying the specification in pairs with instructor support.
2.
/ The student will state the definition of an embedded system.
3. Koopman
/ The student will generate explanations and examples of the typical application categories of embedded systems, proposed by Koopman.
4. ISO/IEC9126

/ The student will generate explanations and reasons which quality attribute is the most required of a given embedded system, with his/her own words.

(Relationships to the Diploma Policy)
I. (knowledge, comprehension)
- (1-4)
/ The student will state concepts and terminologies related embedded software in his/her own words. (Objective 1-4)

II. (skills)
- (1)
/ The student will learn development and management skills of embedded software. (Objective 1)

III. (thinking, decision making, writing)
- (1)
/ The student will solve problems by him/herself with reading reference materials and discussing problems in pair. (Objective 1)
- (4)
/ The student will judge what quality is needed to given product. (Objective 4)

IV. (interests, motivation to learn, attitude)
- (4)
/ The student will always choose to think what design quality of embedded software is. (Objective 4)
- (1)
/ The student will choose to investigate reference materials by him/herself rather than to ask somebody, if he/she has a question to develop embedded software. (Objective 1)

/Textbooks

Textbooks will be distributed by the instructors.

(◯) /References Available in the library: ◯

○ B.P. Douglass “Design Patterns for Embedded Systems in C: An Embedded Software Engineering Toolkit”. Newnes, 2010. ISBN 978-1856177078

/Class schedules and Contents

1
We plan to change the class schedules and will announce them at the orientation.

1. / Orientation, Introduction
2. / Modeling for an Embedded System (Tutorial/Exercise)
3. / Tutorial for a Single-Board Microcomputer and Basic Electronic Circuit, Building Development Environment
4. (1) LED / Simple Programming Exercise (1) Basic Output Devices: turn on/off an LED
5. (2) / Simple Input Devices: read a switch

(Software for Embedded Systems)

/Class schedules and Contents

6. (1) / Design Exercise (1) Function, Structure and Behavior
7. / Timer and Interruption
8. (2) / Design Exercise (2) Software Component
9. (1) / Development Exercise (1) Software Component Development
10. (2) / Development Exercise (2) Compose Software Components
11. / Advanced Exercises: Research on other devices
12. / Advanced Exercises: Requirements definition
13. / Advanced Exercises: Design
14. / Advanced Exerciess: Development
15. / Summary and Reflection

/Assessment Method

1: (Exercise) : 50%
2: (Examination) : 5%
3: (Examination) : 5%
4: (Examination) : 5%

(Class Participation): 35%

/Preparation and Review

/Remarks

UML C UML C

Skills of review modeling in UML and programming in the C language are required in this class.

UML C UML 3
C 1 I

This class requires skills of modeling in UML and programming in the C language. The student is expected to have taken a course in modeling in UML (Software Design for undergraduates) and programming in the C language (Programming Laboratory I). Contact the instructor if the student has not taken these courses, to take supplementary lessons before starting this course.

/Message from the Instructor

This class invites a special lecturer, who is a professional engineer and has much experience on embedded system development. Let’s learn how embedded software is developed through him!

/Keywords

UML

embedded system, embedded software, software modeling, software quality, software design, software implementation, programming, UML

(Software Verification)

/ Toshiaki AOKI /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	ソフトウェアの品質を保証する検証技術に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	ソフトウェアの品質を保証する検証手法に関する技能を身に付ける。
思考・判断・表現	Ⅲ	△	ソフトウェアの検証に関する問題を解決する能力を身に付ける。
関心・意欲・態度	Ⅳ	○	ソフトウェアの検証に関する新しい技術を修得し続けるのに必要な基礎を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
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ソフトウェア検証論

(Software Verification)

/Course Description

For embedded software, it is very important to ensure reliability in its developments. This lecture deals with foundations and applications of formal verification to realize highly reliable software. Students learn the principle and theory of the formal verification after introducing their overview.

DP (Diploma Policy and Course Objectives)

1. (Knowledge and Comprehension) :

The learner will acquire basic and advanced knowledge on verification technologies ensuring software quality.

- The learner will explain the overview of formal methods and verifications in his/her own words.
- The learner will explain model checking and program verification which are typical formal methods using examples in his/her own words.
- The learner will explain difference between model checking, program verification and other quality assurance technologies including other formal methods and software testing.

2. (Skills) :

The learner will acquire skills of verification methods ensuring software quality.

- Spin
  The learner will describe and verify small examples of concurrent processes using a model checking tool Spin.
- Floyd
  The learner will verify the correctness of small examples of flowchart programs using a Floyd method.
- Hoare
  The learner will verify the partial correctness of small examples of imperative programs using Hoare logic.

3. (Thinking, Decision Making and Writing):

The learner will acquire skills to solve problems on software verification.

- The learner will state problems and advantages of formal methods in applying them into practical systems in his/her own words.
- The learner will judge and coordinate model checking, software verification and other software assurance technologies.

4. (Interests, Motivation to Learn and Attitude):

The learner will acquire fundamental knowledge and skills to continue spending efforts to learn new technologies on software verification.

- The learner will apply knowledge and skills, which are learned in this course, to learn other software assurance tools.

/Textbooks

/None

(○) /References Available in the library: ○

Gerard J. Holzmann: The Spin Model Checker: Primer and Reference Manual, Addison-Wesley, ISBN: 0321228626
ISBN: 4320026586

/Class schedules and Contents

1.
2.
3.
4. 1
5. 2
6.
7.
8.
9.
10. Floyd

(Software Verification)

/Class schedules and Contents

11.
12.
13.
14.
15.

