Special Subjects (プログラム共通科目)

					Semester					
Course	Subjects		Teachers	Credits	19- I	19- II	20- I	20- II	21- I	
	Collaborating Workshop	共学ワークショップ	TBD	2		0				
	Interim Colloquium for Thesis	中間セミナー		2						
All Courses	Intensive International Seminar for Interning Study	短期インターン研修		2						
	Corporate Interning Study	企業インターン研修		2						

Core Subjects (専門選択必修科目)

					Semester						
Course	Subjects		Teachers	Credits	19- I	19- II	20- I	20- II	21- I		
	Advanced Earth Environmental Chemistry	地球環境化学特論	H. Kodama	2		0		0			
	Colloid and Interface Engineering	界面化学工学特論	S. Morisada	2	0		0		0		
Advanced Materials	Advanced Ceramic Chemistry	セラミックス化学特論	M. Yada	2		0		0			
Chemistry Course	Advanced Separation Technology	分離工学特論	K. Ohto	2	0		0		0		
	Physico-Chemical Properties of Materials	材料物性化学特論	T. Narita	2	0		0		0		
	Advanced Functional Electrode	電極機能材料化学特論	M. Tominaga	2	0		0		0		
	Advanced Wastewater Treatment Engineering	水処理工学特論	Y. Mishima	2				0			
Civil Engineering Course	Advanced Geo-sphere Environmental Engineering in Lowland	低平地地圈環境学特論	T. Hino	2	0		0				
	Advanced Geoenvironmental Engineering	環境地盤工学特論	J. Chai	2	0		0				
Architectural Design	Urban Development and Urban Systems	都市構成システム論	T. Inohae	2		0					
Course	Advanced Environmental Engineering of Architecture	建築環境工学特論	S. Kojima	2	0						
	Advanced Thermal Energy Engineering	熱エネルギー工学特論	A. Miyara	2		0		0			
Energy and Mechanical	Advanced Heat Engine Technology	エネルギー機関特論	Y. Mitsutake	2	0		0				
Engineering Course	Advanced Fluid Engineering	流体工学特論	S. Matsuo	2	0		0				
	Advanced Fluid Mechanics for Energy	流体エネルギー力学特論	Y. Kinoue	2	0		0				
	Advanced Dynamics of Machinery	機械力学特論	T. Tsujimura	2		0		0			
Mechanical Systems Engineering Course	Advanced Precision Machine	精密機器工学特論	B. Zhang	2	0		0				
	Advanced Mechanics of Materials	材料力学特論	S. Hattori	2	0		0				
	Electric Power System Engineering	電力システム工学特論	M. Kasu	2		0		0			
Electrical and Electronic	Advanced Pulsed Power Engineering	パルスパワー工学特論	S. Ihara	2		0		0			
Engineering Course	Advanced Processing Plasma Engineering	プロセスプラズマ工学特 論	Y. Ohtsu	2		0		0			
	Advanced New & Saved Energy Engineering	新・省エネルギー工学特 論	E.Nishiyama	2		0		0			

Outline of Core Subjects

環境系コース群 **Advanced Materials Chemistry Course**

<Advanced Earth Environmental Chemistry > (地球環境化学特論)

Assoc. Prof. H. Kodama Lectures about evaluation of electrostatic effect and binding constants distribution on the metal ion-binding equilibria in charged polyion systems

< Colloid and Interface Engineering >(界面化学工学特論)

Assoc. Prof. S. Morisada This class includes lectures on the basics of colloid and interface science, which are related to various chemical processes.

<Advanced Ceramic Chemistry>(セラミックス化学特論)

Assoc. Prof. M. Yada In this class, fundamentals including structures or syntheses of ceramics and their applications will be presented.

<Advanced Separation Technology>(分離工学特論)

Lecture for separation technique of precipitation, solvent extraction and ion-exchange, and critical metal separation.

< Physico-Chemical Properties of Materials>(材料物性化学特論)

Thermodynamics lecture of crystallization and melting properties of common materials.

<Advanced Functional Electrode>(電極機能材料化学特論)

Prof. M. Tominaga In this lecture, we learn functionalized electrode for bioelectrochemical measurements of enzyme, protein and bio-related molecules. As the application of bioelectrochemistry we learn biosensors and biofuel cell based on an electron transfer reaction of enzyme with the functionalized electrode.

Civil Engineering Course

<Advanced Wastewater Treatment Engineering > (水処理工学特論)

Fundamental knowledges and thinking way which relate to water quality and wastewater treatment wastewater treatment will be studied firstly to obtain your understand well. Not only sewage treatment by activated sludge method, but also advanced treatments to remove nutrients, heavy metals are topics in this class.

<Advanced Geo-sphere Environmental Engineering in Lowland > (低平地地圈環境学特論)

We will learn the contents based on the geosphere's viewpoint in the lowland. Regarding the definition of the lowland, it is not only that the altitude of the land is low, but also that the land is susceptible to damage and environmental degradation due to the threat of water level fluctuation. The lecture is carried out by active learning called Project Based Learning (or Research Based Education). Throughout the lecture period, the following contents are practiced: 1) Providing topic by the teacher in charge; 2) Topic selection; 3) Research; 4) Results summary; 5) Presentation.

< Advanced Geoenvironmental Engineering > (環境地盤工学特論)

1) Types of ground contamination.

2) Applicable principles to geoenvironmental engineering.

Lect. Y. Mishima

Prof. T. Hino

Prof. K. Ohto

Prof. J. Chai

Assoc. Prof. T. Narita

Architectural Design Course <Urban Development and Urban Systems > (都市構成システム論)

Assoc. Prof. T. Inohae I lecture on a principle of the constitution of the city and the constitution idea about the system, theory and system model. After having grasped a constitution principle and the theory becoming basic of this lecture, I introduce in particular various results of research to be concerned with a component and the sustained constitution system which my laboratory carried out so far. These research are related to the idea of the sustainable development city closely. I let you understand importance and charm of the approach from a research side for the city constitution and sustainable city, and furthermore in this way develop discussion.

<Advanced Architectuiral Environmental Engineering > (建築環境工学特論)

Prof. S.Kojima This lecture will examine both control of indoor thermal environment and energy saving of buildings by passive cooling/heating systems and active systems. Topics of passive systems, HVAC&R systems, thermal systems, and heat load calculation methods are discussed with some practices.

エネルギー系コース群 Energy and Mechanical Engineering Course

2) Nonlinear Dynamics Analysis

3) Linked Structure Dynamics Applications

< Advanced Thermal Energy Engineering>(熱エネルギー工学特論)	Duof A Miyana
Finite difference method for heat transfer problemsConduction heat transferConvection heat transfer	r foi. A. Miyara
<advanced engine="" heat="" technology="">(エネルギー機関特論)</advanced>	
 Engineering Thermodynamics Heat Conduction Problems 	Prof. Y. Mitsutake
< Advanced Fluid Engineering> (流体工学特論)	
1) Fundamental Fluid Dynamics.	Prof. S. Matsuo
3) Effective Utilization of Fluid Energy.4) Application to Biomedical Fluid Engineering.	
< Advanced Fluid Mechanics for Energy >(流体エネルギー力学特論)	Durf V IZ:
Basic theories of fluid dynamics and fluid mechanics are given in the lecture	Proi. Y. Kinoue
Mechanical Systems Engineering Course < Advanced Dynamics of Machinery > (機械力学特論)	
1) Dynamics of Rigid Machines	Prof. T. Tsujimura

3) Design and construction of new waste disposal facilities.

4) Remediation techniques for contaminated sites.

< Advanced Precision Machine>(精密機器工学特論)

1) Principle of Ultra-Precision Machining

2) Developments in Ultra-Precision Machining

3) Machine Tools for Ultra-Precision Machining

< Advanced Mechanics of Materials>(材料力学特論)

1) Stresses in the elastic range

2) Fracture mechanics

3) Preventing mechanical failure.

Electrical and Electronic Engineering Course

< Electric Power System Engineering > (電力システム工学特論)

In order to realize energy sustainable society, high-efficient power transistors are necessary. For the purpose, widegap semiconductors such as SiC, GaN, diamond are lectured.

<Advanced Pulsed Power Engineering > (パルスパワー工学特論)

1) Fundamentals of energy storage and pulsed power generation.

2) Pulse forming networks, switching devices.

