SYLLABUS

Classification	elective	Course No.	03607	Hrs.:E.:Crs	3 : 0 : 3	Instructor	태기융
Course Title	Korean	생분해성 고분자와 수화젤					
	English	Biodegradable polymer and hydrogel					

Course Outline

This course is to provide the concepts and various kinds of biodegradable polymers and hydrogel systems. Also, it covers from the general concept of diffusion to the release profile of molecules dispersed inside the biodegradable polymer or hydrogel.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Definition of biodegradable polymer	
2nd we	In vivo degradable, synthetic solid polymers	
3rd we	In vivo degradable, biologically originated systems	
4th we	Environmentally degradable synthetic polymer	
5th we	Environmentally degradable natural polymers	
6th we	Elastomer	
7th we	Swelling behavio	
8th we	Chemically crosslinked hydrogel	
9th we	Biodegradable crosslinked hydrogel	
10th w	Physical hydroge	
11th w	Polyelectrolyte hydrogel	
12th w	Diffusion: concept	
13th w	Diffusion profiles in special cases	
14th w	Diffusion in biological system	
15th w	Release of molecules from degradable polymer	
16th w	Release of molecules from hydrogel	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03611	Hrs.:E.:Crs	3: 0: 3	Instructor	김영하
Course Title	Korean	생체의료용 고분자					
	English	Biomedical Polymers					

Course Outline

Lecture and discussion on biological background and the design strategy for polymeric materials for blood compatibility, tissue compatibility, drug delivery, and artificial organs. Application of polymers to various areas including cardiovascular, ophthalmic, orthopedical, dental or plastic surgical applications will be discussed.

Prerequisite	None
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Definition and Criteria of Biomaterials	
2nd we	Classification of Materials	
3rd we	Natural Polymers	
4th we	Materials / Body Interactions and Biocompatibility	
5th we	Blood-material Interactions and Coagulation	
6th we	Cardiovascular Application and Blood Compatible Polymers	
7th we	Inflammation and Immune System	
8th we	Wound Healing	
9th we	Hard/Soft Tissue Replacements	
10th w	Surgical Application	
11th w	Ophthalmic Application	
12th w	Dental Application	
13th w	Biodegradable Polymers and Application	
14th w	Tissue Engineering	
15th w	Drug / Gene Delivery Systems	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03618	Hrs.:E.:Crs	3: 0: 3	Instructor	김동유
Course Title	Korean	고분자 구조 및 특성					
	English	Structure Property Relationship of Polymers					

Course Outline

The main purpose of this course is to collect and organize understanding of the relationships between structure, properties and applications of polymer materials. The important polymer properties such as processability, mechanical, thermal, electrical, optical, acoustic, chemical and surface properties will be discussed from various aspects of polymer structures. (More thorough discussion of the physical and mechanical properties will be given at the course No. 3603.)

Prerequisite	
Textbook and References	Polymer Structure, Properties and Applications, R. D. Deanin, Cahners, Boston, 1972

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	submolecular structure:	
3rd we	chemical composition & properties	
4th we	Molecular structure I:	
5th we	size and shape & properties	
6th we	Molecular structure II:	
7th we	molecular flexibility & properties	
8th we	Intermolecular structure I:	
9th we	intermolecular order & properties	
10th w	Intermolecular structure II:	
11th w	intermolecular bonding & properties	
12th w	Supermolecular structure I: multiple phases	
13th w	Supermolecular structure II: macrostructure	
14th w	Commercial polymers: properties and applications	
15th w	Commercial polymers: properties and applications	
16th w	Commercial polymers: properties and applications	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03621	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이광희
Course Title	Korean	유기물광전자 I					
	English	Organic Materials for Electronics and Photonics I					

Course Outline

The main purpose of this course is to understand basic concepts, mechanisms, and current issues in Polymer Electronics and Optoelectronics, so called 'Plastic Electronics", which utilizes novel materials exhibiting the electrical and optical properties of metals or semiconductors 'and' which retain the attractive mechanical properties and processing advantages of polymers.

Prerequisite	"Introduction to Solid State Physics" (C. Kittel)
Textbook and References	- Pope and Swenberg, "Electronic Processes in Organic Crystals and Polymers", Second Edition, Oxford Univ. Press, 1999. - Hadziioannou and P.F. van Hutten (eds), `Semiconducting Polymers`, Wiley-VCH, 2000.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction: Vision of `Plastic Electronics`	
2nd we	Semiconducting Polymers I: Basic	
3rd we	Semiconducting Polymers II: Electronic Structure	
4th we	Semiconducting Polymers III: Bond Relaxation	Quiz 1
5th we	Semiconducting Polymers IV: Photoexcitation	
6th we	Semiconducting Polymers V: Photoinduced Charge Transfer	
7th we	Metallic Polymers I: Basic	
8th we	Metallic Polymers II: Doping	Midterm
9th we	Metallic Polymers III: Metal-Insulator Transition	
10th w	Metallic Polymers IV: True Metallic Transport	
11th w	Polymer Light-Emitting Diodes I: Basic	
12th w	Polymer Light-Emitting Diodes II: Advanced	Quiz2
13th w	Polymer Solar Cells I: Basic	
14th w	Polymer Solar Cells II: Advanced	
15th w	Polymer Field-Effect Transistors I: Basic	
16th w	Polymer Field-Effect Transistors II: Advanced	Final

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03629	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이탁희
Course Title	Korean	전자재료과학					
	English	Electronic Properties of Materials					

Course Outline

Basic electrical, optical, magnetic, and thermal properties of various materials such as metals, semiconductors, and ceramics (and superconductors) will be studied based on their electronic structures.

Prerequisite	
Textbook and References	Text book: Electronic Properties of Materials by Rolf E. Hummel Reference: Materials science for Electrical and Electronic Engineers by Ian P. Jones

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Fundamentals of electron theory	
2nd we	Energy band	
3rd we	Crystal	
4th we	Metals, alloys	
5th we	Polymers, ceramics	
6th we	Dielectrics, amorphous materials	
7th we	Semiconductors I	
8th we	Semiconductors II	
9th we	Optical properties I	
10th w	Optical properties II	
11th w	Magnetic properties I	
12th w	Magnetic properties II	
13th w	Thermal properties I	
14th w	Thermal properties II	
15th w	Superconductors I	
16th w	Superconductors II	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03636	Hrs.:E.:Crs	3: 0: 3	Instructor	황현상
Course Title	Korean	반도체공정					
	English	Semiconductor Processing					

Course Outline

The purpose of this course is to provide students with technical background on silicon process technology for VLSI. The topics to be discussed by class are as shown below 1. Semiconductor process review 2. Crystal growth and oxidation 3. Doping Process such as ion implantation and diffusion 4. Deposited thin film: polysilicon, oxide, nitride, metals 5. Metallization and Contacts process 6. Lithography & Etching Process 7. Process Integration and SUPREM modeling

Prerequisite	
Textbook and References	1.ULSI Technology, C.Y. CHANG and S. M. SZE, McGrow-Hill Book Co. 1996 2. VLSI Fabrication Principles, 2nd Ed, Ghandhi, John wiley & Sons, 1994 3. Silicon Processing for the VLSI Era. Vol. 3: process integration, S. Wolf, Lattice Press

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	ULSI Process Overview : Introduction	
2nd we	Wafer Cleaning Technology	
3rd we	EPITAXY	
4th we	Conventional and Rapid Thermal Process-I	
5th we	Conventional and Rapid Thermal Process-II	
6th we	Dielectric and Polysilicon Deposition	
7th we	Etching	
8th we	Lithography	
9th we	MIDTERM/ Ion Implantation - I	
10th w	Ion Implantation - II	
11th w	Metallization -I	
12th w	Process Modeling : SUPREM-III, IV part-1	
13th w	Process Modeling : SUPREM-III, IV part-2	
14th w	Process Integration-I	
15th w	Process Integration-II	
16th w	FINAL	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03640	Hrs.:E.:Crs	3 : 0 : 3	Instructor	조병기
Course Title	Korean	자성재료					
	English	Magnetic Materials					

Course Outline

In this lecture, we review the basis concepts in electromagnetism and magnetic interaction required in understanding magnetic materials. The phase and phase transitions related to magnetism shall be studied in detail. Variety of magnetic properties such as magnetic anisotropy, magnetostriction, and magnetic hysteresis are discussed. Finally, we cover the magnetic thin films and multilayers as well as giant magneto-resistance with the perspective of material science.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Review of the basic Electromagnetism	
2nd we	Classical description of magnetism	
3rd we	Atomic magnetic dipole moment	
4th we	Exchange interaction	
5th we	Exchange interaction	
6th we	Paramagnetism	
7th we	Ferromagnetism	
8th we	Antiferromagnetism	
9th we	Magnetic phase transitions/Mid term exam	
10th w	Magnetic anisotropy	
11th w	Magnetic anisotropy	
12th w	Magnetostriction	
13th w	Shape and exchange anisotropy	
14th w	Nanomagnetism	
15th w	Applications of magnetic thin films	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03674	Hrs.:E.:Crs	3 : 0 : 3	Instructor	고흥조
Course Title	Korean	고분자물리화학					
	English	Physical Chemistry of Polymer					

Course Outline

Studies on classical theories concerning the general physicochemical phenomena of polymeric systems including polymer swelling, gelation, chain configuration, polymer solution behavior, network elasticity, phase separation, viscosity, and so on.