1. State transition model and modeling behavior
2. Non-determinism, determinism and collaborative behavior
3. Overview of model checking
4. Modeling concurrent process I concurrent behavior
5. Modeling concurrent process II collaborative behavior
6. Deadlock and progress
7. Property automata and temporal logic
8. Verification of concurrent and distributed algorithms
9. Verification of concurrent programs
10. Verification of flowcharts(Floyd method)
11. Correctness and termination
12. Verification of imperial programs (Hoare logic)
13. Verification condition generation
14. Weakest pre-conditions and program derivation
15. Report preparation

/Assessment Method

50% 50%
Exercises 50%, Reports 50%

/Preparation and Review

/Remarks

* PC / Bring a laptop PC for this class.
* / Practice repeatedly after lessons.

/Message from the Instructor

/Keywords

(Software Engineering)

/ Susumu YAMAZAKI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
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学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	ソフトウェア工学に関連する概念・用語等の基礎知識を自分の言葉で説明することができる。
技能	Ⅱ	○	ソフトウェア工学に関連するトピックについて、体系立てた方法で調査することができる。
思考・判断・表現	Ⅲ	○	ソフトウェア工学に関連するリサーチ・クエスチョンを独自に立て、適切な調査・実験を行い、問題を解決することができる。
関心・意欲・態度	Ⅳ	○	自らの関心・意欲に基づいて、ソフトウェア工学に関連する課題を設定し調査する態度を身に付ける。

※◎：強く関連　○：関連　△：やや関連

※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。

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ソフトウェア工学概論

(Software Engineering)

/Course Description

This class, Software Engineering instructs a body of knowledge of theories and practices on software development. Real software development includes not only programming but also various other activities. This class shows an overview how software is developed.
A graduate student should learn something actively, autonomously and deeply. This class is also designed to facilitate active, autonomous and deep learning in the learning process on software engineering. It is strongly needed to learn not only technology but also how to learn technology because a technology is evolved rapidly and becomes obsolescent. We believe your experience in this class will be useful for your future.

(Course Objectives)
1.
/ Given a topic related to software engineering, the student will generate a summary on the topic by writing in his/her own words, with supporting by the instructor and the text.

2.
/ Given a topic related to software engineering, the student will generate research questions on the topic by writing in his/her own words.

3. 2
/ The student will generate presentations and introductions for the research questions of Objective 2 with supporting by the instructor.

(Relationships to the Diploma Policy)
I. (knowledge, comprehension)
- (1, 3)
/ The student will generate a description of basic knowledge including concept and terminology related to software engineering, in his/her own words. (Objective 1&3)

II. (skills)
- (1, 3)
/ The student will adopt a systematic method to research on topics related to software engineering. (Objective 1&3)

III. (thinking, decision making, writing)
- ( ) (2)
/ The student will generate independently research questions (or problems) related to software engineering. (Objective 2)
- (1, 3)
/ The student will adopt a suitable method to research on solutions of the problems. (Objective 1&3)
- (1, 3)
/ The student will generate description on the solutions in his/her own words. (Objective 1&3)

IV. (interests, motivation to learn, attitude)
- (2,3)
/ The student will choose to raise and investigate research questions, based on his/her own interests and motivation to learn. (Objective 2&3)

/Textbooks

The textbook will be distributed in the class.

(○) /References Available in the library: ○

This section shows some major references. According to students' interests, other references will be introduced to class.

○

○Software Engineering: A Practitioner's Approach. Roger Pressman. McGraw-Hill.

○ ( )
○Software Engineering: Theory and Practice, Shari Lawrence Pfleeger, Pearson Education.

○ -SWEBOK2004
SWBOK. IEEE Computer Society. available at http://www.computer.org/portal/web/swebok/home

○ 201 BP
201 Principles of Software Development. Alan M. Davis. IEEE Computer Society.

(Software Engineering)

( ) /References Available in the library:

The Essence of Software Engineering: Applying the SEMAT Kernel. Ivar Jacobson et al. Addison-Wesley.

/Class schedules and Contents

We have designed this class to aim at facilitating active, autonomous and deep learning of students, who may have little experience to develop software.

2
This class consists of two parts.

/ Contents of the textbook

1. / Introduction
2. / Programming
3. / Design
4. / Requirements Engineering
5. / Software Testing
6. / Process
7. / Project
8. 2

Part I (/ Learning of the Overview)

1. / Orientation
2. 1 / Reference 1
3. 1 ( ) / Reference 1 (discussion)
4. 2 / Reference 2
5. 2 ( ) / Reference 2 (discussion)
6. 3 / Reference 3
7. 3 ( ) / Reference 3 (discussion)

Part II (/ Poster Presentations)

8. / Research Planning
9. / Writing Presentation
10. / Poster Session
11. / Refining Presentation
12. ( ) / Poster Session (Retry)
13. / Writing Research Report
14. / Refine Research Report
15. / Reflection

/Assessment Method

/ Assessment for Each Course Objective

1: 3 (Part I): 30%

2: 3 (Part I): 20%

3: : 50%

- (1)
- (2 1)
- (2)
- (1)
- (1)
-

Objective 1, 30%

- Three reports at least in Part I. Each describes a summary of the reference introduced in the textbook.

Objective 2, 20%

- Three reports at least in Part I. Each describes one or more research questions and their motivation.

(Software Engineering)

/Assessment Method

Objective 3, 50%

- A report. It describes a plan to research a research topic that is selected in the questions of Objective 2;
- Twice poster presentations and the poster. They describe the investigation on the research question;
- Twice reports. Each describes reflection of the discussion of each presentation;
- A report. They describe an article of an introduction to the research result of the question;
- A report. It describes reflection of this course; and
- Class participation in discussion.

/Preparation and Review

/Remarks

-

-
-

- This class requires experience in software development (including programming) or project-based activity including graduation research. Contact the instructor before starting the term if the student does not have above-mentioned experience, to take supplementary lessons.
- This class requires presentation skills in Japanese. Contact the instructor before starting the term if the student does not have the skills.
- The student must prepare and review his/her lesson very much. However, the instructor will show how the learner should prepare and review his/her lesson at least, in the guidance and each lecture.