3) Applications of pulsed power technology.

<Advanced Processing Plasma Engineering > (プロセスプラズマ工学特論)

Fundamental characteristics are introduced for processing plasma engineering. Ionized gas production methods such as DC, AC, RF and microwave discharges are lectured. The plasma applications are also explained.

<Advanced New & Saved Energy Engineering > (新・省エネルギー工学特論)

1) Fundamentals of wireless energy transfer.

2) Wireless power transfer using Microwave.

3) Wireless power transfer via magnetic resonance coupling.

Prof. B. Zhang

Prof. S. Hattori

Prof. M. Kasu

Assoc. Prof. S. Ihara

Prof. Y. Ohtsu

Assoc. Prof. E. Nishiyama

Curriculum for the students of Advanced Materials Chemistry Course

(機能材料化学コース授業科目)

Major Subjects				Semester				
Subjects		Teachers	Credits	19- I	19- ∏	20- I	20- II	21- I
Fundamental Material Chemistry	機能材料化学基礎特論	Oishi,Ohto,Tominaga, Hanamoto,Yamada,W atari,Era,Kawakita,Ko dama,Sakaguchi,Narit a,Morisada,Yada	2	0		0		0
Applied Material Chemistry	機能材料化学特論	same as above	2		0		0	
Advanced Material Chemistry	機能材料化学応用特論	same as above	2			0		0
Advanced Materials Chemistry of Coordination Compounds	錯体材料化学特論	Y. Yamada	2		0		0	
Advanced Inorganic Material Chemistry	無機材料化学特論	T. Watari	2	0		0		0
Organic Reaction Mechanism	反応有機化学特論	T. Hanamoto	2	0		0		0
Physical Organic Chemistry	物性有機化学特論	M. Takeshita	2		0		0	
Physical Chemistry of Polymers	高分子物理化学特論	Y. Oishi	2		0		0	
Optoelectronic Material Chemistry	光電子機能材料化学特論	M. Era	2		0		0	
Physical Chemistry of Condensed Matter	物性物理化学特論	K. Sakaguchi	2	0		0		0
Advanced Mass Transfer	物質移動特論	H. Kawakita	2		0		0	
★Advanced Study in Applied Material Chemistry I (Compulsory)	機能材料化学特別研究 I	Oishi,Ohto,Tominaga, Hanamoto,Yamada,W atari,Era,Kawakita,Ko dama,Sakaguchi,Narit a.Morisada,Yada	8	0		0		0
★ Advanced Study in Applied Material Chemistry II (Compulsory)	機能材料化学特別研究Ⅱ	same as above	8		0		0	
★ Advanced Study in Applied Material Chemistry III (Compulsory)	機能材料化学特別研究Ⅲ	same as above	8			0		0
★ Advanced Study in Applied Material ChemistryIV (Compulsory)	機能材料化学特別研究IV	same as above	8				0	

Outline of Major subjects

Advanced Materials Chemistry Course

< Fundamental Material Chemistry > (機能材料化学基礎特論)

Prof. K. Ohto etc. This class includes lectures on students' own specialties for each research field such as inorganic chemistry, organic chemistry, physical chemistry, analytical chemistry and chemical engineering with small class.

<Applied Material Chemistry>(機能材料化学特論)

Research activities on students' own research topics such as, references investigation, etc are carried out.

<Advanced Material Chemistry>(機能材料化学応用特論)

This class includes lectures on advanced chemical topics with omnibus class.

< Advanced Materials Chemistry of Coordination Compounds>(錯体材料化学特論)

A course mainly deals with structures and electronic transitions of coordination compounds.

< Advanced Inorganic Material Chemistry >(無機材料化学特論)

Inorganic materials, called "Ceramics", have their own specific characteristics; dielectricity, ferroelectricity, semiconductivity, optical character. These characteristics were explained based on the crystal structure and the defects in the crystal. Also, some devises, the multi-layer capacitor, ignitor, buzzer, photo-catalyst, will be explained from their bulk structure as well as characteristics.

< Organic Reaction Mechanism> (反応有機化学特論)

Prof. T. Hanamoto A course mainly deals with highly-stereoselective organic reaction (chemoselectivity, regioselectivity, diastereoselectivity, enantioselectivity).

< Physical Organic Chemistry>(物性有機化学特論)

In this class, the basics of organic functional materials, systems for liquid crystal and organic light emitted diodes, and molecular recognitions including molecular machines will be lectured. Knowledge of fundamental organic chemistry is necessary.

< Physical Chemistry of Polymers>(高分子物理化学特論)

Prof. Y. Oishi A seminar of selected topics in physical chemistry of polymers. Topics vary from year to year and may include statistical chain, polymer solution, polymeric gel, rubber elasticity and crystallization of polymers.

< Optoelectronic Material Chemistry>(光電子機能材料化学特論)

Physical chemistry of molecular materials for electronics and photonics

< Physical Chemistry of Condensed Matter>(物性物理化学特論)

This class includes lectures on group theory for material science, which is related to various chemical properties such as vibrational spectroscopy, molecular orbital and so on.

< Advanced Mass Transfer>(物質移動特論)

This class includes the mass transfer with fluid behavior that is important in reaction and separation engineering.

Prof. M. Takeshita

Assoc. Prof. M. Era

Assoc. Prof. K. Sakaguchi

Assoc. Prof. H. Kawakita

Prof. K. Ohto etc.

Prof. K. Ohto etc.

Prof. Y. Yamada

Prof. T. Watari

< Advanced Study in Applied Material Chemistry I > (機能材料化学特別研究 I)

Prof. M. Tominaga–etc. This study includes postgraduation research such as experiments, reading on research paper, and so on.

< Advanced Study in Applied Material Chemistry Ⅱ >(機能材料化学特別研究Ⅱ)

Prof. M. Tominaga-etc This study includes postgraduation research such as experiments, reading on research paper, writing on abstracts and so on.

< Advanced Study in Applied Material ChemistryⅢ>(機能材料化学特別研究Ⅲ)

Prof. M. Tominaga–etc

This study includes postgraduation research such as interrim presentation, experiments, reading on research paper, writing on abstracts and so on.

<Advanced Study in Applied Material ChemistryIV>(機能材料化学特別研究IV)

Prof. M. Tominaga-etc

This study includes postgraduation research such as presentation outside the University, experiments, reading on research paper, writing on abstracts and so on.

Curriculum for the students of Energy and Mechanical Engineering Course (機械エネルギー工学コース授業科目)

Major Subjects					S	emeste	er	
Subjects		Teachers	Credits	19- I	19- ∏	20- I	20- П	21- I
Advanced Thermodynamics	熱力学特論	K. Ishida	2	0		0		
Advanced Mechanical Engineering PBL	機械システム工学PBL	S. Hagihara etc	2		0		0	
Advanced Instrument and Control Engineering	計測制御特論	K .Sato	2	0		0		
Advanced Heat Transport Engineering	熱輸送工学特論	K. Kariya	2	0		0		
Advanced Heat and Mass Transfer	熱物質移動工学特論	H. Arima	2	0		0		
Advanced Fluid Energy	流体エネルギー特論	N. Shiomi	2		0		0	
Advanced Fluid System Engineering	流動システム工学特論	T. Murakami	2		0		0	
Advanced Ocean Engineering	海洋工学特論	S. Nagata	2		0		0	
Advanced Marine System Design	海洋システム設計特論	S. Ishida	2		0		0	
Advanced Energy Conversion	エネルギー変換特論	Y. Ikegami	2	0		0		
Advanced Fluid Mechanics for Energy	流体エネルギー力学特論	Y. Kinoue	2	0		0		
Advanced Ocean Measurement	海洋環境特論	Y. Imai	2	0		0		
★Advanced Study in Mechanical and Energy Engineering I (Compulsory)	機械エネルギー工学特別研究 I	Ishida,Ikegami,Kinoue,Na gata,Matsuo,Mitsutake,Mi yara,Imai,Kariya,Shiomi, Murakami,Ishida	5	0		0		
★Advanced Study in Mechanical and Energy Engineering II (Compulsory)	機械エネルギー工学特別研究Ⅱ	same as above	5		0		0	
★Advanced Study in Mechanical and Energy Engineering III (Compulsory)	機械エネルギー工学特別研究Ⅲ	same as above	10	0		0		
★Advanced Study in Mechanical and Energy Engineering IV (Compulsory)	機械エネルギー工学特別研究IV	same as above	10		0		0	