Prerequisite	N/A
Textbook and References	P. J. Flory, Principles of Polymer Chemistry (main text) H.R. Allcock, Contemporary polymer chemistry Evaluation: Homework 50, Daily Quiz 100, Examination 200 (Total 350)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction and Statistical Chain Configuration	
2nd we	"	
3rd we	"	
4th we	Thermodynamics of Polymer solution	
5th we	"	
6th we	"	
7th we	Rubber Elasticity	
8th we	Mid-term Exam	
9th we	Phase Equilibria in Polymer Systems	
10th w	"	
11th w	Frictional Properties and molecular weight Determination	
12th w	"	
13th w	"	
14th w	"	
15th w	Overview and special topic	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03681	Hrs.:E.:Crs	3: 0: 3	Instructor	장윤희
Course Title	Korean	분자모델링					
	English	Molecular Modeling in Materials Science					

Course Outline

In this course we will learn how to use computers in modeling materials and processes at an atomic/molecular level. The course will proceed with lectures, computer labs, and carrying out term projects. Students are encouraged to pursue a project related to their own research. Grading: Exam/Quiz (60%), Lab report/Term paper/Homework (40%) Additional points to well-performed labs/projects & active participation

Prerequisite	Applied quantum chemistry (every 2nd semester) or quantum mechanics
Textbook and References	Part 1. Quantum Chemistry and Spectroscopy, 2nd Ed. T. Engel (2010) Part 2. Will be announced in http://mse.gist.ac.kr/~modeling/lecture.html

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Kick-off meeting & QM. HF-SCF method review (Engel Ch.11)	
2nd we	QM. HF-SCF & LCAO-MO method, Diatomic molecules (Ch.12)	
3rd we	QM lab. Sketch diatomic molecules, calculate electronic structure	
4th we	QM. Basis set, geometry, frequency & PES (Ch.15)	
5th we	QM lab. Geometry optimization & basis set dependence	
6th we	QM. Polyatomc molecules (Ch.13) & density functional theory	
7th we	QM lab. Polyatomic molecules. Sketch or import? (CSD Database)	
8th we	QM. UV/visible spectroscopy (Ch.14) - student presentation	
9th we	Mid-term exam & Basics for Project set-up (EndNote @ Library)	
10th w	QM 2. Solid. Periodic quantum mechanics, Plane-wave basis set	
11th w	QM 2 lab. Solid & surface. Build/import (ICSD database) & cut	
12th w	QM 2 lab. Solid & surface. Band structure & DOS calculation	
13th w	Project. Proposal presentation. term paper part 1 (introduction)	
14th w	Project. Model build-up. term paper part 2 (calculation details)	
15th w	Project. Calculation. term paper part 3 (results and discussion)	
16th w	Final exam & Final term paper	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03691	Hrs.:E.:Crs	3: 0: 3	Instructor	이병훈
Course Title	Korean	나노소자물리개론					
	English	Device physics for nanoscale solid state devices					

Course Outline

This class will review the basic device physics and cover advanced device physics of nanoscale solid state devices. This course will be a prerequisite course for the Advanced Electrical characterization methods for nano scale devices

Prerequisite	학부수준의 반도체 소자개론
Textbook and References	Text book: Fundamentals of Modern VLSI devices, 2nd ed., Y.Tauer, T.H.Ning References: Physics of Semiconductor devices, M.Shur

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introdcution to semiconductor device (Tauer, Ch.1)	
2nd we	Basic Device physics (Tauer, Ch.2)	
3rd we	MOSFET devices (Tauer, Ch.3),	
4th we	CMOS device design (Tauer, Ch.4), Exam 1	
5th we	CMOS device design (Tauer, Ch.4)	
6th we	CMOS performance factors(Tauer, Ch.5)	
7th we	CMOS performance factors(Tauer, Ch.5)	
8th we	Midterm exam	
9th we	SOI device (Tauer, Ch.10)	
10th w	SOI device (Tauer, Ch.10)	
11th w	Strain Engineering	
12th w	Strain Engineering, Exam 2	
13th w	Photonic Devices (Shur, Ch.5),	
14th w	Physics of carbon electronics	
15th w	Physics of carbon electronics	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	03692	Hrs.:E.:Crs	3: 0: 3	Instructor	엄숭호
Course Title	Korean	약물전달의 공학적 원리					
	English	Engineering Principles in Drug Delivery					

Course Outline

- To understand the physical, chemical, and engineering principles that form the foundation of a wide range of drug delivery systems - To critically read, understand, and evaluate the primary drug delivery literatures - To clearly present the concepts of specific drug delivery systems in both written and verbal formats

Prerequisite	N/A
Textbook and References	Drug Delivery: Engineering Priniciples for Drug Therapy by W. Mark Saltzman

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Course overview	
2nd we	Small molecule formulation/stability	
3rd we	Solid state chemistry	
4th we	Macromolecule formulation/stability	
5th we	Polymer chemistry/synthesis fundamentals	
6th we	Transdermal Delivery	
7th we	Controlled release devices (matrix, bioerodible)	
8th we	Controlled release devices (stimuli-sensitive)	
9th we	Mid-term Exam	
10th w	Intravenous drug delivery (targeted delivery)	
11th w	Intravenous drug delivery (PEGylation)	
12th w	Intravenous drug delivery (gene therapy)	
13th w	Oral drug delivery systems	
14th w	Lung/mucosal ddrug delivery	
15th w	Special Topics	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	03701	Hrs.:E.:Crs	0: 0: 2	Instructor	
Course Title	Korean	고분자개별연구					
	English	Individual Research in Polymer Materials					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	03731	Hrs.:E.:Crs	0: 0: 2	Instructor	
Course Title	Korean	전자재료개별연구					
	English	Individual Research in Electron Materials					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	03801	Hrs.:E.:Crs	0 : 0 : 1	Instructor	
Course Title	Korean	세미나					
	English	Seminar					

Course Outline

국내.외 연구분야의 전문가를 초청하여 최근의 연구동향 및 연구결과를 청취

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	03901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Research for Master Dissertation					

Course Outline

Research study at the M.S. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	03906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Research for Ph.D. Dissertation					

Course Outline

Research study at the Ph.D. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	09503	Hrs.:E.:Crs	4: 0: 4	Instructor	김용철
Course Title	Korean	고급생화학					
	English	Advanced Biochemistry					

Course Outline

This course will cover the molecular design of life focusing on not only its components such as DNA, RNA, protein, carbohydrate and lipid but also its strategy to use them as enzyme, building blocks etc. This course will cover how living organism produces its own energy

Prerequisite	None
Textbook and References	Biochemistry (6th Edition) Berg, J.M., Tymoczko, J.L., and Stryer, L. (2006)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	"Chapter 1. Biochemistry : An Evolving Science (Mar 2nd) Chapter 2. Protein Composition and Structure (Mar 4th))"	"Zee-Yong Park Soo Hyun Eom"
2nd we	"Chapter 3. Exploring Proteins and Proteomes (Mar 9th) Chapter 3a. Protein Structure Determination Methods (Mar 11th)"	Soo Hyun Eom
3rd we	"Chapter 4. DNA, RNA, and the Flow of Genetic Information (Mar 16th) Chapter 5. Exploring Genes and Genomes (Mar 18th)"	Sin-Hyeog Im
4th we	"Chapter 5. Exploring Genes and Genomes (Mar 23rd) Chapter 6. Exploring Evolution and Bioinformatics (Mar 25th)"	"Sin-Hyeog Im Zee-Yong Park"
5th we	Chapter 7. Hemoglobin: Portrait of a Protein in Action (Mar 30th)	Zee-Yong Park
6th we	"Chapter 8. Enzymes: Basic Concepts and Kinetics (Apr 6th) Chapter 9. Catalytic Strategies (Apr 8th)"	"Darren Williams Yong-Chul Kim"
7th we	"Chapter 10. Regulatory Strategies (Apr 13th) Chapter 11. Carbohydrates (Apr 15th)"	"Yong-Chul Kim Young-Soo Jun"
8th we	Mid-term Exam (Apr 22th)	
9th we	"Chapter 12. Lipids and Cell Membranes (Apr 27th) Chapter 13. Membrane Channels and Pumps (Apr 29th)"	"Young-Soo Jun Young-Joon Kim"
10th w	"Chapter 14. Signal-Transduction Pathways (May 4th) Chapter 15. Metabolism: Basic Concepts and Design (May 6th)"	"Yong-Chul Kim Young-Joon Kim"
11th w	Chapter 16. Glycolysis and Cglucogenesis (May 11th, 13th)	Darren Williams
12th w	"Chapter 28. DNA Replication, Repair, and Recombination (May 18h) Chapter 29. RNA Synthesis and Processing (May 20th)"	"Haihong Shen Haihong Shen"
13th w	Chapter 30. Protein Synthesis (May 25th, 27th)	Haihong Shen
14th w	Chapter 32. Sensory system (June 1st, 3rd)	Young-Joon Kim
15th w	Chapter 34. Molecular Motors (June 8th, 10th)	Young-Soo Jun
16th w	Final Exam (June 17th)	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	09505	Hrs.:E.:Crs	3: 0: 3	Instructor	해홍 심
Course Title	Korean	분자생물실험학					
	English	Methods in Molecular Biology					

Course Outline

In order to review experimental techniques required for conducting a modern biological research, basic and detailed procedures of molecular biology, protein chemistry and cell biology will be discussed.