/Message from the Instructor

2013

http://zacky-sel.blogspot.jp

We have renewed this class in 2013, including adoption of the flipped classroom and active learning approach.
The flipped classroom means to swap the roles of a school lesson and homework: the role of the homework in the flipped style is to acquire knowledge and that of the lesson is to apply it by group works and follow-up instructions, though the role of the lesson in a traditional style is to acquire knowledge and that of the homework is to apply it. This approach aims to improve learning effectiveness.
Active leaning means that the students learn something by themselves, or instruction to intend such learning. In this course, the students raise research questions, research one of them, and make a presentation of it.
We adopt this approach with some arrangements in this class from our experiences based on our instructional design studies. The most important concept of this class design is to facilitate deep learning process started from a question of each student for software engineering topics. To strengthen it, the student will learn new knowledge by him/herself after finishing the whole course of study. Because software technology is evolved rapidly and becomes obsolescent, it is required not only to learn knowledge but also to learn how to learn knowledge.

See further reading: http://zacky-sel.blogspot.jp

/Keywords

Software engineering, software development, programming, software design, requirements engineering, software testing, software process model, software life cycle, software project planning, software project management

(Applied Control Engineering)

/ Toru TAKAHASHI /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	制御応用工学に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	制御応用工学をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	制御応用工学に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	制御応用工学に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※コンピュータシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

制御応用工学

/Course Description

MATLAB·Simulink

Various computer-controlled units have been used in advanced automotive systems. This course is to offer simple vehicle dynamics and control technology. First, basic vehicle motion dynamics and control system analysis method will be introduced. Next, dynamics models will be discussed to analyze vehicle motion. After understanding theories, MATLAB/Simulink simulation exercises will be done. Moreover, various case studies of control system models in automotive systems will be introduced and discussed. Attainable goals are to be able to linealize vehicle motion dynamics and to analyze control systems.

/Textbooks

/Lectures based on original texts

(○) /References Available in the library: ○

/To be announced in class

(Applied Control Engineering)

/Class schedules and Contents

1
2 MATLAB/Simulink
3 MATLAB/Simulink
4 1 2 MATLAB/Simulink
5 2 MATLAB/Simulink
6 3 MATLAB/Simulink
7 MATLAB/Simulink
8 1
9 MATLAB/Simulink
10 2 2
11 MATLAB/Simulink
12 1
13 2
14 3
15

1 General introduction
2 Basic dynamics of a rigid body and basic control system analysis
3 Basic characteristics of a pneumatic tire
4 Vehicle model 1 (half car model) and MATLAB/Simulink simulations
5 Vehicle model 2 (longitudinal and pitching motion) and MATLAB/Simulink simulations
6 Vehicle model 3 (lateral and yawing motion) and MATLAB/Simulink simulations
7 MATLAB/Simulink simulation exercises
8 Vehicle model 1 with suspensions (quarter car model)
9 MATLAB/Simulink simulation exercises
10 Vehicle model 2 with suspensions (half car model)
11 MATLAB/Simulink simulation exercises
12 Case study 1 of automotive control systems
13 Case study 2 of automotive control systems
14 Case study 3 of automotive control systems
15 Final Review

/Assessment Method

50%
50%
Mid-term Paper 50%
Final Examination 50%

/Preparation and Review

/Remarks

Students are required to have knowledge about linear algebra,Laplace transform and state-variable model.

As this course is one at joint graduate school in car electronics, course registered students have priority.

/Message from the Instructor

I believe that this course will help students to be more interested in automotive technology.

/Keywords

vehicle model , automotive control system

○VLSI

(VLSI Physical Design)

/ Shigetoshi NAKATAKE / 19

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	VLSI物理設計に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	VLSI物理設計技術をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	VLSI物理設計に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	VLSI物理設計に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※コンピュータシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

VLSI物理設計

/Course Description

VLSI

In this class, focusing on advanced technologies in VLSI physical (layout) designs, we review technical papers (including conference papers) and discuss about the proposing technologies for design automation from theoretical and practical viewpoints. Furthermore, we acquire knowledges to develop VLSI physical design tools.

/Textbooks

Documents distributed in class

(○) /References Available in the library: ○

Books introduced in class

○VLSI

(VLSI Physical Design)

/Class schedules and Contents

1 VLSI
2 VLSI (1)
3 VLSI (2)
4 VLSI (3)
5
6
7
8 VLSI (1)
9 VLSI (2)
10 VLSI (3)
11
12
13
14 VLSI
15

1 Advanced technologies of VLSI physical designs
2 Technical paper reviewing of VLSI placement (1)
3 Technical paper reviewing of VLSI placement (2)
4 Technical paper reviewing of VLSI placement (3)
5 Discussion of technical papers for theoretical aspects
6 Discussion of technical papers for practical aspects
7 Discussion of technical papers for design tools implementation
8 Technical paper reviewing of VLSI routing (1)
9 Technical paper reviewing of VLSI routing (2)
10 Technical paper reviewing of VLSI routing (3)
11 Discussion of technical papers for theoretical aspects
12 Discussion of technical papers for practical aspects
13 Discussion of technical papers for design tools implementation
14 Perspective of VLSI physical designs
15 Conclusions
Details of technical papers are given in class.

/Assessment Method

50%
50%

Contributions to the debate 50%
Report 50%

/Preparation and Review

/Remarks

VLSI
discrete structure and algorithms, integrated circuit design, mathematical programming, VLSI physical design

Students must contact to faculty to enroll this class.

/Message from the Instructor

VLSI

In advanced technologies of VLSI physical design, novel technologies have been proposed from theoretical and practical viewpoints. To develop technologies in future needs the both viewpoints.