Outline of Major subjects

Energy and Mechanical Engineering Course

<advanced thermodynamics=""> (熱力学特論)</advanced>	T 4 TZ T. 1.º 1.
Lectures on advanced applications of thermodynamics to energy conversion and energy	rgy transfer processes.
<advanced engineering="" mechanical="" pbl=""></advanced> (機械システム工学 PBL)	Prof. S. Hagihara etc.
<advanced and="" control="" engineering="" instrument="">(計測制御特論)</advanced>	Prof. K. Sato
< Advanced Heat Transport Engineering > (熱輸送工学特論)	
 The first and second law of thermodynamics Phase equilibrium Analysis of heat engines 	Assoc. Prof. K.Kariya
<advanced and="" heat="" mass="" transfer="">(熱物質移動工学特論)</advanced>	Assoc Prof H Arima
 Basic of Mass Transfer Analysis of Fundamental Equation for Heat and Mass Transfer Problem on Boundary Layers of Heat and Mass Transfer 	A550C. 1 101. 11. Armia
<advanced energy="" fluid="">(流体エネルギー特論)</advanced>	Assoc Prof N Shiomi
 1) Turbomachinery 2) Experimental Fluid Dynamics 	Assoc. 1101. IV. Shiohi
<advanced engineering="" fluid="" system="">(流動システム工学特論)</advanced>	Assoc Prof T Murakami
 Computational fluid dynamics Finite element method for structure analysis Fluid Structure Interaction 	ASSOCTION I. Mutakani
<advanced engineering="" ocean="">(海洋工学特論)</advanced>	Prof. S. Nagata
<advanced engineering="" ocean="">(海洋システム設計特論)</advanced>	Duof & Ishida
 Theory of Sea Waves Hydro Dynamics Forces on Offshore Structures Wave Energy Conversion 	r tor. S isinua
< Advanced Energy Conversion > (エネルギー変換特論)	Prof. Y. Ikegami
< Advanced Ocean Measurement > (海洋環境特論)	Assoc. Prof. Y. Imai

<Advanced Study in Mechanical and Energy Engineering I>(機械エネルギー工学特別研究 I) Prof. T. Tsujimura etc.

<Advanced Study in Mechanical and Energy Engineering II > (機械エネルギー工学特別研究 II) Prof. T. Tsujimura etc.

< Advanced Study in Mechanical and Energy Engineering III>(機械エネルギー工学特別研究Ⅲ) Prof. T. Tsujimura etc.

<Advanced Study in Mechanical and Energy Engineering IV>(機械エネルギー工学特別研究IV) Prof. T. Tsujimura etc.

Curriculum for the students of Mechanical Systems Engineering Course (機械システム工学コース授業科目)

Major Subjects				Semester				
Subjects		Teachers	Credits	19- I	19-∏	20- I	20-П	21- I
Advanced Thermodynamics	熱力学特論	K. Ishida	2	0		0		
Advanced Mechanical Engineering PBL	機械システム工学PBL	S. Hagihara etc	2		0		0	
Advanced Instrument and Control Engineering	計測制御特論	K .Sato	2	0		0		
Advanced Materials Science for Engineers	機械材料学特論	S. Morita	2	0		0		
Advanced Lubrication Engineering	潤滑工学特論	T. Mawatari	2		0		0	
Advanced Robotics	ロボット工学特論	K .Sato	2		0		0	
Advanced Applied Dynamics	応用力学特論	T. Tsujimura	2		0		0	
Advanced Manufacturing Processes	生産加工学特論	F. Ohshima	2		0		0	
Advanced Surface Engineering	表面工学特論	H. Hasegawa	2	0		0		
Advanced Solid Mechanics	固体力学特論	S. Hagihara	2	0		0		
Advanced Strength of Materials	材料強度学特論	S. Taketomi	2	0		0		
Advanced Computational Mechanics	計算力学特論	Y. Tadano	2		0		0	
★Advanced Study in Mechanical and System Engineering I (Compulsory)	機械システム工学特別研究 I	Sato,Zhang,Tsujimura,Ha gihara,Hattori,Ohshima,T aketomi,Tadano,Hasegaw a,Mawatari,Morita	5	0		0		
★Advanced Study in Mechanical and System Engineering II (Compulsory)	機械システム工学特別研究Ⅱ	same as above	5		0		0	
★Advanced Study in Mechanical and System Engineering III (Compulsory)	機械システム工学特別研究Ⅲ	same as above	10	0		0		
★Advanced Study in Mechanical and System Engineering IV (Compulsory)	機械システム工学特別研究IV	same as above	10		0		0	

Outline of Major subjects

Mechanical Systems Engineering Course

<advanced thermodynamics=""> (熱力学特論)</advanced>	
Lectures on advanced applications of thermodynamics to energy conversion a	Lect. K. Ishida and energy transfer processes.
<advanced engineering="" mechanical="" pbl="">(機械システム工学 PBL)</advanced>	Prof. S. Hagihara etc.
<advanced and="" control="" engineering="" instrument="">(計測制御特論)</advanced>	Prof. K. Sato
< Advanced Materials Science for Engineers > (機械材料学特論) Microstructural feature of materials Phase diagrams of ferrous and non-ferrous metallic materials Mechanical properties of industrial materials 	Assoc. Prof. S. Morita
<advanced engineering="" lubrication=""> (潤滑工学特論) Principle of Lubrication Lubricaton Regimes Mechanisms of Fluid Lbrication </advanced>	Assoc. Prof. T. Mawatari
<advanced robotics=""> (ロボット工学特論) 1) Autonomous Machinery Design 2) Autonomous Machinery Control 3) Autonomous Machinery Intelligence</advanced>	Prof. K. Sato
<advanced applied="" dynamics=""> (応用力学特論) The purpose of this subject is dynamical analyses of various phenomena in m</advanced>	Prof. T. Tsujimura echanical systems.
<advanced manufacturing="" processes=""> (生産加工学特論) Principle of Machine Tools Theory of Manufacturing Processes Computer Graphics for Manufacturing Processes </advanced>	Assoc.Prof. F. Oshima
<advanced engineering="" surface="">(表面工学特論) Material science, processing and design Surface science and treatment Machine processing </advanced>	Assoc. Prof. H. Hasegawa
< Advanced Solid Mechanics > (固体力学特論) Solid mechanics Finite Element Method Computational Mechanics of Solids 	Prof. S.Hagihara
<advanced materials="" of="" strength="">(材料強度学特論)</advanced>	Assoc. Prof. S. Taketomi

- 1) Strength of materials and kinds of failure
- 2) Some fractographic studies and their mechanisms
- 3) Initiation and propagation of fatigue cracks

4) Case studies and analysis of failure etc.

< Advanced Computational Mechanics > (計算力学特論)

1) Mathematical foundation of computational mechanics

2) Nonlinear solid mechanics

3) Nonlinear finite element method

<Advanced Study in Mechanical and System Engineering I>(機械システム工学特別研究 I)

Prof. T. Tsujimura etc.

<Advanced Study in Mechanical and System Engineering II > (機械システム工学特別研究II) Prof. T. Tsujimura etc.

<Advanced Study in Mechanical and System Engineering III >(機械システム工学特別研究Ⅲ) Prof. T. Tsujimura etc.

< Advanced Study in Mechanical and System Engineering IV > (機械システム工学特別研究IV) Prof. T. Tsujimura etc.