Prerequisite	No
Textbook and References	No

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Course Introduction & General Technologies (3/3, 3/5)	W.K. Song
2nd we	Techniques related to cells and tissues (3/10, 3/12)	J. Y. Lee
3rd we	?DNA Techniques I (3/17, 3/19)	S. H. Im
4th we	DNA Techniques II (3/24, 3/26)	W. J. Park
5th we	Protein Purification (3/31, 4/2)	S. H. Eom
6th we	Proteomics and 2-dimensional electrophoresis (4/7, 4/9)	Y. J. Yoo
7th we	Mass Spectrometry (4/14, 4/16)	Z. Y. Park
8th we	Use of Laboratory Mice (4/21, 4/23)	C. Cho
9th we	Midterm Exam (4/30)	
10th w	Rapid kinetics/Spectrophotometry (5/7)	D. H. Kim
11th w	Immunohistochemistry techniques (5/12, 5/14)	M. Song
12th w	General Techniques II (5/19)	J. S. Chun
13th w	Activity Imaging of various cellular events (5/26, 5/28)	Y. J. Kim
14th w	Flow cytometry (6/2, 6/4)	C. D. Jun
15th w	HPLC (6/9, 6/11)	Y.C. Kim
16th w	RNA technology (6/16, 6/18)	H. Shen

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09606	Hrs.:E.:Crs	3: 0: 3	Instructor	송우근
Course Title	Korean	의생명과학에서의 면역학적 방법론					
	English	Immunological Methods in Biomedical Applications					

Course Outline

Thrs Course will be discussed about. ?Antigen structure, Ab structure, reaction of Ag-Ab. ?Clinical application of Ag-Ab reaction. ?Immunological methods.

Prerequisite	Immunology
Textbook and References	Lecture & discussion

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Antigenic determinant	Woo-Keun Song
2nd we	Antigenic determinant	Woo-Keun Song
3rd we	Immunological Method in Biological Application	Woo-Keun Song
4th we	Immunological Method in Biological Application	Woo-Keun Song
5th we	Analysis of antibody characteristics	Woo-Keun Song
6th we	Analysis of antibody characteristics	Woo-Keun Song
7th we	Antibody-Antigen reaction	Woo-Keun Song
8th we	Mid-term Exam	Woo-Keun Song
9th we	Antibody-Antigen reaction	Woo-Keun Song
10th w	Detection of Ab-Ag Complex	Woo-Keun Song
11th w	Detection of Ab-Ag Complex	Woo-Keun Song
12th w	Characteristics of Idrotypic Antibody	Woo-Keun Song
13th w	Clinical application of Ag-Ab coplex	Woo-Keun Song
14th w	Clinical application of Ag-Ab coplex	Woo-Keun Song
15th w	Clinical application of Ag-Ab coplex	Woo-Keun Song
16th w	Final Exam	Woo-Keun Song

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09608	Hrs.:E.:Crs	3 : 0 : 3	Instructor	전장수
Course Title	Korean	세포생화학 I					
	English	Cellular Biochemistry I					

Course Outline

This class will cover recent advances in the molecular mechanisms of cartilage degeneration involved in pathogenesis of degenerative cartilage disease such as osteoarthritis

Prerequisite	None
Textbook and References	Recent review papers and original articles.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Overview of cartilage degernation	Jang-Soo Chun
2nd we	Pathogenesis of cartilage degeneration I	Jang-Soo Chun
3rd we	Pathogenesis of cartilage degeneration II	Jang-Soo Chun
4th we	Pathogenesis of cartilage degeneration III	Jang-Soo Chun
5th we	Current topics I	Jang-Soo Chun
6th we	Current topics II	Jang-Soo Chun
7th we	Exam I	Jang-Soo Chun
8th we	Current topics III	Jang-Soo Chun
9th we	Molecules involved in cartilage degeneration I	Jang-Soo Chun
10th w	Molecules involved in cartilage degeneration II	Jang-Soo Chun
11th w	Molecules involved in cartilage degeneration III	Jang-Soo Chun
12th w	Current topics I	Jang-Soo Chun
13th w	Current topics II	Jang-Soo Chun
14th w	Current topics III	Jang-Soo Chun
15th w	Current topics IV	Jang-Soo Chun
16th w	Exam. II	Jang-Soo Chun

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09612	Hrs.:E.:Crs	3 : 0 : 3	Instructor	김용철
Course Title	Korean	의약화학 I					
	English	Medicinal Chemistry I					

Course Outline

Basic principles and techniques of medicinal chemistry for drug design and the molecular mechanisms by which drugs act in the body, will be covered.

Prerequisite	
Textbook and References	An Introduction to Medicinal Chemistry (by L. Patrick)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	Yong-Chul Kim
2nd we	Protein Structure	Yong-Chul Kim
3rd we	Drug Action at Enzymes	Yong-Chul Kim
4th we	Drug Action at Receptors	Yong-Chul Kim
5th we	Receptor Structure and Signal Transduction	Yong-Chul Kim
6th we	Nucleic Acids	Yong-Chul Kim
7th we	Drug Discovery and Drug Development	Yong-Chul Kim
8th we	Mid-Term Exam	Yong-Chul Kim
9th we	Drug Design and Drug-Target Interactions	Yong-Chul Kim
10th w	Pharmacokinetics	Yong-Chul Kim
11th w	Quantitative Structure-Activity Relationships	Yong-Chul Kim
12th w	Combinatorial Synthesis	Yong-Chul Kim
13th w	〃	Yong-Chul Kim
14th w	Computers in Medicinal Chemistry	Yong-Chul Kim
15th w	〃	Yong-Chul Kim
16th w	Final Exam	Yong-Chul Kim

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09616	Hrs.:E.:Crs	3: 0: 3	Instructor	박지용
Course Title	Korean	분석생화학					
	English	Biochemical Analysis					

Course Outline

This course is designed to teach master degree students fundamentals of common analytical techniques widely used in biochemistry and cell biology research.

Prerequisite	none
Textbook and References	Principles of Instrumental Analysis, Skoog, D. A. et. al. 5th ed.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	Zee-Yong Park
2nd we	Basics of Electric Circuits/ Signals and Noise	Zee-Yong Park
3rd we	Principles of Spectroscopic Methods	Zee-Yong Park
4th we	UV/VIS Spectrometry and its Applications	Zee-Yong Park
5th we	Fluorescence and Phosphorescence	Zee-Yong Park
6th we	Infrared Spectometry	Zee-Yong Park
7th we	Circular Dichroism Spectrometry	Zee-Yong Park
8th we	Mid-term Exam	Zee-Yong Park
9th we	Nuclear Magnetic Resonance	Zee-Yong Park
10th w	Mass Spectrometry I, II	Zee-Yong Park
11th w	Basics of Chromatographic Separations	Zee-Yong Park
12th w	Gas Chromatography	Zee-Yong Park
13th w	High Performance Liquid Chromatography	Zee-Yong Park
14th w	Capillary Electrophoresis and other types of LC	Zee-Yong Park
15th w	Automated Methods of Analysis	Zee-Yong Park
16th w	Final Exam	Zee-Yong Park

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09629	Hrs.:E.:Crs	3: 0: 3	Instructor	박우진
Course Title	Korean	인류유전학					
	English	Human Genetics					

Course Outline

This course will focus on understanding organization, expression control, and physical mapping of human genime.