/Keywords

○

(Theory of Combinatorial Optimization)

/ Yasuhiro TAKASHIMA / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	組み合わせ最適化に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	組み合わせ最適化技術をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	組み合わせ最適化に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	組み合わせ最適化に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※コンピュータシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

組み合わせ最適化論

/Course Description

This course notes the complexity theory which is the basic concept of the combinatorial problem.
In the former part of this course, the complexity theory which is a basic of combinatorial optimization and the methods to solve the difficult problem are lectured. In the latter part, the combinatorial problem is solved with the utilization of the
lectured methods. The objective of this course consists of estimating the problem and considering its solution.

/Textbooks

None

(○) /References Available in the library: ○

M. R. Garey and D. S. Johnson, Computers and Intractability: A Guide to the Theory of Np-Completeness, W H Freeman & Co (Sd)

○

(Theory of Combinatorial Optimization)

/Class schedules and Contents

1
2
3 Cook
4 NP
5
6 NP
7
8
9 (1)
10 (2)
11 (3)
12 (4)
13 (5)
14 (6)
15
(1)-(6)

1 Guidance
2 Class of Problems
3 Cook's Theorem
4 NP-Completeness
5 Analyzing Problems
6 NP-Hardness
7 Approximation Algorithms
8 Statistical Method
9 Exercise (1)
10 Exercise (2)
11 Exercise (3)
12 Exercise (4)
13 Exercise (5)
14 Exercise (6)
15 Conclusion
Exercises (1) to (6) deal with programming exercises. Details are given in class.

/Assessment Method

(Participation) 20%
(Report) 80%

/Preparation and Review

/Remarks

You should review and understand the issues of the discrete problem and data structure.

/Message from the Instructor

The estimation of the difficulty of the problem is an important issue for the research. This course focuses on the estimation. I hope to obtain the method to solve the difficult problem.

/Keywords

NP

Time Complexity, NP, Approximation Algorithms

○

(Introduction to Nonlinear Programming)

/ Hiroshi MIYASHITA /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	非線形最適化に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	非線形最適化技術をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	非線形最適化に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	非線形最適化に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※コンピュータシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

非線形最適化基礎論

/Course Description

10

1) , 2)

Nonlinear programming is a field of applied mathematics that have many applications in engineering. Although it has a long history, it experienced major developments in the last ten years. In the engineering field, when simple linear modelscannot be used to solve problems, nonlinear programming is applied to solve the problems. In this lecture, the students can obtain basic knowledge of nonlinear programming at the beginning graduate level.
In addition to the basic topics, this lecture covers some of the important topics in the engineering field such as network optimization and discrete optimization based on Lagrangian relaxation. This lecture aims at giving the basic mathematical knowledge about nonlinear programming so that the students can understand the algorithms and
use them.

/Textbooks

Lecture materials given in the class

(○) /References Available in the library: ○

D.P. Bertsekas: Nonlinear Programming, Athena Scientific, 1999.

○

(Introduction to Nonlinear Programming)

/Class schedules and Contents

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1 Unconstrained optimization, Optimality conditions
2 Gradient method,
3 Newton's method
4 Least squares problem
5 Conjugate direction methods
6 Quasi-Newton method
7 Optimization over a convex set, Optimality conditions
8 Gradient projection methods
9 Lagrange multiplier theory
10 Lagrange multiplier algorithm
11 Penalty and augmented Lagrangian methods
12 Duality and convex programming
13 Network optimization
14 Discrete optimization, Lagrangian relaxation
15 Summary of the lecture

/Assessment Method

2 50%
Two assignments Each 50%

/Preparation and Review

/Remarks

The mathematical prerequisites are linear algebra and advanced calculus.

/Message from the Instructor

The students in this class are expected not only to understand the basic theory of nonlinear programming but also to apply it to their own research field.

/Keywords

, , , , , ,

nonlinear programming, constraints, objective function, optimality conditions, Lagrange multiplier theory, convex programming, discrete optimization

○

(Advanced Computer Architecture)

/ Makoto SUGIHARA /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	アーキテクチャ設計に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	アーキテクチャ設計技術をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	アーキテクチャ設計に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	アーキテクチャ設計に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※コンピュータシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

アーキテクチャ設計論

/Course Description

1970

LSI

Computer systems are essential for current and future information society, and microprocessors are basic components in such computer systems.This lecture explains the architecture and implementation of high-performance microprocessor systems in detail. In addition, other topics such as low-power/low-energy computing, secure computing, and fault-tolerant computing are also discussed. Students can understand not only the organization and trends of modern microprocessors, but also how to develop high-performance applications and how to design power efficient LSIs.

/Textbooks

None

(○) /References Available in the library: ○

Computer Organization and Design, Revised Fourth Edition, Fourth Edition: The Hardware/Software Interface, David A.Patterson and Jonh L.Hennessy.
Coputer Architecture, Fifth Edition: A Quantitative Approach, John L.Hennessy and David A.Patterson.

○

(Advanced Computer Architecture)

/Class schedules and Contents

1
2 MIPS
3
4
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1 Computer Abstractions and Technology
2 MIPS ISA Review
3 Arithmatic for Computers
4 Processor: Building a Datapath
5 Processor: Pipleline Datapath and Control
6 Data and Control Hazard
7 Parallelism via Instructions
8 Memory hierarchies; cache basics review
9 Improving cache performance, cache coherence
10 Virtual machine
11 Storage
12 Designing an I/O systems
13 Multiprocessor
14 GPUs; Network connected multi's, network topologies
15 Performance models; technology trends and future directions

/Assessment Method

/ Report100%
80% / It is required to join the lectures more than 80%

/Preparation and Review

/Remarks

It is expected (not required) that students have knowledge of the basics of computer architecture.

Students should review lecture materials after class.