Assoc. Prof. Y. Tadano

Curriculum for the students of Electrical and Electronic Engineering Course (電気電子工学コース授業科目)

Major Subjects					Semester				
Subjects		Teachers	Credits	19- I	19- II	20- I	20- П	21- I	
Advanced Information Electronics on Materials	物質情報エレクトロニクス特論	K. Takahashi	2	0		0			
Advanced Quantum Opto-electronics	光量子エレクトロニクス特論	Q. Guo	2	0		0			
Advanced Integrated Circuit Process Engineering	集積回路プロセス工学特論	T. Tanaka	2	0		0			
Electronic System Design and Integration Technology	電子情報システム設計特論	S. Sasaki	2	0		0			
Design of System LSI Circuits	システムLSI回路設計特論	S. Fukai	2	0		0			
Advanced Wireless Communication Systems	ワイヤレス通信システム特論	I. Toyoda	2	0		0			
Microwave Integrated Circuits	マイクロ波集積回路特論	T. Ohishi	2	0		0			
Advanced Utilization of Synchrotron Light	シンクロトロン光利用科学技術工学特論	K. Takahashi	2		0		0		
Advanced Engineering of Computational Intelligence	計算論的知能工学特論	H. Wakuya	2		0		0		
Graphical User Interface	グラフィカル・ユーザ・インターフェー ス特論	T. Furukawa	2		0		0		
Advanced Adaptive Systems Theory	適応システム特論	H. Itoh	2		0		0		
Microwave Circuit Design Engineering	高周波回路設計特論	T. Tanaka	2		0		0		
Advanced Data Analysis Engineering	データ解析工学特論	S. Hara	2		0		0		
★Advanced Study in Electrical and Electronic Engineering I (Compulsory)	電気電子工学特別研究 I	Furukawa, Toyoda, Kasu , Ohishi, Ohtsu, Tanaka, Guo, Ihara, Hara, Wakuy a, Fukai, Sasaki, Tanaka, Itoh, Fukumoto, Nishiya ma, Takahashi	8	0		0			
★Advanced Study in Electrical and Electronic Engineering II (Compulsory)	電気電子工学特別研究Ⅱ	same as above	8		0		0		
★ Advanced Study in Electrical and Electronic Engineering III (Compulsory)	電気電子工学特別研究Ⅲ	same as above	8			0			
★Advanced Study in Electrical and Electronic Engineering IV (Compulsory)	電気電子工学特別研究IV	same as above	10				0		

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Outline of Major subjects

Electrical and Electronic Engineering Course

<Advanced Information Electronics on Materials > (物質情報エレクトロニクス特論)

Assoc. Prof. K. Takahashi In the electronics field, the knowledge about quantum theory becomes more and more important in order to understand the electron behavior from a microscopic standpoint. Namely, the knowledge about quantum theory is required in order to understand not only the electrical and optical properties of semiconductor but also the principles of new electronic and optical devices. The fundamental and systematical knowledge about quantum theory is given in this subject.

<Advanced Quantum Opto-electronics > (光量子エレクトロニクス特論)

The aim of this course is to give fundamental knowledge on various physical processes of optoelectronic transition, in order to understand technologies for applications in light emitting diodes, detectors, and solar energy conversion devices

<Advanced Integrated Circuit Process Engineering > (集積回路プロセス工学特論)

Prof. T. Tanaka This subject starts with an introduction of physics and properties of semiconductors and fundamentals of pn-junction, followed by a generic overview of MOSFET and bipolar transistor. Integrated circuit process technologies including crystal growth, oxidation, thin film growth, thermal diffusion, ion implantation, lithography, and etching will be introduced.

<Electronic System Design and Integration Technology > (電子情報システム設計特論)

The main topics of this subject are as follows:

- 1) Introduction to Packaging Technology for High-Speed Information equipment
- 2) Noise of the power supply line
- 3) Cross-talk Noise
- 4) Cooling technology
- 5) IC package and packaging technology
- 6) Interconnection technology for high speed signal
- 7) Multi chip Module technology

< Design of System LSI Circuits > (システム LSI 回路設計特論)

- 1. Introduction to integrated circuit technologies
- 2. The top-down design and co-design
- 3. IC design training
- a. Layout design
- b. Hardware description language design

<Advanced Wireless Communication Systems > (ワイヤレス通信システム特論)

The main topics of this subject are as follows:

- 1) Introduction to wireless communication technologies
- 2) Fundamental technologies in wireless communications
- 3) Advanced technologies used in wireless LAN and FWA systems

<Microwave Integrated Circuits > (マイクロ波集積回路特論)

High frequency and high power amplifier used in microwave integrated circuits for radar and radio frequency communication system is mainly lectured.

The topics of this lecture are as follows:

1. semiconductor devices for micorwave integrated circuit

Assoc. Prof. S. Sasaki

Assoc. Prof. S. Fukai

Prof. I. Toyoda

Prof. T. Ohishi

Prof. O. Guo

- 2. microwave integrated circuit components
- 3. high frequency power amplifier

<Advanced Utilization of Synchrotron Light > (シンクロトロン光利用科学技術工学特論)

Assoc. Prof. K. Takahashi Basic aspects on synchrotron light application, such as synchrotron light source, beamline, X-ray detection, ultra-high-vacuum, and experimental methods will be reviewed, in order to understand the scientific and industrial application of synchrotron light.

< Advanced Engineering of Computational Intelligence > (計算論的知能工学特論)

Brain is one of the keywords of the 21st century. As an approach to investigate its mysterious functions, fundamental knowledge on computational intelligence is discussed. Also, recent topics of neurocomputing technology, biomedical engineering and welfare engineering are dealt with.

<Graphical User Interface > (グラフィカル・ユーザ・インターフェース特論)

First we will learn the fundamental programming for GUI using Xt Intrinsics in X Window System to grasp the concept of the Toolkit programming. After learning Xt Intrinsics, we will use another GUI Toolkits such as Gtk+ and Qt to implement advanced applications with better user interface.

<Advanced Adaptive Systems Theory > (適応システム特論)

Assoc. Prof.H. Itoh In this class, we will learn several methods for making machines that can automatically learn how to behave in unknown environments. Especially, we will learn (1) reinforcement learning, (2) stochastic modeling, and (3) optimal control in partially observable domains.

< Microwave Circuit Design Engineering > (高周波回路設計特論)

In this lecture, first, students learn theory of transmission line and a method to use smith chart. Next, students learn theory of high frequency active device and circuit by a standard schooling style.

< Advanced Data Analysis Engineering > (データ解析工学特論)

Assoc. Prof. S. Hara The subject of this lecture is a data analysis in photovoltaic(PV) power systems. The contents of this lecture are PV systems, modeling of PV systems, solar irradiance, temperature estimation of PV cells, simulation of mega solar power plants, height dependence of string power, fault detection of PV systems, interpolation of PV measurement data, fast fluctuation of PV signals, computation of cable resistances in PV systems, and recognition of thermographic camera image of PV modules.

< Advanced Study in Electrical and Electronic Engineering I>(電気電子工学特別研究 I)

Prof. T. Furukawa etc.

< Advanced Study in Electrical and Electronic Engineering Ⅱ> (電気電子工学特別研究Ⅱ)

Prof. T. Furukawa etc.

< Advanced Study in Electrical and Electronic Engineering Ⅲ > (電気電子工学特別研究Ⅲ)

Prof. T. Furukawa etc.

< Advanced Study in Electrical and Electronic Engineering IV > (電気電子工学特別研究IV)

Prof. T. Furukawa etc.

Prof. T. Furukawa

Assoc. Prof. T. Tanaka

Assoc. Prof. H. Wakuva

Curriculum for the students of Civil Engineering Course (都市基盤工学コース授業科目)

Major Subjects				Semester					
Subjects		Teachers	Credits	19- I	19 - ∏	20- I	20- II	21- I	
Water Environmental System Engineering	水環境システム工学特論	V. Narumol	2	0		0		0	
Advanced Applied Fluid Mechanics	応用流体力学特論	H. Oshikawa	2				0		
Advanced Structural Engineering	構造工学特論	K. Ijima H. Obiya	2				0		
International Seminar for Urban Environment and Urban Planning	国際都市・環境特別演習	N. Mishima etc	2	0	0	0	0		
Advanced Geotechnical Engineering	地盤工学特論	T. Negami	2		0				
Advanced Hydraulics	水工学特論	K.Ohgushi	2						
Advanced Hydroinformatics	水環境情報学特論	K.Ohgushi	2			0			
Advanced Environmental Transport Phenomena	環境輸送特論	H. Yamanishi	2	0					
Advanced Nonlinear Structural Analysis	非線形構造解析学特論	H. Obiya	2			0			
Advanced Construction Materials	建設材料学特論	Y. Itoh	2			0			
★Advanced Study in Civil Engineering I (Compulsory)	都市基盤工学特別研究 I	Yamanishi,Ijima,Chai,O hgushi,Itoh,Mishima,Ob iya,Kojima,Hino,Oshika wa,Narumol,Goto,Hiras e,Li,Inohae,Nakaohkubo ,Miyahara,Negami,Sakai	5	0					
★Advanced Study in Civil Engineering II (Compulsory)	都市基盤工学特別研究Ⅱ	same as above	5		0				
★Advanced Study in Civil Engineering III (Compulsory)	都市基盤工学特別研究Ⅲ	same as above	10			0			
★Advanced Study in Civil Engineering IV (Compulsory)	都市基盤工学特別研究IV	same as above	10				0		

Outline of Major Subjects

Civil Engineering Course

<Water Environmental System Engineering>(水環境システム工学特論)

Assoc. Prof. V. Narumol

To maintain the sustainability of water environment, it is important to recognize how nature responses to human activity. And when engineers and scientists design or plan for water environment, they should consider the phenomena in the water environment as a system. The aim of this lecture is to understand water environment using the system engineering approach. Content of this lecture is listed below.