Prerequisite	
Textbook and References	Human Molecular Genetics 2, Strachan and Read

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Genes in pedigrees	Woo Jin Park
2nd we	"	Woo Jin Park
3rd we	Cell-based DNA cloning	Woo Jin Park
4th we	Nucleic acid hybridization	Woo Jin Park
5th we	PCR, Sequencing, in vitro mutagenesis	Woo Jin Park
6th we	Organization of human genome	Woo Jin Park
7th we	"	Woo Jin Park
8th we	Mid-term Exam	Woo Jin Park
9th we	Human Gene Expression	Woo Jin Park
10th w	?The Sensory Syetem	Woo Jin Park
11th w	"	Woo Jin Park
12th w	Instability of the human genome	Woo Jin Park
13th w	"	Woo Jin Park
14th w	Physical and transcript mapping	Woo Jin Park
15th w	"	Woo Jin Park
16th w	Final Exam	Woo Jin Park

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09634	Hrs.:E.:Crs	3 : 0 : 3	Instructor	엄수현
Course Title	Korean	생체물리화학					
	English	Biophysical Chemistry					

Course Outline

This course will cover the general physical chemistry methods for the study of biomacromolecules.

Prerequisite	
Textbook and References	Physical Biochemistry(Principles and Applications)Shrehan,David2000

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	Soo Hyun Eom
2nd we	Chromatography	Soo Hyun Eom
3rd we	Spectroscopy Techniques 1(Intorduction)	Soo Hyun Eom
4th we	?????????"????????????2(Fluorescence)	Soo Hyun Eom
5th we	?????????"????????????3(CD/LD)	Soo Hyun Eom
6th we	?????????"????????????4(Raman/IR)	Soo Hyun Eom
7th we	?????????"????????????5(ESR)	Soo Hyun Eom
8th we	?????????"????????????6(MS)	Soo Hyun Eom
9th we	Three-dimensional Structure 1(X-Ray)	Soo Hyun Eom
10th w	?????????"??????????????2("??)	Soo Hyun Eom
11th w	?????????"??????????????3(NMR)	Soo Hyun Eom
12th w	?????????"??????????????4("??)	Soo Hyun Eom
13th w	Gel Electrophoresis	Soo Hyun Eom
14th w	Hydrodynamic methods	Soo Hyun Eom
15th w	Biocalorimetry	Soo Hyun Eom
16th w	Final Exam	Soo Hyun Eom

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09639	Hrs.:E.:Crs	3: 0: 3	Instructor	김도한
Course Title	Korean	칼슘수송 분자생리					
	English	Molecular Physiology of Ca2+ Transport					

Course Outline

This course will examine the molecular mechanisms of Ca transport through the biomembranes focussing on the structure and function of Ca transport proteins.

Prerequisite	
Textbook and References	Recent references

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Proteins involved in Ca transport	Do Han Kim
2nd we	〃	Do Han Kim
3rd we	〃	Do Han Kim
4th we	Kinetic properties of Ca transport	Do Han Kim
5th we	〃	Do Han Kim
6th we	〃	Do Han Kim
7th we	Studies on the functional domains	Do Han Kim
8th we	〃	Do Han Kim
9th we	〃	Do Han Kim
10th w	Methods used for Ca transport studies	Do Han Kim
11th w	〃	Do Han Kim
12th w	〃	Do Han Kim
13th w	Modulatory mechanisms of Ca transport	Do Han Kim
14th w	〃	Do Han Kim
15th w	〃	Do Han Kim
16th w	Final exam	Do Han Kim

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09655	Hrs.:E.:Crs	3: 0: 3	Instructor	임신혁
Course Title	Korean	면역관용 및 면역계 질환					
	English	Immune tolerance in health and disease					

Course Outline

Balance in immunity and tolerance keeps our body in health. Breakdown of immunological homeostasis is associated with immune disorders including autoimmune diseases, cancers and some viral infections. In this course we will discuss the role of T cells, B cells and antigen presenting cells both in health and disease

Prerequisite	None but recommended to take basic immunology course
Textbook and References	Immunology by Janis Kuby(W.H Freeman and company)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	T cell activation	Im, SH
2nd we	T cell differentiation	"
3rd we	Regulatory T cells : Tr1	"
4th we	Regulatory T cells : CD4+CD25+	"
5th we	Regulatory T cells : CD8+	"
6th we	Cytokines in immunity and tolerance	"
7th we	B cell maturation	"
8th we	B cell activation and proliferation	"
9th we	B cell tolerance	"
10th w	Spring Break(5.8-5.12)	"
11th w	APC in immunity and tolerance	"
12th w	Organ-specific autoimmune disease	"
13th w	Systemic autoimmune disease	"
14th w	Tumor evasion of immune system	"
15th w	Viral evasion of immune system	"
16th w	Course Summary / Final Exam(17th)	"

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09665	Hrs.:E.:Crs	3: 0: 3	Instructor	조정희
Course Title	Korean	수정조절특론					
	English	Current topics on fertilization					

Course Outline

Fertilization is a central research field in reproduction. In this course, current research results from studies on mammalian fertilization will be discussed.

Prerequisite	
Textbook and References	Fertilization (edited by Daniel Hardy), Academic Press, 2002

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Spermatogenesis	Cho C
2nd we	Sperm migration	Cho C
3rd we	Sperm maturation	Cho C
4th we	Oogenesis	Cho C
5th we	Egg migration (ovulation)	Cho C
6th we	Hormonal control of reproduction	Cho C
7th we	Mid term Exam	Cho C
8th we	Sperm-egg cumulus cell penetration (1)	Cho C
9th we	Sperm-egg cumulus cell penetration (2)	Cho C
10th w	Sperm-egg zona interaction (1)	Cho C
11th w	Sperm-egg zona interaction (2)	Cho C
12th w	Sperm-egg plasma membrane binding (1)	Cho C
13th w	Sperm-egg plasma membrane binding (2)	Cho C
14th w	Sperm-egg plasma membrane fusion (1)	Cho C
15th w	Sperm-egg plasma membrane fusion (2)	Cho C
16th w	Final Exam	Cho C

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09670	Hrs.:E.:Crs	3: 0: 3	Instructor	전창덕
Course Title	Korean	세포부착 및 이동연구					
	English	Cell adhesion & migration					

Course Outline

In immune system, adhesion and migration of cells are related with the immune surveillance. Indeed, immune cells are not fixed but continuously circulated whole body so as to eliminate invaded microorganisms or neoplastic cancer cells. However, the molecular mechanisms involving in immune cell adhesion and migration are not currently fully defined. In this class, we will study the molecular nature of cell adhesion and migration in immune system

Prerequisite	Immunology
Textbook and References	Immunology, fifth edition, Richard A Goldsby

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Historical perspective	Chang-Duk Jun
2nd we	Molecules in immune cell adhesion	Chang-Duk Jun
3rd we	Molecules in other cell adhesion	Chang-Duk Jun
4th we	Integrins I	Chang-Duk Jun
5th we	Integrins II	Chang-Duk Jun
6th we	Adhesion molecules I	Chang-Duk Jun
7th we	Adhesion molecules II	Chang-Duk Jun
8th we	Mid-term Exam	Chang-Duk Jun
9th we	Cytoskeletons I	Chang-Duk Jun
10th w	Cytoskeletons II	Chang-Duk Jun
11th w	Signaling through adhesion molecules I	Chang-Duk Jun
12th w	Signaling through adhesion molecules II	Chang-Duk Jun
13th w	Methods for cell adhesion & migration study	Chang-Duk Jun
14th w	Molecular imaging of cell migration	Chang-Duk Jun
15th w	Discussion	Chang-Duk Jun
16th w	Final Exam	Chang-Duk Jun

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09674	Hrs.:E.:Crs	3: 0: 3	Instructor	송미령
Course Title	Korean	신경발생학 연구동향					
	English	Trends in Neural Development					

Course Outline

This course covers recent advances in the field of neural development including neuronal patterning, cell specification, cell migration, and axon navigation. A combined lecture and seminar presentation with open discussions format will be used.

Prerequisite	No
Textbook and References	No

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Overview of Neural Development	
2nd we	Presentation & Discussion	
3rd we	Dorsal-Ventral Patterning	
4th we	Presentation & Discussion	
5th we	Neural Induction	
6th we	Presentation & Discussion	
7th we	Neural Tube Patterning	
8th we	Presentation & Discussion	
9th we	Neural Specification I	
10th w	Presentation & Discussion	
11th w	Movement and Migration	
12th w	Presentation & Discussion	
13th w	Axonal Navigation	
14th w	Presentation & Discussion	
15th w	Synapse Formation I	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09695	Hrs.:E.:Crs	3: 0: 3	Instructor	이주영
Course Title	Korean	선천성면역리셉터 조절론					
	English	Innate Immune Receptors					

Course Outline

To understand how the exogenous and endogenous materials regulate innate immunity and what are the intracellular signaling pathways inducing innate immune responses. This course will enhance our knowledge as to how the innate immunity is related to the development and progress of chronic diseases.