/Message from the Instructor

/Keywords

(Design for Testability)

/ Shinji KIMURA /

/Instructor

/Year 2 /Credits 2 /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	システムLSIの信頼性保証に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	システムLSIの信頼性保証技術をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	システムLSIの信頼性保証に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	システムLSIの信頼性保証に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※コンピュータシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

テスト容易化設計

/Course Description

(Large Scale Integration, LSI)
LSI LSI
LSI LSI 1 LSI
LSI
/

LSI (Large Scale Integration) is one of key components of recent information and communication systems, and its correctness is very important for the correct behavior of the total systems. The class focues on analysis and detection methods for the behavior of LSI based on methematical logic. There are two major issues in the erros of LSI: one is the design bug and the other is fabrication bug.Attendees can understand how to detect these bugs and also how to improve the tolerance for the bugs. The objectives of the lecture are to understand the test algorithms and the verification algorithms for LSI's and to analyze simple circuits by hand.

/Textbooks

/ Handouts are used

(○) /References Available in the library: ○

LSI IT Text 2006 "Essentials of electronic testing for digital, memory, and mixed-signal VLSI circuits," M. L. Bushnell and V. D. Agrawal, Kluwer Academic, 2000.

(Design for Testability)

/Class schedules and Contents

1 (LSI)
Design and Fabrication of LSI
2 LSI
Fault Models and Basic Fabrication Test
3 LSI
Test Pattern Generation Algorithm
4
Logic Simulation and Fault Simulation
5
Observability and Controllability of LSI Circuits
6
Sequential Test
7
Design Methods for Improving Testability
8 (Built-in Self Test, BIST)
Built-in Self Test (BIST)
9
Memory Test, Analog Test and Delay Test
10
Design Verification
11
Logic Representation and Equivalence Check
12
Combinational Verification
13
Equivalence of Sequential Circuits
14
Sequential Verification
15
Summary

/Assessment Method

/ Attitude of participation 10%
/Intermediate Tests 30% 3 About 3 times
/ Final Exam. 60% 8 8 questions or so

/Preparation and Review

/Remarks

/
Handouts are used in the class. Manuscripts given beforehand should be read before each class, and problems specified in each class should be solved after the class.

/Message from the Instructor

0 1 0 1
/

You can learn about manipulation/optimization methods of logic functions, which is applicable to various areas. We just manipulate {0, 1} like computers, which seems simple but is very interesting.

/Keywords

LSI /LSI Fault, Design Error, Reliability, Design Verification

○

(System Control Theory)

/ Kazumi HORIGUCHI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	システム制御に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	システム制御技術をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	システム制御に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	システム制御に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※コンピュータシステムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

システム制御理論

/Course Description

1960

In this course, we learn the system control theory developed after 1960. First, we describe linear systems in the state space and derive a solution of the state equation. Then, we discuss controllability, observability and minimal realization of linear systems. Next, we learn stability criteria of linear systems and Lyapunov's stability theory. Moreover, we understand pole assignment and state observers which are necessary to design control systems. Finally, we learn the optimal control which is a main result of the modern control theory.
The target is as follows.
We can analyze and synthesize linear systems based on the state space description.

/Textbooks

Lecture note will be distributed in class.

(○) /References Available in the library: ○

1994 3,700
2010 2,400

○

(System Control Theory)

/Class schedules and Contents

1
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1 Mathematics of systems control; Linear space, linear mapping
2 Mathematics of systems control; Normal matrix, positive definite matrix
3 State space description; Linear systems, nonlinear systems
4 State space description; Solution of state equation
5 Controllability and Observability; Controllability
6 Controllability and Observability; Observability
7 State space description and transfer function
8 Stability; Stability of linear systems
9 Stability; Lyapunov's stability theory
10 Pole assignment
11 State observer; Full order state observer
12 State observer; Minimal order state observer
13 Optimal control; Optimal regulator
14 Optimal control; Optimal servo system
15 Final Review

/Assessment Method

50%
50%
Assignments 50%
Final Examination 50%

/Preparation and Review

/Remarks

Students are required to read the lecture note in advance.

Students are required to have learned linear algebra, complex function, Laplace transform and classical control.

/Message from the Instructor

System control theory is an interesting theory which is related to matrix theory, circuit theory, signal theory, information theory, and so on. Students who like theory are welcomed.

/Keywords

linear system, stability, pole assignment, state observer, optimal control

(Software for Embedded Systems)

/ Susumu YAMAZAKI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

, , , ,

/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	組込みソフトウェアに関連する概念・用語を自分の言葉で説明することができる。
技能	Ⅱ	○	組込みソフトウェアの開発手法・管理手法に関する技能を身に付ける。
思考・判断・表現	Ⅲ	△	組込みソフトウェアに関する問題を自立的に解決することができる。
関心・意欲・態度	Ⅳ	○	組込みソフトウェアの設計品質とは何かを常に考える習慣を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※情報工学専攻以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

組込みソフトウェア

(Software for Embedded Systems)

/Course Description

LED

This class introduces how to develop simple embedded software. The target system is a single-board microcomputer, which has Light Emitting Diodes, pushed buttons and so on. It includes an essencial knowledge of embedded system development.
This class also regards reading reference materials and solving problems autonomously as important because it is strongly needed to learn not only technology but also how to learn technology because a technology is evolved rapidly and becomes obsolescent.

(Course Objectives)
1. 1 3 1 3

/ Given reference materials, a single-board microcomputer with between one and three types of hardware devices, and requirements specifications of software that have between one and three functions, the student will generate rules and procedures for solving problems to design and implement embedded software satisfying the specification in pairs with instructor support.
2.
/ The student will state the definition of an embedded system.
3. Koopman
/ The student will generate explanations and examples of the typical application categories of embedded systems, proposed by Koopman.
4. ISO/IEC9126

/ The student will generate explanations and reasons which quality attribute is the most required of a given embedded system, with his/her own words.