1) Basic Concept on Water-Mass Cycle Phenomena

2) System Approach on Water-Mass Systems (Water Quality Modeling)

3) Integrated Water Management and Water Policy Analysis

4) Interesting Issues on Water Environment in Japan and Other Countries

<Advanced Applied Fluid Mechanics>(応用流体力学特論)

Assoc. Prof. H. Oshikawa

Theories and equations expressing flow phenomena, advection and diffusion transport and waves are described: 1) Navier-Stokes equation, 2) Reynolds equation, 3) advection diffusion equation, 4) the small amplitude wave theory. In addition, statistical properties of water surface waves and turbulence, which are representative irregular phenomena in hydraulics, will be explained.

<Advanced Structural Engineering>(構造工学特論)

Prof. K. Ijima, Prof. H. Obiya Main part of the lecture is geometrically and/or materially nonlinear structural analysis by the tangent stiffness method.

1) Concept of the method.

- 2) Application to axial member structures.
- 3) Application to bending member structures.

4) Application to shell structures.

5) Application to form finding.

< International Seminar for Urban Environment and Urban Planning > (国際都市・環境特別演習) Prof. N. Mishima etc.

< Advanced Geotechnical Engineering > (地盤工学特論)

Lect. T. Negami

This class presents the basic soil behavior and evaluation method of design parameters of soils. The latest ground improvement and earth reinforcement technology are introduced. Main topics of this class are as follows: 1) behavior and strength of soils, 2) laboratory testing and engineering properties of soils, 3) ground improvement technologies.

< Advanced Hydraulics > (水工学特論)

Fundamental matters on the finite difference method necessary for civil engineers to perform hydraulic calculations are lectured. First, the fundamentals of the finite difference method are outlined. Then, the basic formulas of integral form and differential form based on the assumption of Saint Venant for one-dimensional open channel flow are derived. Various finite difference methods for the basic equations are introduced. We discuss the numerical stability of calculation method. Finally, lecture on applied matters such as numerical calculation of the sedimentation in the river and diffusion of dissolved matters in the water body.

Prof. K. Ohgushi

<Advanced Hydroinformatics > (水環境情報学特論)

By effectively obtaining and utilizing the information of water environment in the watershed and the coastal area, it can be possible to grasp our surrounding water environment appropriately and to connect to the disaster prevention, water use and creation of environment being symbiotic to the nature. In this lecture, you can learn the applied technology of remote sensing and GIS related to water environment and comprehension of the phenomena using the computational simulation and how to use it. The necessary knowledge and technique to effectively obtain and utilize the information of water environment in future will be lectured for the student of the master course of the field of Civil Engineering and Architecture.

<Advanced Environmental Transport Phenomena > (環境輸送特論)

This lecture picks up a system approach in formulating and analyzing environmental phenomena. Basically, those phenomena that occur in environmental systems are described and formulated. In addition, natural environmental topics recognized as being most important are included. The lecture's contents can be grouped in the following chapters:

1) Physical Phenomena.

2) Chemical Phenomena.

3) Biologic Phenomena and Ecological Systems.

< Advanced Nonlinear Structural Analysis > (非線形構造解析学特論)

Application of non-linear theories for static and dynamic analyses is mainly lectured. Latest topics in this field will be focused. To take this class, fundamental knowledge and ability of structural mechanics is required.

< Advanced Construction Materials > (建設材料学特論)

This lecture introduces the recent topics on the cement, concrete, metal and construction waste. Attending a lecture should have the knowledge on concrete engineering and reinforced concrete in undergraduate program.

< Advanced Study in Civil Engineering I - IV > (都市基盤工学特別研究 I ~ IV)

The course unit is designed to provide students with a structured approach to understanding modern <u>civil engineering</u> <u>problems</u>. Students will cover theoretical concepts and practical works related to <u>urban management</u>, <u>safety management</u>, <u>environment and sustainability</u>. Their knowledge of these concepts will be developed further through a series of four steps $(I \sim IV)$ that are to be undertaken through a 'recent study'

Prof. K. Ohgushi

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H. Yamanishi etc.

Prof. H. Obiva

Prof. H. Yamanishi

Prof. Y. Ito

Curriculum for the students of Architectural Design Course (建築環境デザインコース授業科目)

Major Subjects					S	emeste	er	
Subjects		Teachers	Credits	19- I	19- ∏	20- I	20- ∏	21- I
Advanced Exercise of Architecture and Environmental Design I	建築環境デザイン特別演習 I	N. Mishima	3	0		0		
Advanced Exercise of Architecture and Environmental Design II	建築環境デザイン特別演習Ⅱ	Y.Hirase	3		0		0	
International Seminar for Urban Environment and Urban Planning	国際都市・環境特別演習	N. Mishima etc	2	0	0	0	0	
Advanced Exercise of Community Design and Architecture	地域デザイン特別演習	R. Goto M. Miyahara	2		0			
Advanced Urban Design	都市デザイン特論	N. Mishima	2	0				
Advanced Architectural Environmental Design	建築環境設計特論	C. Nakaohkubo	2			0		
Psychological Theory for Architecture and Urban Spaces	建築都市空間論	M. Miyahara	2	0		0		
Advanced Dwelling Environment	住環境論	R. Goto 🗆	2				0	
Advanced Nonlinear Structural Analysis	非線形構造解析学特論	H. Obiya	2			0		
Advanced Structural Engineering	構造工学特論	K. Ijima H. Obiya	2		0		0	
Advanced Construction Materials	建設材料学特論	Y. Itoh	2			0		
★Advanced Study in Architecture and Environmental Design I (Compulsory)	建築環境デザイン特別研究 I	Yamanishi,Ijima,Chai,Ohgu shi,Itoh,Mishima,Obiya,Koj ima,Hino,Oshikawa,Narum ol,Goto,Hirase,Li,Inohae,Na kaohkubo,Miyahara,Negami ,Sakai,Mishima	5	0				
★ Advanced Study in Architecture and Environmental Design II (Compulsory)	建築環境デザイン特別研究Ⅱ	same as above	5		0			
★ Advanced Study in Architecture and Environmental Design III (Compulsory)	建築環境デザイン特別研究Ⅲ	same as above	10			0		
★Advanced Study in Architecture and Environmental Design IV (Compulsory)	建築環境デザイン特別研究Ⅳ	same as above	10				0	

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Outline of Major Subjects

Architectural Design Course

<Advanced Exercise of Architecture and Environmental Design I>(建築環境デザイン特別演習 I)

Prof. N. Mishima

This exercise consists of two assignments regarding architecture and urban design. The first assignment is a project-type practice to design and propose an attractive idea for activation of a site. The second assignment is to submit an idea to a competition for architectural and urban design student hosted by Japan Institute of Architecture.

<Advanced Exercise of Architecture and Environmental Design II>(建築環境デザイン特別演習Ⅱ)

Assoc. Prof. Y. Hirase As a graduate course in architectural design practice, and challenge them to architectural practice and project proposals. Basic knowledge of architectural planning space design, the goal is to acquire the ability to propose the idea of architectural space for new life and new public service through exercises. As the theme of practical projects, learning from the process of planning and problem solving suggestions.

< International Seminar for Urban Environment and Urban Planning > (国際都市・環境特別演習)

Prof. N. Mishima etc.

< Advanced Exercise of Community Design and Architecture > (地域デザイン特別演習)

Assoc. Prof. R. Goto, Assoc. Prof. M. Miyahara Modern architectural planning and town planning are demanded the relations of community and material network in the surrounding architecture. This exercise is analysis and makes a presentation about such a community design and architecture in the existential field.