Prerequisite	
Textbook and References	Immunology, Handbook of Cell signaling, published articles

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	An introduction	Joo Young Lee
2nd we	The discovery of Toll-like receptor	Joo Young Lee
3rd we	The isotype and ligands of Toll-like receptors	Joo Young Lee
4th we	The endogenous agonists of Toll-like receptors	Joo Young Lee
5th we	The adaptors of Toll-like receptors and their roles	Joo Young Lee
6th we	The kinases activated by Toll-like receptors	Joo Young Lee
7th we	The transcription factors of Toll-like receptors	Joo Young Lee
8th we	Mid-term Exam	Joo Young Lee
9th we	The secondary signaling mediated through IFN receptors	Joo Young Lee
10th w	Negative regulators of Toll-like receptors	Joo Young Lee
11th w	Nods; intracellular pathogen recognition receptors	Joo Young Lee
12th w	Innate immune receptors against virus	Joo Young Lee
13th w	Cellular specificity of innate immune receptors	Joo Young Lee
14th w	Chronic diseases and innate immune receptors	Joo Young Lee
15th w	The regulators of innate immune receptors	Joo Young Lee
16th w	Final Exam	Joo Young Lee

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09696	Hrs.:E.:Crs	3: 0: 3	Instructor	해홍 심
Course Title	Korean	리보핵산생물학					
	English	RNA biology					

Course Outline

The course will focus on the function of RNA, functional mechanisms of RNA and experimental approaches of RNA.

Prerequisite	none
Textbook and References	none

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	functions of RNA (1)	Haihong Shen
2nd we	functions of RNA (2)	Haihong Shen
3rd we	functions of RNA (3)	Haihong Shen
4th we	Regulatory mechanisms of RNA (1)	Haihong Shen
5th we	Regulatory mechanisms of RNA (2)	Haihong Shen
6th we	Regulatory mechanisms of RNA (3)	Haihong Shen
7th we	Regulatory mechanisms of RNA (4)	Haihong Shen
8th we	mid-term exam	Haihong Shen
9th we	experimental approaches on RNA (1)	Haihong Shen
10th w	experimental approaches on RNA (2)	Haihong Shen
11th w	experimental approaches on RNA (3)	Haihong Shen
12th w	experimental approaches on RNA (4)	Haihong Shen
13th w	experimental approaches on RNA (5)	Haihong Shen
14th w	experimental approaches on RNA (6)	Haihong Shen
15th w	experimental approaches on RNA (7)	Haihong Shen
16th w	final exam	Haihong Shen

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	09698	Hrs.:E.:Crs	3: 0: 3	Instructor	김영준
Course Title	Korean	신경생물학 III					
	English	Neurobiology III					

Course Outline

This course provides fundamental understandings on how neural circuits control animal behaviors. Major topics will include sensory perceptions, motor controls, behavioral plasticity.

Prerequisite	Neurobiology I, Neurobiology II, permission from instructor
Textbook and References	Behavioral Neurobiology The Cellular Organization of Natural Behavior, Thomas J. Carew, 2000 Sinauer Associates, Inc., Sunderland, Massachusetts

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction: Neurons as the building blocks of behavior	Young-Joon Kim
2nd we	Sensory Perception: Echolocation in Bats	Young-Joon Kim
3rd we	Sensory Perception: Prey Location in Barn Owls	Young-Joon Kim
4th we	Sensory Perception: Feature Analysis in Toads	Young-Joon Kim
5th we	Sensory Perception: Journal study	Young-Joon Kim
6th we	Motor controls: Mate Calling in Crickets	Young-Joon Kim
7th we	Motor controls: Flight in Locusts	Young-Joon Kim
8th we	Motor controls: Escape Behavior in Crayfish	Young-Joon Kim
9th we	Motor controls: Journal study	Young-Joon Kim
10th w	Behavioral Plasticity: The development of Learning in Songbirds	Young-Joon Kim
11th w	Behavioral Plasticity: Associate Learning in Honeybees	Young-Joon Kim
12th w	Behavioral plasticity: Learning and Memory in Aplysia	Young-Joon Kim
13th w	Behavioral plasticity: Molecular genetics of learning and memory	Young-Joon Kim
14th w	Behavioral plasticity: Spatial Navigation in Rats	Young-Joon Kim
15th w	Behavioral plasticity: Journal study	Young-Joon Kim
16th w	Final exam	Young-Joon Kim

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	09801	Hrs.:E.:Crs	0 : 0 : 1	Instructor	김영준
Course Title	Korean	학과세미나					
	English	Departmental Seminar					

Course Outline

본원 교수 및 외부인사를 세미나 연사로 초빙하여 첨단 생물학 전분야에 대한 이해증진을 목적으로 한다.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	09802	Hrs.:E.:Crs	0 : 0 : 1	Instructor	다렌윌리암스
Course Title	Korean	연구세미나					
	English	Research Seminar					

Course Outline

석?박사과정 학생들이 본인들의 연구결과를 발표 토의함으로서 장차의 연구계획과 활동에 반영함을 목적으로 한다.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	09901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Thesis Research / M.S.					

Course Outline

석사학위 논문을 위한 연구

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	09906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Thesis Research / Ph.D.					

Course Outline

박사학위 논문을 위한 연구

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07503	Hrs.:E.:Crs	3: 0: 3	Instructor	한승희
Course Title	Korean	환경화학					
	English	Environmental Chemistry					

Course Outline

Fundametal and advanced environmental chemistry is studied including, reaction kinetics, thermodynamics, equilibrium chemisty, acid-base chemistry, oxidation and reduction, and electrochemistry related to natural and environmental processes.

Prerequisite	No required
Textbook and References	Zumdahl, Chemistry, 4th, Honghton Miffliu.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Types of Chemical Reactions and Soultion Stoichiometry	
2nd we	Gases	
3rd we	Thermochemistry	
4th we	Bonding : General Concepts	
5th we	Covalent Bonding : Orbitals & 1st Exam.	
6th we	Liquids and Solids	
7th we	Propertices of Solution	
8th we	Chemical Kinetics	
9th we	Chemical Equilibrium	
10th w	Acids an Bases & 2nd Exam	
11th w	Applications of Aqueous Equilibria	
12th w	Spontaneity, Entropy, and Free energy	
13th w	Electrochemistry	
14th w	Transition Metals and Coordination Chemistry	
15th w	Organic Chemistry	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07504	Hrs.:E.:Crs	3: 0: 3	Instructor	김준하
Course Title	Korean	환경이동현상					
	English	Environmental Transport Phenomena					

Course Outline

The objective of this course is to build up the mathematical base and explain the principle about transport of momentum, energy, and mass.

Prerequisite	Not required
Textbook and References	1) Transport Phenomena (2nd edit), R.B. Bird, W.E. Stewart, and E.N. Lightfoot, Hohn Wiley & Sons, Inc. 2) Fluid Mechanics, Streeter et al., Mcgraw-Hill 3) Differential Eqauation (4th ed.), by D.G. Zill & M.R. Cullen

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Newton`s Law, Fourier`s Law and Fick`s Law	
2nd we	Dimensionless analysis	
3rd we	Vector operation	
4th we	Tensor operation	
5th we	Differential opreation & Integral theorem for Vector & Tensor	
6th we	Mid-term examination	
7th we	Generalization of basic laws for the diffusion	
8th we	Equation of Continuity	
9th we	Equation of Motion, Energy, and Continuity in multicomponent system	
10th w	Substantial derivatives on Equation of Motion, Energy, and Continuity	
11th w	Special forms of Equation of Motion	
12th w	Special forms of Equation of Energy	
13th w	Special forms of Equation of Continuity	
14th w	Problem Based Learing (PBL)	
15th w	Problem Based Learing (PBL) and Team Presentation	
16th w	Final Examination	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07505	Hrs.:E.:Crs	3: 0: 3	Instructor	허호길
Course Title	Korean	환경미생물학					
	English	Environmental Microbiology					

Course Outline

Attempted to limit the topics covered to those that we consider essential to the quantitative expression and mechanistic understanding of the microbial activities that occur in natural environmentas or processed engineered for the purpose of exerting useful control over the natureal environment. Approach is more process-Oriented than species-Oriented

Prerequisite	None
Textbook and References	1. Microbiology for Environmental Scientists and Engineers-Gaudy & Gaudy, Mcgraw Hill 2. The Microbial World-Stanier, Ingraham, Wheelis & painter, Prentics Hall 3. Microbiology : An Introduction - Tortora, Funker $ Case, Benjamin/cummings Publishing Co.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	The life-support system	
3rd we	Chemical Composition of cells & The nature of Organic matter	
4th we	The Microorganisms	
5th we	Nutrition and Growth Conditions	
6th we	Quantitative Description of Growth	
7th we	Energy generation and Utilization in Biological System	
8th we	Metabolic Classification of Microorganisms	
9th we	The Central Pathways of Metabolism	
10th w	Aerobic Metabolism	
11th w	Aerobic Metabolism	
12th w	Anaerobic Metabolism	
13th w	Anaerobic Metabolism	
14th w	Anaerobic Metabolism	
15th w	Respose to change in the Environment	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	07506	Hrs.:E.:Crs	1: 0: 1	Instructor	정철
Course Title	Korean	환경공학 세미나					
	English	Environmental Engineering Seminar					