(Relationships to the Diploma Policy)
I. (knowledge, comprehension)
- (1-4)
/ The student will state concepts and terminologies related embedded software in his/her own words. (Objective 1-4)

II. (skills)
- (1)
/ The student will learn development and management skills of embedded software. (Objective 1)

III. (thinking, decision making, writing)
- (1)
/ The student will solve problems by him/herself with reading reference materials and discussing problems in pair. (Objective 1)
- (4)
/ The student will judge what quality is needed to given product. (Objective 4)

IV. (interests, motivation to learn, attitude)
- (4)
/ The student will always choose to think what design quality of embedded software is. (Objective 4)
- (1)
/ The student will choose to investigate reference materials by him/herself rather than to ask somebody, if he/she has a question to develop embedded software. (Objective 1)

/Textbooks

Textbooks will be distributed by the instructors.

(○) /References Available in the library: ○

○ B.P. Douglass “Design Patterns for Embedded Systems in C: An Embedded Software Engineering Toolkit”. Newnes, 2010. ISBN 978-1856177078

/Class schedules and Contents

1
We plan to change the class schedules and will announce them at the orientation.

1. / Orientation, Introduction
2. / Modeling for an Embedded System (Tutorial/Exercise)
3. / Tutorial for a Single-Board Microcomputer and Basic Electronic Circuit, Building Development Environment
4. (1) LED / Simple Programming Exercise (1) Basic Output Devices: turn on/off an LED
5. (2) / Simple Input Devices: read a switch

(Software for Embedded Systems)

/Class schedules and Contents

6. (1) / Design Exercise (1) Function, Structure and Behavior
7. / Timer and Interruption
8. (2) / Design Exercise (2) Software Component
9. (1) / Development Exercise (1) Software Component Development
10. (2) / Development Exercise (2) Compose Software Components
11. / Advanced Exercises: Research on other devices
12. / Advanced Exercises: Requirements definition
13. / Advanced Exercises: Design
14. / Advanced Exerciess: Development
15. / Summary and Reflection

/Assessment Method

1: (Exercise) : 50%
2: (Examination) : 5%
3: (Examination) : 5%
4: (Examination) : 5%

(Class Participation): 35%

/Preparation and Review

/Remarks

UML C UML C

Skills of review modeling in UML and programming in the C language are required in this class.

UML C UML 3
C 1 I

This class requires skills of modeling in UML and programming in the C language. The student is expected to have taken a course in modeling in UML (Software Design for undergraduates) and programming in the C language (Programming Laboratory I). Contact the instructor if the student has not taken these courses, to take supplementary lessons before starting this course.

/Message from the Instructor

This class invites a special lecturer, who is a professional engineer and has much experience on embedded system development. Let’s learn how embedded software is developed through him!

/Keywords

UML

embedded system, embedded software, software modeling, software quality, software design, software implementation, programming, UML

(Software Verification)

/ Toshiaki AOKI /

/Instructor

2 2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

/ Notice/Intensive course

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	ソフトウェアの品質を保証する検証技術に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	ソフトウェアの品質を保証する検証手法に関する技能を身に付ける。
思考・判断・表現	Ⅲ	△	ソフトウェアの検証に関する問題を解決する能力を身に付ける。
関心・意欲・態度	Ⅳ	○	ソフトウェアの検証に関する新しい技術を修得し続けるのに必要な基礎を身に付ける。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※情報工学専攻以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

ソフトウェア検証論

(Software Verification)

/Course Description

For embedded software, it is very important to ensure reliability in its developments. This lecture deals with foundations and applications of formal verification to realize highly reliable software. Students learn the principle and theory of the formal verification after introducing their overview.

DP (Diploma Policy and Course Objectives)

1. (Knowledge and Comprehension) :

The learner will acquire basic and advanced knowledge on verification technologies ensuring software quality.

- The learner will explain the overview of formal methods and verifications in his/her own words.
- The learner will explain model checking and program verification which are typical formal methods using examples in his/her own words.
- The learner will explain difference between model checking, program verification and other quality assurance technologies including other formal methods and software testing.

2. (Skills) :

The learner will acquire skills of verification methods ensuring software quality.

- Spin
  The learner will describe and verify small examples of concurrent processes using a model checking tool Spin.
- Floyd
  The learner will verify the correctness of small examples of flowchart programs using a Floyd method.
- Hoare
  The learner will verify the partial correctness of small examples of imperative programs using Hoare logic.

3. (Thinking, Decision Making and Writing):

The learner will acquire skills to solve problems on software verification.

- The learner will state problems and advantages of formal methods in applying them into practical systems in his/her own words.
- The learner will judge and coordinate model checking, software verification and other software assurance technologies.

4. (Interests, Motivation to Learn and Attitude):

The learner will acquire fundamental knowledge and skills to continue spending efforts to learn new technologies on software verification.

- The learner will apply knowledge and skills, which are learned in this course, to learn other software assurance tools.

/Textbooks

/None

(○) /References Available in the library: ○

Gerard J. Holzmann: The Spin Model Checker: Primer and Reference Manual, Addison-Wesley, ISBN: 0321228626
ISBN: 4320026586

/Class schedules and Contents

1.
2.
3.
4. 1
5. 2
6.
7.
8.
9.
10. Floyd

(Software Verification)

/Class schedules and Contents

11.
12.
13.
14.
15.

1. State transition model and modeling behavior
2. Non-determinism, determinism and collaborative behavior
3. Overview of model checking
4. Modeling concurrent process I concurrent behavior
5. Modeling concurrent process II collaborative behavior
6. Deadlock and progress
7. Property automata and temporal logic
8. Verification of concurrent and distributed algorithms
9. Verification of concurrent programs
10. Verification of flowcharts(Floyd method)
11. Correctness and termination
12. Verification of imperial programs (Hoare logic)
13. Verification condition generation
14. Weakest pre-conditions and program derivation
15. Report preparation

/Assessment Method

50% 50%
Exercises 50%, Reports 50%

/Preparation and Review

/Remarks

* PC / Bring a laptop PC for this class.
* / Practice repeatedly after lessons.