<Advanced Urban Design > (都市デザイン特論)

Prof. N. Mishima URBAN DESIGN is a complex interdisciplinary field that encompasses architecture, landscape architecture, urban planning, civil and transportation engineering, psychology, real estate development, law and other specialties. Main part of this course is analysis and discussion about such urban design processes, dealing with several examples of urban design and developments in the world.

< Advanced Architectural Environmental Design > (建築環境設計特論)

Assoc. Prof K. Nakaokubo This lecture introduces the design methods of environmental conscious buildings. In this lecture, the passive design methods, such as solar thermal heating system, the use of winds, greenery and so on, are explained mainly. Then, students make a presentation of the environmental conscious design in actual buildings based on their literature searching.

< Psychological Theory for Architecture and Urban Spaces > (建築都市空間論)

Assoc. Prof. M. Miyahara

Assoc. Prof R.Goto

Environmental psychology has developed as psychological research to alleviate the negative impact on the human life brought by the redevelopment of the city and economic growth after the 1960s. In the field of architecture, it developed as a framework to understand the relationship between human's behavior and the environment. In this class, we will learn how we can understand the architecture and cities from the view of environmental psychology.

<Advanced Dwelling Environment > (住環境論)

In this lecture, topics of dwelling environment are discussed mainly from the viewpoints of natural condition, specific condition and living condition

1) Formation of traditional house and residence in rural and urban area.

2) Problems and further needs for actual development and its panning.

< Advanced Nonlinear Structural Analysis > (非線形構造解析学特論)

Prof. H. Obiya

Application of non-linear theories for static and dynamic analyses is mainly lectured. Latest topics in this field will be focused. To take this class, fundamental knowledge and ability of structural mechanics is required.

<Advanced Structural Engineering>(構造工学特論)

Prof. K. Ijima, Prof. H. Obiya

Main part of the lecture is geometrically and/or materially nonlinear structural analysis by the tangent stiffness method.

1) Concept of the method.

2) Application to axial member structures.

3) Application to bending member structures.

4) Application to shell structures.

5) Application to form finding.

< Advanced Construction Materials > (建設材料学特論)

Prof. Y. Ito

This lecture introduces the recent topics on the cement, concrete, metal and construction waste. Attending a lecture should have the knowledge on concrete engineering and reinforced concrete in undergraduate program.

< Advanced Study in Architecture and Environmental Design I-IV>(建築環境デザイン特別研究 I ~IV)

Prof. H. Yamanishi etc The course unit is designed to provide students with a structured approach to understanding modern <u>architecture and</u> <u>urban design problems</u>. Students will cover theoretical concepts and practical works related to <u>urban design, city</u> <u>planning, safety management and habitat environment</u>. Their knowledge of these concepts will be developed further through a series of four steps (I ~ IV) that are to be undertaken through a 'recent study'

Outline of subjectsCourse of Electronics and Information SystemsChair of Electrical and Electronic Engineering

Prof. T. Tanaka This subject focuses on physics, processing and applications of semiconductor materials. Topics covered include: semiconductor crystal growth, band structure, carrier transport properties, point defects, optical properties, and device physics of light emitting diodes and solar cells

<Advanced Study of Science and Technology of Semiconductor Materials>(半導体材料学特論)

<Advanced Electromagnetic Theory>(電磁波工学特論)

The main topics of this subject are as follows:
1) Introduction to numerical analysis of Maxwell's equations
2) Overview of the FEM (Finite Element Method), MoM (Method of Moments), and FDTD (Finite Difference Time Domain) method
3) Integral equation method and its applications

<Advanced Study of Semiconductor Properties>(半導体物性特論)

<Advanced Surface Science of Semiconductors>(半導体表面科学特論)

Prof. Q. Guo Topics of this course include theoretical and experimental aspects of the electronic and geometric structure of surfaces of semiconductors. Modern ultrahigh vacuum experimental methods will be also discussed.

<Signal Processing Circuits>(信号処理回路特論)

Assoc. Prof. S. Fukai This lecture includes the analysis and design of electronic circuits used for signal processing.

<Advanced Engineering of Brain-like Information Systems> (神経情報処理工学特論)

Assoc. Prof. H. Wakuya A biological brain is one of the natural information processing systems as a result of three-billion-year evolution. In this lecture, several trials for discovering its mechanism are introduced, and some brain-like information systems are also described.

<Advanced Study of Laser Engineering and Applications> (レーザ応用工学特論)

<Advanced Electronics Packaging Technology> (エレクトロニクス実装工学特論)

The main topics of this subject are as follows:

1) Packaging technologies required in realizing the high speed and high performance information equipment.

2) Trends of key technologies in next-generation systems

<Neural Information Processing>(脳型情報処理特論)

This lecture consists of three parts. First part is on complex networks. Several methods for synthesis of complex networks are lectured. Second part lectures on a theory of network calculus. Last part is classes including computer exercises on neuromorphic engineering, VLSI circuits emulating neural systems.

Unsettled

Unsettled

Assoc. Prof. S. Sasaki

Assoc. Prof. S. Hara

Prof. I. Toyoda

< Optical and Electronic Properties of Condensed Matters> (光電子物性特論)

Assoc. Prof. T. Tanaka

Basic aspects and recent topics of electron spectroscopic research on condensed matters, such as high-resolution photoelectron spectroscopy, will be reviewed.

<Advanced Environmental and Energy Engineering> (環境エネルギー工学特論)

Prof. M. Kasu Diamond semiconductor is expected to the highest efficient power transistors. In the lecture, diamond crystal growth, physics, devices are reviewed.

<Advanced Numerical Electrodynamics>(数值電気力学特論)

In this class, we will review Maxwell's electromagnetic equations as the fundamental equations of electromagnetic phenomena. After reviewing Maxwell's equations, we will learn the principles and the practical algorithms of the finite element method, the boundary element method and the finite difference time domain method.

<Advanced Plasma Production Engineering> (プラズマ発生工学特論)

Prof. Y. Ohtsu Production mechanism of gas discharge plasmas is lectured with including physical and chemical reactions in reactive plasmas. Recent topics on plasma production are presented and discussed with students.

<Topics in Pulsed Power Engineering > (パルスパワー工学特論)

- 1) Overview of pulsed power engineering
- 2) Fundamentals of energy storage and pulsed power generation.
- 3) Devices for pulsed power generation.
- 4) Circuit for pulsed power generation.
- 5) Applications of pulsed power technology.

<Advanced Antenna Engineering> (アンテナ工学特論)

This subject focuses on advanced antenna engineering.

- 1) Antenna theory
- 2) Planar antennas
- 3) Integration of antenna and microwave circuit
- 4) Functional antennas

< Advanced Engineering of Information and Communication > (情報通信工学特論)

Assoc. Prof. H. Fukumoto

Assoc. Prof. E. Nishiyama

In this lecture, we will review the state of information communication technology. Current technologies, new technologies such as HTML5 and Websocket, and future prospects are introduced.

<Advanced Crystal Engineering>(結晶工学特論)

Unsettled

Course of Mechanical Engineering and Physical Science Chair of Mechanical Engineering

<Advanced Technology of Thermal Energy> (熱エネルギー利用学特論)

Prof. A. Miyara

Prof. T. Furukawa

Assoc. Prof. S. Ihara

Basic theory and equipments to utilize thermal energy <Advanced Technology of Fluid Energy>(流体エネルギー創成工学特論) Unsettled <Advanced Fluid Machinery> (流体機械システム学特論) Prof. Y. Kinoue Theoretical and numerical analysis, experimental analysis for fluid machinery are lectured. <Advanced Technology of Facilities for Utilization of High Density Energy> (熱エネルギー機器工学特論) **Prof. Y. Mitsutake** Transient cooling technology of hot surface with spray/laminar jet. <Advanced Study of Thermal Energy Transfer> (熱エネルギー移動工学特論) Assoc. Prof. K. Kariya 1) Convection heat transfer 2) Boiling and condensation heat transfer 3) Critical heat flux <Advanced Turbomachinery>(流体機器開発工学特論) Assoc. Prof. N. Shiomi Experimental measurement scheme and data processing for internal flow of turbomachinery <Advanced Design of Machinery and Machine Elements>(機器要素設計学特論) **Prof. B. Zhang** 1) Methodology of Machine Design 2) Design Process and Procedure 3) Engineering Analysis in Design 4) Some Case Studies <Advanced Manufacturing Processes> (高精度加工システム特論) Unsettled <Advanced Tribology>(トライボロジー解析特論) Assoc. T. Mawatari 1) High Pressure Rheology of Lubricants 2) Hertzian Contact of Elastic Solids 3) Elastohydrodynamic Lubrication Theory <Computational Solid Mechanics > (計算固体力学特論) **Prof. S. Hagihara** 1) Solid Mechanics 2) Finite Element Method 3) Numerical Calculation <Advanced Strength of Mechanical Materials>(機械材料強度学特論) Assoc. Prof. Y. Tadano 1) Strength of Mechanical Materials 2) Nonlinear solid mechanics 3) Material modeling <Advanced Production System> (生産システム特論) Assoc. Prof. H. Hasegawa 1) Melt processing