Course Outline

Invitede speakers and visiting lecturers give talks in current issues of Environmental Engineering.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07606	Hrs.:E.:Crs	3: 0: 3	Instructor	문승현
Course Title	Korean	환경공학특론 I					
	English	Special Topics in Environmental Engineering I					

Course Outline

This course deals with application of membranes for energy conversion systems, including understanding of electron and ion transport through conducting membranes. Uses of membranes and conducting thin

Prerequisite	No Prerequisite
Textbook and References	Handouts

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Chap. 1: Introduction to membranes	
2nd we	Chap. 1: Introduction to membranes	
3rd we	Chap. 2: Electron vs. ionic conducting/thermodynamics	
4th we	Chap. 2: Electron vs. ionic conducting/materials	
5th we	chap. 3: Ion exchange membrane processes	
6th we	chap. 3: Ion exchange membrane processes	
7th we	chap. 3: Ion exchange membrane processes	
8th we	Chap. 4: Membranes for fuel cells	
9th we	Chap. 4: Membranes for fuel cells/enzyme fuel cells	
10th w	Chap. 5: Conducting layers for solar cells	
11th w	Chap. 5: Conducting layers for solar cells	
12th w	Chap. 6: Membranes for energy storage/batteries	
13th w	Chap. 6: Membranes for energy storage/capacitors, RFB	
14th w	Chap. 7: Complex energy conversion systems	
15th w	Term project presentation	
16th w	Term project presentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07624	Hrs.:E.:Crs	3: 0: 3	Instructor	조재원
Course Title	Korean	지속가능 수처리					
	English	Sustainable Water Treatment					

Course Outline

지구의 생태를 고려한 지속가능한 수처리공정 가능기술을 다룬다. This course encompasses potential water treatment technologies which consider global and local sustainability. It covers drinking water and wastewater reclamation treatment processes, with underlying chemistries being focused as well.

Prerequisite	None
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Aquatic and organic chemistry, and pharmaceutical issue in water	
2nd we	Chemical processes, focussing coagulation	ferric coagulation experiment
3rd we	Particle, colloid, and NOM removal using various chemicals	
4th we	Natural organic matter (NOM) issues in water treatment	
5th we	Removal processes for NOM	NOM analyzing
6th we	Filtration theory	
7th we	Sand & activated carbon adsorption	Filtration
8th we	1st examination	
9th we	Membrane process theory	
10th w	Membrane: transport and fouling	Field test
11th w	Oxidation and disinfection	
12th w	Taste and odor issues in water treatment	
13th w	Natural system for water treatment	
14th w	Wetland Application for wastewater treatment	Field trip & sampling
15th w	Desalination	
16th w	Term project presentation	17th Final Exam

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07654	Hrs.:E.:Crs	3: 0: 3	Instructor	데트레프 뮬러
Course Title	Korean	기상학개론					
	English	Introduction to Meteorology					

Course Outline

This course gives an introduction to meteorology and the understanding of meteorological phenomena. Topics deal with fundamental meteorological parameters: pressure, temperature, humidity, wind. Another part of the lecture is about observational techniques of meteorological parameters. Specific focus will be given to satellite meterology.

Prerequisite	None
Textbook and References	R.R. Rogers and M.K. Yau: A short course in Cloud Physics, Pergamon , 1989. R. B. Stull: Meteorology for Scientists and Engineers, Brooks Cole,1999. F.K. Lutgens, E.J. Tarbuck, D.Tasa: The Atmosphere: an introduction to meteorology, Prentice Hall, 2009.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction: meteorology versus climate, history of meteorology	Detlef Mueller
2nd we	Meteorology: basic concepts	Detlef Mueller
3rd we	Equation of State: pressure, temperature, etc.	Detlef Mueller
4th we	Equation of State, continued: basic concepts of thermodynamics, adiabatic processes	Detlef Mueller
5th we	Equation of State, continued: water vapor, stratification of the atmosphere with condensation	Detlef Mueller
6th we	Mid-term 1	Detlef Mueller
7th we	Stratification, precipitation	Detlef Mueller
8th we	Wind, 1: general concepts, local wind phenomena	Detlef Mueller
9th we	Wind, 2: general circulation	Detlef Mueller
10th w	Introduction to boundary layer meteorology and micrometeorology	Detlef Mueller
11th w	Ground-based instruments for measurements of meteorological parameters	Detlef Mueller
12th w	Mid-term 2	Detlef Mueller
13th w	Satellite meteorology, 1 : introduction, wind, temperature	Detlef Mueller
14th w	Satellite meteorology, 2: clouds, radar, energy budget, gps based methods	Detlef Mueller
15th w	Synopsis: introduction	Detlef Mueller
16th w	Clouds: introduction, pollution, weather, climate	Detlef Mueller

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07657	Hrs.:E.:Crs	3: 0: 3	Instructor	정철
Course Title	Korean	대기물리					
	English	Atmospheric Physics					

Course Outline

The major objective of this course is to understand the physical characteristics of air pollution phenomena.

Prerequisite	NO
Textbook and References	G. Stephens, "Remote Sensing of the Lower Atmosphere", Oxford University Press, 1994

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	The Nature of Electromagnetic Radiation	
3rd we	Radiation Laws	
4th we	Basic Environmental Spectroscopy	
5th we	Microscopic Interactions	
6th we	Macroscopic Interactions	
7th we	Particle Absorption and Scattering	
8th we	Mid Term	
9th we	Passive Sensing Using Extinction Based Methods	
10th w	Passive Sensing Using Scattering Methods	
11th w	Passive Sensing Using Emission Based Methods	
12th w	Active Sensing I	
13th w	Active Sensing II	
14th w	Active Sensing III	
15th w	Applications	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07674	Hrs.:E.:Crs	3: 0: 3	Instructor	김경웅
Course Title	Korean	토양환경화학					
	English	Environmental Soil Chemistry					

Course Outline

This course describes soil chemistry within the bounds of established chemical principles. The emphasis is on environmental topics recognizing that a major challenge of the future is to protect the soil ecosystem from the pollutants of an industrial society.

Prerequisite	
Textbook and References	(1) Sparks, D. (1995) Environmental Soil Chemistry. Academic Press, San Diego. (2) McBride, M. B. (1994) Environmental Chemistry of Soils. Oxford Univ. Press, New York. (3) Adriano, D. (2001) Trace Elements in Terrestrial Environments (2nd Ed.). Springer, New York.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Environmental Soil Chemistry : Overview	
3rd we	Inorganic Soil Components	
4th we	Chemistry of Soil Organic Matter	
5th we	Soil Solution-Solid Phase Equlibria	
6th we	Sorption Phenomena on Soils (I)	
7th we	Sorption Phenomena on Soils (II)	
8th we	Mid-term Exam	
9th we	Sorption Phenomena on Soils (III)	
10th w	Ion Exchange Processes (I)	
11th w	Ion Exchange Processes (II)	
12th w	Kinetics of Soil Chemical Processes (I)	
13th w	Kinetics of Soil Chemical Processes (II)	
14th w	Redox Chemistry of Soil Acidity	
15th w	The Chemistry of Soil Acidity	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07679	Hrs.:E.:Crs	3: 0: 3	Instructor	김상돈
Course Title	Korean	독성변화이론					
	English	Theory of toxicity changes					

Course Outline

유기/무기 오염원의 생물학적 활동도는 환경공학분야에서 다루는 환경화학물질의 특성과 반응현상의 이론을 공부하는 과목으로서, 자연계에 노출된 환경오염물질의 물리, 화학, 생물학적 반응에 의한 독성변화 등을 다룬다. Theory of toxicity changes include rigorous studies on characteristics and interactions of pollutants with materials in environmental systems such as air, water, and soil phases. This course also includes theories for specific interactions of pollutants in physical, chemical and biological aspects.