/Message from the Instructor

/Keywords

(Software Engineering)

/ Susumu YAMAZAKI / 19

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	ソフトウェア工学に関連する概念・用語等の基礎知識を自分の言葉で説明することができる。
技能	Ⅱ	○	ソフトウェア工学に関連するトピックについて、体系立てた方法で調査することができる。
思考・判断・表現	Ⅲ	○	ソフトウェア工学に関連するリサーチ・クエスチョンを独自に立て、適切な調査・実験を行い、問題を解決することができる。
関心・意欲・態度	Ⅳ	○	自らの関心・意欲に基づいて、ソフトウェア工学に関連する課題を設定し調査する態度を身に付ける。

※◎：強く関連　○：関連　△：やや関連

※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。

※情報工学専攻以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

ソフトウェア工学概論

(Software Engineering)

/Course Description

This class, Software Engineering instructs a body of knowledge of theories and practices on software development. Real software development includes not only programming but also various other activities. This class shows an overview how software is developed.
A graduate student should learn something actively, autonomously and deeply. This class is also designed to facilitate active, autonomous and deep learning in the learning process on software engineering. It is strongly needed to learn not only technology but also how to learn technology because a technology is evolved rapidly and becomes obsolescent. We believe your experience in this class will be useful for your future.

(Course Objectives)
1.
/ Given a topic related to software engineering, the student will generate a summary on the topic by writing in his/her own words, with supporting by the instructor and the text.

2.
/ Given a topic related to software engineering, the student will generate research questions on the topic by writing in his/her own words.

3. 2
/ The student will generate presentations and introductions for the research questions of Objective 2 with supporting by the instructor.

(Relationships to the Diploma Policy)
I. (knowledge, comprehension)
- (1, 3)
/ The student will generate a description of basic knowledge including concept and terminology related to software engineering, in his/her own words. (Objective 1&3)

II. (skills)
- (1, 3)
/ The student will adopt a systematic method to research on topics related to software engineering. (Objective 1&3)

III. (thinking, decision making, writing)
- ( ) (2)
/ The student will generate independently research questions (or problems) related to software engineering. (Objective 2)
- (1, 3)
/ The student will adopt a suitable method to research on solutions of the problems. (Objective 1&3)
- (1, 3)
/ The student will generate description on the solutions in his/her own words. (Objective 1&3)

IV. (interests, motivation to learn, attitude)
- (2,3)
/ The student will choose to raise and investigate research questions, based on his/her own interests and motivation to learn. (Objective 2&3)

/Textbooks

The textbook will be distributed in the class.

(○) /References Available in the library: ○

This section shows some major references. According to students' interests, other references will be introduced to class.

○

○Software Engineering: A Practitioner's Approach. Roger Pressman. McGraw-Hill.

○ ( )
○Software Engineering: Theory and Practice, Shari Lawrence Pfleeger, Pearson Education.

○ -SWEBOK2004
SWBOK. IEEE Computer Society. available at http://www.computer.org/portal/web/swebok/home

○ 201 BP
201 Principles of Software Development. Alan M. Davis. IEEE Computer Society.

(Software Engineering)

( ) /References Available in the library:

The Essence of Software Engineering: Applying the SEMAT Kernel. Ivar Jacobson et al. Addison-Wesley.

/Class schedules and Contents

We have designed this class to aim at facilitating active, autonomous and deep learning of students, who may have little experience to develop software.

2
This class consists of two parts.

/ Contents of the textbook

1. / Introduction
2. / Programming
3. / Design
4. / Requirements Engineering
5. / Software Testing
6. / Process
7. / Project
8. 2

Part I (/ Learning of the Overview)

1. / Orientation
2. 1 / Reference 1
3. 1 ( ) / Reference 1 (discussion)
4. 2 / Reference 2
5. 2 ( ) / Reference 2 (discussion)
6. 3 / Reference 3
7. 3 ( ) / Reference 3 (discussion)

Part II (/ Poster Presentations)

8. / Research Planning
9. / Writing Presentation
10. / Poster Session
11. / Refining Presentation
12. ( ) / Poster Session (Retry)
13. / Writing Research Report
14. / Refine Research Report
15. / Reflection

/Assessment Method

/ Assessment for Each Course Objective

1: 3 (Part I): 30%

2: 3 (Part I): 20%

3: : 50%

- (1)
- (2 1)
- (2)
- (1)
- (1)
-

Objective 1, 30%

- Three reports at least in Part I. Each describes a summary of the reference introduced in the textbook.

Objective 2, 20%

- Three reports at least in Part I. Each describes one or more research questions and their motivation.

(Software Engineering)

/Assessment Method

Objective 3, 50%

- A report. It describes a plan to research a research topic that is selected in the questions of Objective 2;
- Twice poster presentations and the poster. They describe the investigation on the research question;
- Twice reports. Each describes reflection of the discussion of each presentation;
- A report. They describe an article of an introduction to the research result of the question;
- A report. It describes reflection of this course; and
- Class participation in discussion.

/Preparation and Review

/Remarks

-

-
-

- This class requires experience in software development (including programming) or project-based activity including graduation research. Contact the instructor before starting the term if the student does not have above-mentioned experience, to take supplementary lessons.
- This class requires presentation skills in Japanese. Contact the instructor before starting the term if the student does not have the skills.
- The student must prepare and review his/her lesson very much. However, the instructor will show how the learner should prepare and review his/her lesson at least, in the guidance and each lecture.

/Message from the Instructor

2013

http://zacky-sel.blogspot.jp

We have renewed this class in 2013, including adoption of the flipped classroom and active learning approach.
The flipped classroom means to swap the roles of a school lesson and homework: the role of the homework in the flipped style is to acquire knowledge and that of the lesson is to apply it by group works and follow-up instructions, though the role of the lesson in a traditional style is to acquire knowledge and that of the homework is to apply it. This approach aims to improve learning effectiveness.
Active leaning means that the students learn something by themselves, or instruction to intend such learning. In this course, the students raise research questions, research one of them, and make a presentation of it.
We adopt this approach with some arrangements in this class from our experiences based on our instructional design studies. The most important concept of this class design is to facilitate deep learning process started from a question of each student for software engineering topics. To strengthen it, the student will learn new knowledge by him/herself after finishing the whole course of study. Because software technology is evolved rapidly and becomes obsolescent, it is required not only to learn knowledge but also to learn how to learn knowledge.