2) Plastic forming3) Removal processing	
<behavior-based and="" control="" robots=""></behavior-based> (行動型ロボット特論)	Prof T Tsuiimura
1) Artificial Intelligence 2) Meta-heuristics 3) Behavior Network < Mechanical System Control > (機械システム制御特論)	i i oi. i. isujiinu a
 Classical Control Theory Modern Control Theory Robust Control Theory 	Prof. K.Sato
<adaptive and="" learning="" systems=""> (適応・学習システム特論)</adaptive>	
As Topics are follows: 1) Intelligent systems 2) Evolutionary computation 3) Machine Learning	soc. Prof. K. Izumi
<advanced machining="" precision="">(精密加工学特論)</advanced>	Prof P Zhang
Fundamentals Applications and Recent developments of precision machining	1 Ioi. D. Zhang
<advanced fatigue="" metals="" of=""> (金属疲労学特論)</advanced>	Drof N Hattari
 Fatigue Properties of Materials Stress Concentrations at Notches Stress Intensity Factors of Cracks 	
<advanced materials="" non-ferrous="" structural="">(非鉄金属材料学特論)</advanced>	
Ass 1) Application of non-ferrous materials to industrial fields 2) Microstructures of non-ferrous materials 3) Deformation and fracture behavior	soc. Prof. S. Morita
<advanced environment="" in="" materials="" of="" strength="" study=""> (環境材料強度特論</advanced>)
 Assoc 1) Stress Singularity Field of the Materials 2) Plastic Deformation due to Dislocation Motion 3) Environmentally Assisted Cracking 	e. Prof. S. Taketomi
<advanced engineering="" ocean="">(海洋工学特論)</advanced>	Drof S Nagata
Sea Environment Numerical Method for Load and Response of Structure Design of Offshore Structures	TTOL 5. Nagata
<advanced energy="" on="" phenomena="" transport="">(エネルギー輸送現象特論)</advanced>	Unsettled
<advanced energy="" of="" renewable="" utilization="">(自然エネルギー利用工学特論)</advanced>	Unsettled

<Advanced Creative Engineering on Ocean Thermal Energy>(海洋熱エネルギー創成工学特論)

Prof. Y. Ikegami

Optimization of Ocean Thermal Energy Conversion Advanced thermodynamics for Ocean Thermal Energy Conversion By product of Ocean Thermal Energy Conversion

<Ocean Measurement>(海洋環境工学特論)

Assoc. Prof. Y. Imai

1) Observation system

2) Analysis of measured data

3) Numerical simulation

<Advanced Study of Ocean Thermal Energy>(海洋熱エネルギー機器工学特論)

Assoc. Prof. H. Arima

1) Basic of Heat Exchanger for Ocean Thermal Energy Conversion (OTEC)

2) Calculation of Heat Exchanger for OTEC

3) Design of Heat Exchanger for OTEC

Course of Environmental Science and Engineering Chair of Chemistry and Applied Chemistry

<Structural Aspects of Metal Complexes>(複合錯体構造学特論)

Prof. M. Koikawa

Prof. T. Hanamoto

Prof. Y. Yamada

This class deals with structure and magnetism of binuclear and polynuclear metal complexes.

<Advanced Coordination Chemistry>(金属錯体化学特論)

Unsettled

<Environmentally Benign Chemistry of Organic Substances>(環境調和型有機化学特論)

Prof. T. Kitamura Environmentally benign Chemistry of organic substances will be lectured and the related literatures are introduced.

<Structure of Organic Thin Films>(有機薄膜構造特論)

Prof. Y. Oishi and Assoc. Prof. T. Narita Aggregation structure and its analysis methods of organic monolayer and Langmuir-Blodgett film

<Advanced Organic Synthesis > (物質変換化学特論)

A course deals with current topics which are concerned with new organic transformation, building blocks, reaction intermediates in organic chemistry.

<Functional Protein Chemistry>(機能蛋白質化学特論) Unsettled

< Chemistry of Highly Controlled Materials > (高機能物質化学特論)

Structure and photochemistry of coordination compounds.

<Advanced Molecular Photochemistry>(光機能性物質学特論)

Unsettled

<advanced amphiphilic="" chemistry="" materials="" of="">(両親媒性物質化学特論) Prof M Tominage</advanced>		
Self-organized structure of amphiphilic materials and its application to nano science.		
<advanced chemistry="" materials="" of="" organic="" photophysical=""> (固体機能材料工学特論) Assoc. Prof. M. Era This lecture will provide photophysical and photochemical processes of organic materials</advanced>		
Computational Chemistry of Materials > (計算機物質化学特論) Prof. M. Unno		
Basics and applications of quantum chemical calculations of materials		
< Advanced Aquatic Environmental Chemistry > (循環資源化学特論) Unsettled		
< Advanced Chemistry of Microenvironmental Control >(環境制御化学特論) Assoc. Prof. S. Osada Control of cell function by small organic molecules		
<advanced chemistry="" molecular="" recognition="">(分子認識化学特論) Prof. T. Takamuku This class deals with new techniques for investigation of liquid and solution structures and dynamics on a molecular scale.</advanced>		
< Material Recycle and Waste Management > (廃棄物工学特論) Assoc. Prof. S. Morisada Physical and chemical treatment of wastes and resource recovery <chemical and="" science="" separation="" technology="">(分離機能分子工学特論) Prof. K. Ohto Separation science and technology such as chemical treatment, solvent extraction, ion exchange, for rare metals</chemical>		

Chair of Civil Engineering and Architecture

<Advanced Geotechnical Engineering>(基礎地盤工学特論)

1) Constitutive models and soil mechanics.

- 2) Plasticity and yielding of soils.
- 3) Strength of soils.
- 4) Elasto-plastic model for soils (particularly Cam clay model).
- 5) Applications of elasto-plastic models.

<Advanced Geotechnical Materials > (地盤材料学特論)

Unsettled

Prof. J. Chai

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<advanced analysis="" geotechnical="" materials="">(地盤材料解析学特論)</advanced>			
 It is lectured on the following contents mainly. 1) Bonding, Crystal Structure, and Surface Characteristics 2) Soil Mineralogy 3) Soil Formation and Soil Deposits 4) Determination of Soil Composition 5) Soil Water 6) Clay-Water Electrolyte System 7) Soil Fabric and Its Measurement 8) Effective, Intergranular, and Total Stress 9) Soil Composition and Engineering Properties 10) Soil Structure-Its Formation, Stability, and Relationships to Properties 	Prof. T. Hino		
<advanced architectural="" characteristics="" regional="" related="" theory="" to=""> (地域建築計画学特論)</advanced>			
 Architecture and regional characteristics Site Planning Planning of Community Facilities 	Assoc. Prof. R. Goto		
<advanced mechanics="" soil="">(土質工学特論)</advanced>	Assoc. Prof. A. Sakai		
Prediction and control of soil deformation under cyclic loading.			
<construction infrastructure="" management="" of=""> (構造施工学特論)</construction>	Unsettled		
<advanced design="" structural="">(構造設計学特論) 1) Geometrically nonlinear analysis. 2) Material nonlinear analysis.</advanced>	Prof. K. Ijima		
<advanced computational="" engineering=""> (計算工学特論)</advanced>			
 Equilibrium path and stability of structures. Finite rotation of nodes. Shape analysis for curved surface. 	Prof. H. Obiya		
<advanced concrete="" engineering="">(コンクリート工学特論)</advanced>			
 Repair of concrete structures are lectured. 1) Damage occurring during construction. 2) Investigation and diagnosis. 3) Repairs to cracked concrete. 4) Large-volume repairs. 	Prof. Y. Ito		

<Advanced Water Resources Management Engineering > (水資源管理学特論)

Assoc. Prof. V.Narumol In this lecture, students will integrate their basic knowledge and technical knowledge related to water environment through the analysis of history of water pollution problems and case study in their country. Some examples of integrated water management will be demonstrated and needs for water management in the future will be discussed.