Prerequisite	환경독성학 (Environmental Toxicology), 수질화학 (Water Chemistry)
Textbook and References	Bioavailability: Physical, Chemical and Biological Interactions, Lewis Publishers, Inc.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction?	
2nd we	Physicochemical Factors Affecting Bioavailability in Freshwater	
3rd we	Physicochemical Factors Affecting Bioavailability in Seawater	
4th we	Synopsis on Physicochemical Factors	
5th we	Ligand and Bioavailability of Metals	
6th we	Synopsis on Inorganic Contaminants	
7th we	Interaction of Organic Pollutants with Inorganic Solids	
8th we	Interaction of Organic Pollutants with Particulate and DOM	
9th we	Influences of Particulate and DOM on the Bioavailability	
10th w	Photochemical Aspects of Bioavailability	
11th w	Redox Process on Metal Mobility in Sediments	
12th w	Sediment-Water Exchange Processes	
13th w	Bioavailability in Dynamic Water-Sediment Environments	
14th w	Contaminant Kinetics	
15th w	Physiological and Biochemical Mechanisms in Fish	
16th w	Summary and Conclusions	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	07690	Hrs.:E.:Crs	3: 0: 3	Instructor	이재영
Course Title	Korean	환경공학특론 II					
	English	Special Topics in Environmental Engineering II					

Course Outline

The objective of this course is the discussion of the many diverse roles of electrocatalysis based on surface and interface electrochemistry.

Prerequisite	
Textbook and References	Lecture materials will be delivered

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Course introduction	
2nd we	Surface electrochemistry I	
3rd we	Surface electrochemistry II	
4th we	Surface electrochemistry III	
5th we	Interfacial electrochemistry I	
6th we	Interfacial electrochemistry II	
7th we	Interfacial electrochemistry III	
8th we	Mid exam	
9th we	Electrocatalysis in Fuel cells I	
10th w	Electrocatalysis in Fuel cells II	
11th w	Hydrogen and oxygen from water I	
12th w	Hydrogen and oxygen from water II	
13th w	Fuels from CO2	
14th w	Thermoelectric I	
15th w	Thermoelectric II	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	07701	Hrs.:E.:Crs	0: 0: 2	Instructor	
Course Title	Korean	개별연구 I					
	English	Individual Research I					

Course Outline

Topics covered depend on the faculty who offer the course and student interest.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	07702	Hrs.:E.:Crs	0: 0: 2	Instructor	
Course Title	Korean	개별연구 II					
	English	Individual Research II					

Course Outline

Topics covered depend on the faculty who offer the course and student interest.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	07901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Research for Master Dissertation					

Course Outline

Research study at the M.S. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	07906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Research for Ph.D. Dissertation					

Course Outline

Research study at the Ph.D. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	11001	Hrs.:E.:Crs	1: 0: 0	Instructor	송계휴,이흥노,김소희
Course Title	Korean	정보기전 콜로퀴움					
	English	Information & Mechatronics Colloquium					

Course Outline

Information & Mechatronics colloquium introduces a broad range of information and communication and mechatronics research to M.S. and Ph.D students. It is consisted of about 10 seminars by the expert in communication and computer network, photonics, semiconductor, signal processing, computer science. robotics and control and mechanical systems design and micromechatronics.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11412	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이종수
Course Title	Korean	초고주파 증폭기 설계					
	English	Microwave Amplifier Design					

Course Outline

This is the advanced class for the design of wireless transmitter in digital communication systems. This course covers the basic microwave amplifier designs including a parameters, matching theory and transmitter architecture for wireless communications. Also, the fundamental theory of analysis and design for the power amplifier

Prerequisite	None
Textbook and References	Microwave Transistor Amplifiers by Guillermo Gonzalez(Prentice Hall, 2nd edition), RF power amplifiers for wireless communications by Steve C. Cripps (Artech House, 2nd edition)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Presentation of Two Port Networks	
2nd we	Matching networks and signal flow graphs	
3rd we	Matching networks and signal flow graphs	
4th we	Microwave Transistor amplifier designs	
5th we	Introduction to RF Power amplifier	
6th we	Linear power amplifier	
7th we	Linear power amplifier	
8th we	Switching mode power amplifier	
9th we	Switching mode power amplifier	
10th w	High efficiency amplifier modes	
11th w	High efficiency amplifier modes, Class AB	
12th w	High efficiency amplifier modes, Class AB	
13th w	Advanced power amplifier design	
14th w	Overdriven Power amplifier	
15th w	Nonlinearity in power amplifier	
16th w	Nonlinearity in power amplifier	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11420	Hrs.:E.:Crs	3: 0: 3	Instructor	광몽 심
Course Title	Korean	다중 Agent 시스템					
	English	Fundamentals of Multiagent Systems					

Course Outline

This basic elective course introduces the fundamental principles, problem-solving techniques, and applications of multiagent systems. Topics include interactions, cooperation, coordination, organizations, negotiations, cooperative problem solving in multiagent systems, and state-of-the-art agent technologies (e.g., agreement technology, agent-based Grid computing, biologically-inspired agents, cooperative information agents, e-commerce agents, etc.). Problem-solving techniques in multiagent systems that can significantly enhance students' ability to build complex software systems will also be covered.

Prerequisite	rogramming skills, preferably in C++ and/or C and/or Java. Some background in Artificial Intelligence is recommended but not essential.
Textbook and References	1. Jacques Ferber, Multi-Agent Systems: An Introduction to Distributed Artificial Intelligence, Addison Wesley, 1999 2. Michael Wooldridge, An Introduction to MultiAgent Systems, Wiley, 2002

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Principles of Multiagent Systems: Introduction and Definitions	
2nd we	Foundations of Multiagent Systems I: Interactions and Cooperations	
3rd we	Foundations of Multiagent Systems II: Multiagent Organizations	
4th we	Foundations of Multiagent Systems III: Coordination	
5th we	Foundations of Multiagent Systems IV: Cooperative Problem Solving	
6th we	Foundations of Multiagent Systems V: Negotiation	
7th we	Agent Technology I: Agreement Technology	
8th we	Project proposal presentations	
9th we	Agent Technology II: Agent-based Grid Computing	
10th w	Agent Technology III: Biologically-inspired Agents and Collective Intelligence	
11th w	Agent Technology IV: Cooperative Information Agents Part 1	
12th w	Agent Technology V: Cooperative Information Agents Part 2	
13th w	Agent Technology VI: E-commerce Agents	
14th w	Project Presentations	
15th w	Revision	
16th w	Examinations	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11421	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이동선
Course Title	Korean	고효율 고체 조명					
	English	Solid-State Lighting					

Course Outline

LEDs have drawn people's attention because of its very high emission dfficiency and environment-friendly nature. In this course, basic principles and theories of LEDs and applications to solid-state lighting will be given. And also some basics of lighting (illumination) will be lectured.

Prerequisite	
Textbook and References	Introduction to Solid State Lighting by Zukauskas et al. Light-Emitting Diodes by E. F. Schubert

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	History of Lighting	
2nd we	Lighting Economy & Environmental Needs	
3rd we	Definitions of Terms in Vision, Photometry and Radiometry	
4th we	Basic of All Solid-State Lamps	
5th we	Radiative and Non-radiative Recombinations	
6th we	LED Basics - Optical? Properties	
7th we	LED Basics - Electrical Properties	
8th we	Midterm	
9th we	Efficiency	
10th w	High internal efficiency LED designs	
11th w	Light extractions from LED	
12th w	Packaging	
13th w	White-light sources based on LEDs	
14th w	White light sources based on wavelength converters	
15th w	Various Applications	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11422	Hrs.:E.:Crs	3: 0: 3	Instructor	윤국진
Course Title	Korean	고차원 영상 이해 및 처리					
	English	High-Level image understanding & processing					

Course Outline

The course covers advanced topics in image processing/understanding, computer vision, and pattern recognition, aiming at providing a full detail of advanced concepts, methods, and tools for vision science and its applications. Topics include image features and correspondence, 3D reconstruction of static/dynamic scenes (multiple view geometry and matching, motion analysis and tracking), object/face/action recognition, color constancy and reflection, image segmentation, and recent geometric and statistical methods for practical applications. For each topic, classic theories and algorithms will be briefly given, followed by advanced theories and techniques. To achieve an in-depth understanding of the most significant current approaches, computer projects and/or homeworks will be assigned.

Prerequisite	Digital Image Processing, Linear Algenbra
Textbook and References	-Multiple View Geometry in Computer Vision, 2nd Ed., R. Hartley & A. Zisserman, Cambridge Univ. Press -Computer Vision, George Stockman & Linda G. Shapiro, Prentice Hall -Computer Vision: A Modern Approach, David A. Forsyth and Jean Ponce, Prentice Hall -http://homepages.inf.ed.ac.uk/rbf/CVonline

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction?	
2nd we	Multi-view geometry	
3rd we	Image feature and correspondence	
4th we	Stereo matching	Term-project proposal
5th we	3D reconstruction using multiple images	
6th we	Motion analysis and tracking	
7th we	Image registration	
8th we	Midterm exam	
9th we	Image segmentation	
10th w	Color constancy, reflection analysis, photometric stereo	Interim presentation
11th w	Face detection and recognition	
12th w	Object classification and recognition	
13th w	Action Recognition	
14th w	Video applications	
15th w	Applications: Project Presentation	Presentation & Demo
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11602	Hrs.:E.:Crs	3 : 0 : 3	Instructor	송계휴
Course Title	Korean	전자기학					
	English	Electromagnetics					

Course Outline

Electrostatics in dielectric media, Currents and magnetic fields, Origin of electricity and magnetism, Maxwell's equations, Propagation of electromagnetic wave, Radiation of electromagnetic wave.