See further reading: http://zacky-sel.blogspot.jp

/Keywords

Software engineering, software development, programming, software design, requirements engineering, software testing, software process model, software life cycle, software project planning, software project management

○

(Sensor Systems Engineering)

/ Isamu MATSUNAMI /

/Instructor

2 1

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

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/Department , ,

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in “Diploma Policy” (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ	◎	計測応用工学に関する基礎知識及び専門知識を修得する。
技能	Ⅱ	○	計測応用工学技術をVLSI・組込み・制御システムの設計に応用することができる。
思考・判断・表現	Ⅲ	△	計測応用工学に関する課題を探求し、その解決法を示すことができる。
関心・意欲・態度	Ⅳ	○	計測応用工学に関する知識を深め、新しい技術を開発する意欲をもつ。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※情報工学専攻以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

計測応用工学

/Course Description

In recent years, significant technical advances are in need of a highly accurate measurement. In this course we study the concept of applied measurement engineering, sensors, its structures and interface, and signal processing. Especially, a systematic study is carried out by the use of various sensors, radar, laser radar, infrared camera, optical sensor and imaging sensor, which play a central role in intelligent car and robot.

/Textbooks

Privately Power-Point presentation materials

– 2007 2,625

(○) /References Available in the library: ○

– ! 2007 3,360

○

(Sensor Systems Engineering)

/Class schedules and Contents

Concept of applied measurement engineering

Elements of sensor system and technology

Function, structure and interface of radar

Function, structure and interface of laser radar

Function, structure and interface of infrared camera

Function, structure and interface of imaging sensor
MATLAB
MATLAB practice 1 (Noise analysis)
MATLAB PID
MATLAB practice 2 (PID control)
MATLAB
MATLAB practice 3 (Modern control)

Measurement experiment 1 (Sensor interface)

Measurement experiment 2 (Control of radar)

Measurement experiment 3 (Control of infrared camera)

Measurement experiment 4 (Control of imaging sensor)

Measurement experiment 5 (Obstacle detection and white line detection)

Summary of practices and experiments

/Assessment Method

100%
Report 100%

/Preparation and Review

/Remarks

MATLAB
Basic knowledge about MATLAB and C programming skills should be obtained in advance.

Students are required to read all assigned articles prior to the class.

2/3
10 classes (2/3) presence at least required.

/Message from the Instructor

This class will seek the active participation of students.

/Keywords

○ I

(Special Research I)

/Research Advisor

/Instructor

6

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

/Department

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	○	専門分野における調査研究の方法の基礎を修得する。
思考・判断・表現	Ⅲ	◎	調査研究課題を多面的に把握し、妥当な解決策を検討することができる。
関心・意欲・態度	Ⅳ	○	環境課題に取り組むエキスパートとしての役割意識を高める。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

特別研究Ⅰ

/Course Description

Students are given research themes from their research supervisor at the lab to complete master thesis.

/Textbooks

Instructed through your research supervisor (lab).

(○) /References Available in the library: ○

Instructed through your research supervisor (lab).

/Class schedules and Contents

Research theme is given from your research supervisor (lab).

/Assessment Method

Your outcome is reviewed by the course professors at interim and final presentations, especially focused on your logic and activity.

/Preparation and Review

/Remarks

Seminar tour(s) can be taken place.

Prepare always for your works in order to understand researches including significances and goals of your works.

Follow your research supervisor's instruction, and make efforts on preparation and brush-up.

/Message from the Instructor

To perform a research will surely improve your skill. Enjoy seminar, discussion, experiments, technical presentations and writing at your laboratory.

○ I

(Special Research I)

/Keywords

○ II

(Special Research II)

/Research Advisor

/Instructor

2

/Year /Credits /Semester /Class Format /Class

/Year of School Entrance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
									○	○	○	○

/Department

授業で得られる「学位授与方針における能力（学生が修了時に身に付ける能力）」、到達目標
/ Competence Defined in "Diploma Policy" (Competence Students Attain by Course Completion), Specific Targets in Focus

学位授与方針における能力			到達目標
知識・理解	Ⅰ		
技能	Ⅱ	○	専門分野における調査研究を実施し、結論を導く方法を身に付ける。
思考・判断・表現	Ⅲ	◎	調査研究課題を多面的に把握し、必要な解決策を提示することができる。
関心・意欲・態度	Ⅳ	○	環境課題に取り組むエキスパートとしての役割意識を持ち、実務に取り組むことができる。

※◎：強く関連　○：関連　△：やや関連
※Ⅰ，Ⅱ…に対応する学位授与方針における能力は、自コースのカリキュラムマップを確認してください。
※環境資源システムコース以外の学生は、科目と学位授与方針における能力の関連性を自コースのカリキュラムマップで確認してください。

特別研究Ⅱ

/Course Description

Students will be given technical suggestions from relevant professors outside the laboratory, in order to strengthen the viewpoints of the research.

/Textbooks

Instructed from the team.

(○) /References Available in the library: ○

Instructed from the team.

/Class schedules and Contents

Suggestions and discussions are carried out according to the progress of the research.

/Assessment Method

Response to the research, presentations and the outcome are the essential factors to be reviewed.

/Preparation and Review

/Remarks

Seminar tour(s) can be taken place.

Prepare always for your works in order to understand researches including significances and goals of your works.

Follow your research supervisor's instruction, and make efforts on preparation and brush-up.

/Message from the Instructor

/Keywords