<Advanced Water Quality Control Engineering>(水質制御工学特論)

Unsettled

<Advanced Environmental Systems Engineering>(環境システム工学特論)

Prof. H. Yamanishi

Fundamental processes which compose the environmental systems are lectured.

- 1) Physical phenomena.
- 2) Chemical phenomena.
- 3) Biologic phenomena and ecological systems.
- 4) Natural transport systems.
- 5) Water treatment systems.

<Advanced River System Management Engineering>(地域水系管理学特論)

Prof. K. Ohgushi

It is very important to know the flow in the creek in Saga Plain. In the other day in Saga, water flows much in each channel and people utilized it. However, after construction of water and sewer services, the role of the creek has been forgotten and the water flow has stagnated already so that the water quality has been degraded. In recent year, citizen's cleanup of the creek becomes popular in every spring and autumn in Saga City and the attempt to utilize the creek for city-planning is also discussed. In this lecture, you will learn the method of hydraulic calculation of the open channel network and the method of water quality estimation. In this manner, you will learn the basic knowledge to utilize the open channel network from now on. In the area with well-developed creeks like Saga Plain, it is very important to know the mechanism of water channel network and water flow. In this lecture, a theory of open channel network will be explained to learn the water flow in the open channel network and the method of estimating the water quality.

<Advanced Environmental Hydraulics>(環境水理学特論)

Prof. K. Ohgushi

Unsettled

Topics of hydraulics not treated in the undergraduate course will be lectured. Especially, "water wave" and "mass diffusion" will be intensively lectured to consider various characteristics of water. You will learn unsteady phenomena in the hydraulics, such as waves and diffusion. In the case of the waves, under the assumption of small amplitude wave theory, the mass transport velocity appear from the second order approximation. In the diffusion phenomena, not only the molecular diffusion and turbulent diffusion, but also advective dispersion will be discussed to learn the spreading way of mass in the water and the atmosphere.

<Advanced Transportation Planning> (交通計画学特論)

<advanced environmental="" evaluation=""> (環境システム評価特論)</advanced>	Unsettled
<urban management="" system=""> (都市システム管理学特論)</urban>	Unsettled
< Advanced Architectural Theory of Design > (建築意匠特論)	Unsettled

<Advanced Environmental Design>(環境デザイン特論)

Assoc. Prof. K. Nakaohkubo

The methods of thermal environment design in architecture and urban planning will be lectured.

1) Thermal environment issue -global warming and heat island phenomenon-

2) Passive design

3) Exercise in thermal environment design with numerical simulation

<Advanced Architectural Environmental Control Engineering>(建築環境制御学特論)

Prof. S. Kojima

This course will examine control methods of indoor thermal environment of buildings by active system such as HVAC systems.

1) Thermal comfort

2) Thermal envelope

3) Heat load and energy calculation

4) HVAC applications

<Advanced Topics of Urban and Building Environmental Psychology >(都市·建築環境心理学特 論)

Assoc. Prof. H. Li

In modern society, people are living in the city and seeking a healthy, comfortable and safe living environment. In this course, influences of urban and architectural environment on human life and behavior, and reversely, influences of human society on urban and architectural environment are discussed. Moreover, in the view of environmental issues especially in crowded cities, such as pollution, noise and disasters, a relationship between spatial structure of environment and social behaviors are deeply considered.

<Special Theory of Townscape Design>(景観デザイン学特論)

Prof. N. Mishima

Theory of townscape design based on several examples is lectured, mainly focused on following issues.

1) Strategies for townscape planning

2) Human scale townscape design, and

3) Preservation of historic area

<Advanced Coastal Zone Engineering>(沿岸域工学特論)

Assoc. Prof. H. Oshikawa

Fluid dynamics in a coastal zone including estuary and related substance transport are explained. In addition, hydraulic engineering problems such as flood disaster, coastal erosion and water quality are discussed.

Course of Advanced Technology Fusion Chair of Advanced Technology Fusion

< Advanced Biomedical Robotics>(先端医エロボティクス特論)

Prof. N.Ueno

Medical robots, rehabilitation robots, and human assist robots are mainly explained in this lecture. The fundamental of robotics is also lectured.

<Advanced Biological System Engineering>(先端生体システム工学特論)

Prof. S. Goto

From the viewpoint of system control engineering, human is interpreted as a system. In this class, biological signal processing for identification of human state and robotics for extension of human functions are lectured.

<Advanced Biomedical Electronic Engineering>(先端医学電子工学特論)

Prof. E. Takahashi

We will study mathematical and engineering approaches for analysis, simulation, and estimation of physiological regulatory systems in living organisms.

<Advanced Medical and Biological Engineering>(先端医用生体工学特論)

Assoc. Prof. T. Sugi

Recent medical devices and diagnosis system, especially for neurological activity and movement, are introduced.

<Advanced Biomedical Fluid Engineering>(先端生体流体工学特論)

Prof. S. Matsuo

- 1) Fundamental fluid dynamics.
- 2) Shock wave phenomena.
- 3) Effective utilization of fluid energy.
- 2) Application to Biomedical Fluid Engineering.

<Advanced Medical Device Engineering> (先端医療機器工学特論)

Assoc. Prof. T. Hashimoto

Structure and operating principle of various medical instruments will be lectured, with a reference to the current issues from the standpoint of mechanical engineering.

< Advanced Biomedical Electromagnetic Field Analysis > (先端医工電磁界解析特論)

Prof. K. Muramatsu

Theory and recent topics on electromagnetic field analysis using finite element method is lectured. Its applications for electromagnetic devise or sensor are also introduced.

<Advanced Biomedical Sensing>(先端医用計測工学特論)

Prof. K. Teramoto

Introduction to the Medical Imaging I: Inverse problems II: CT III: Ultrasonic Imaging IV: MRI V: PET

<Advanced Biomedical Dynamics>(先端生体機能力学特論)

Assoc. Prof. I. Khan

The course is designed to understand the biomedical engineering dynamics. It combines the use of matrices in generating the kinematic coefficients associated with the formulation of the governing equation of motion. The contents are included an extensive review of kinematics of rigid body, treelike structures with open and closed loops and prescribed motions including flexibility effects. The study plan of the course is to bridge the gap between dynamics and biomedical engineering application in robotics and bio-systems.

<Advanced Medical Image Processing> (先端医用画像処理工学特論)

Assoc. Prof. H. Douzono

Assoc. Prof. A. Kimoto

Advanced medical imaging techniques using soft-computing technologies will be lectured. Students will write a computer program using C-language that realizes such advanced medical imagings.

<Advanced Intelligent Instrumentation>(先端知能計測工学特論)

Various intelligent sensors and sensing techniques are lectured.

< Advanced Solid Material Science > (先端固体材料学特論)

Prof. T. Watari

Advanced and commercialized ceramic (solid materials) devices are explained by focusing basic theory, mechanism, device structure, etc.

1) Dielectric Device (Condenser)

2) Semiconductor (Sensor)

3) Ptocatalyst (TiO₂)

4) Piezoelectrics (Ignition devise, Buzzer)

5) Magnets (Brush-less motor, thermal switch)

6) Photonics (Optical fiber, Phosphors)

< Advanced Materials for Energy Storage > (先端エネルギー材料学特論)

Unsettled

< Advanced Composite Material > (先端材料複合工学特論)	ssaa Prof M Vada	
Topic on design and development of organic / inorganic and ceramics / metal	composite materials.	
<molecular advanced="" design="" materials="" of=""> (先端機能分子設計特論)</molecular>	Unsettled	
< Advanced Physical Organic Chemistry > (先端有機物理化学特論)	Duct M Takashita	
Topic on basic and applied organic photochemistry	rtoi, wi. Takesnita	
< Advanced Adsorptive Material Preparation > (先端機能分子物性特論) Assoc	. Prof. H. Kawakita	

This lecture deals with the preparation method of polymeric adsorptive material to evaluate the adsorption of metals and biomacromolecules.

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