Prerequisite	
Textbook and References	Foundations of electromagnetic theory, 4th edition, J. R. Reitz, F. J. Milford, R. W. Christy Classical Electrodynamics, 3rd ed. John David Jackson Introduction to Electromagnetic Theory, Tal L. Chow Engineering electromagnetics, 5th edition, W. H. Hayt, Jr.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to Electrostatics	
2nd we	Electrostatic energy and potential	
3rd we	Electrostatic field in dielectric and conducting media	
4th we	Solutions of some electrostatic problems	
5th we	Introduction to Magnetism	
6th we	Magnetic properties of matter	
7th we	Magnetic energy, force, and inductance	
8th we	Midterm Exam	
9th we	Boundary value problems in magnetism	
10th w	Plasma Physics	
11th w	Maxwell`s equations	
12th w	Electromagnetic waves	
13th w	Polarization and propagation	
14th w	Introduction to cavity and waveguide	
15th w	Dispersion and dielectric constant	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11603	Hrs.:E.:Crs	3 : 0 : 3	Instructor	전성찬
Course Title	Korean	고급 이산수학					
	English	Advanced Discrete Mathematics					

Course Outline

The course aims to provide the students with mathematical reasoning as well as in-depth basic understanding from Discrete Mathematics found in Computer Science and Engineering.

Prerequisite	None
Textbook and References	Handbook of Discrete and Combinatorial Mathematics - K. H. Rosen et al.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Foundations : Logic, Set Theory, Functions	
2nd we	Number Theory : Basic Concepts, Factorization, Linear Congruence	Quiz
3rd we	Coding Theory and Cryptology : Basics, Public Key, RSA	
4th we	Algebraic Structures : Method of Proof, Matrix Theory, Groups, Rings, Fields	Midterm1
5th we	Algebraic Structures II : Lattices, Boolean Algebra, Boolean Function, Circuit Design & Minimization	
6th we	Counting Methods : Basic Techniques, Permutations, Combinations, Inclusion/Exclusion	Quiz
7th we	Discrete Probability : Fundamental Concepts, Random Walks	
8th we	Sequences : Special Sequences, Generating Functions, Recurrence Relations	Midterm2
9th we	Graph Theory I : Graph Models, Directed Graphs	
10th w	Graph Theory II : Isomorphic Invariants, Some Graph Theories	Quiz
11th w	Graph Theory III : Graph Coloring, Weighted Graphs	
12th w	Trees I : Tree Structures, Tree Traversal, Applications of Tree	Midterm3
13th w	Trees II : Spanning Tree, Minimun Spanning Tree	
14th w	Discrete Optimization : Linear Programming, Packing and Covering	Quiz
15th w	Computer Science : Computability, Complexity, Sorting and Searching	
16th w	Wrap-up : Review of the Course	Final Exam

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11610	Hrs.:E.:Crs	3 : 0 : 3	Instructor	김기선
Course Title	Korean	통신신호 처리					
	English	Communication Signal Processing					

Course Outline

This course covers several issues in LDPC codec, which will be very useful for further communications engineering system. In this course an effort will be made to impart an understanding of LDPC codec system, design of LDPC codes, LDPC encoder, LDPC decoder, which are the key blocks to realize a LDPC codec system.

Prerequisite	The learned courses for graduates: Error Correct Coding
Textbook and References	Text: Robert H. Morelos-Zaragoza, The Art of Error Correcting Coding, 2002 John Wiley & Sons Ltd References: The recent papers on LDPC codec.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Hamming. Golay and Reed-Muller codes	
3rd we	Binary cyclic codes and BCH codes	
4th we	Binary cyclic codes and BCH codes	
5th we	Binary convolutional codes	
6th we	Binary convolutional codes	
7th we	Soft-decisiondecoding	
8th we	Midterm exam	
9th we	Iteratively decodable codes	
10th w	Iteratively decodable codes	
11th w	Construction of good LDPC codes	
12th w	LDPC encoding	
13th w	LDPC decoding algorithms	
14th w	LDPC decoding algorithms	
15th w	Evaluation of LDPC codes	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11616	Hrs.:E.:Crs	3: 0: 3	Instructor	호요성
Course Title	Korean	데이터압축 이론					
	English	Data Compression					

Course Outline

TThis course provides advanced techniques of video compression for multimedia applications. Main topics of this course are entropy coding, predictive coding, transform, quantization, and several international video coding standards, including MPEG-1/2/4 and H.264/AVC. We also analyze the source code of H.264/AVC.

Prerequisite	Digital Image Processing, C/C++ Language
Textbook and References	1. H.264 and MPEG-4 Video Compression (by I. Richardson) 2. Digital Video Compression (by P. Symes)

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Video Formats and Quality	
2nd we	Concepts of Video Coding	
3rd we	Video Model	
4th we	Entropy Coding	
5th we	Predictive Coding	
6th we	Transform	
7th we	Quantization	
8th we	Video Coding Standards	
9th we	MPEG-1 Standard	
10th w	MPEG-2 Standard	
11th w	MPEG-4 Standard	
12th w	H.264/MPEG-4 AVC	
13th w	H.264/AVC Code Analysis	
14th w	H.264/AVC CAVLC and CABAC	
15th w	Applications	
16th w	Next Generation Codecs	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11624	Hrs.:E.:Crs	3: 0: 3	Instructor	이흥노
Course Title	Korean	무선통신					
	English	Wireless Communications					

Course Outline

This course focuses on basic topics of wireless communications such as following: - Introduction to indoor/outdoor wireless communications systems - Characterization of indoor/outdoor radio propagation in UHF band - Fundamentals on operations of cellular systems - Multiple access techniques and also on advanced topics involved with: - Smart antenna systems - OFDM systems ? Ultra WideBand multiple access systems

Prerequisite	None
Textbook and References	Textbook(T.S.Rappaport, Wireless Communications: Principles and Practice, Prentice Hall), Handouts, related papers in the literature

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction to indoor/outdoor communication systems	
2nd we	Characterization of indoor/outdoor radio propagation in UHF band / Discussions on term project	
3rd we	Characterization of indoor/outdoor radio propagation in UHF band	
4th we	Fundamentals on operations of cellular systems	
5th we	Fundamentals on operations of cellular systems	
6th we	Multiple access techniques : FDMA, TDMA, and CDMA	
7th we	Multiple access techniques : other protocols / Intermediate reporting on termproject	
8th we	Midterm exam	
9th we	Smart antenna systems : Fundamentals	
10th w	Smart antenna systems : Advanced theories	
11th w	OFDM systems : Fundamentals	
12th w	OFDM systems : Advanced theories	
13th w	Ultra WideBand Multiple access systems : Fundamentals	
14th w	Ultra WideBand Multiple access systems : Adv. Theories	
15th w	Final reporting on termproject	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11627	Hrs.:E.:Crs	3 : 0 : 3	Instructor	송종인
Course Title	Korean	아나로그 집적회로 설계					
	English	Analog Integrated Circuit Design					

Course Outline

This course covers analog integrated circuit design including models for passive and active elements, design and analysis of basic building blocks used for integrated circuits.

Prerequisite	Basic electronic circuit design, Basic semiconductor device physics
Textbook and References	P. Gray, Analysis and design of analog integrated circuits, 3rd ed. John Wiley & Sons, Inc.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to integrated circuit design	
2nd we	Models for IC active devices	
3rd we	Integrated circuit technologies	
4th we	Single- and Multiple-transistor amplifiers	
5th we	Single- and Multiple-transistor amplifiers	
6th we	Current sources and active loads	
7th we	Current sources and active loads	Midterm Exam
8th we	Output stages	
9th we	Operational amplifier	
10th w	Operational amplifier	
11th w	Operational amplifier	
12th w	Operational amplifier	
13th w	Frequency response of integrated circuits	
14th w	Frequency response of integrated circuits	
15th w	Frequency response of integrated circuits	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11631	Hrs.:E.:Crs	3: 0: 3	Instructor	박창수
Course Title	Korean	광통신시스템					
	English	Optical Communication Systems					

Course Outline

- Optical comm. system and network overview - Optical fibers - Optical transmitters - Optical receivers - Optical amplifiers - Signal multiplexing and demultiplexing - System design and performance

Prerequisite	If any, Optics, Communication Theory, Semiconductor Physics, Waveguide Theory
Textbook and References	Text: Govind P. Agrawal, Fiber-Optic Communication Systems. Supplemental References: R. Hoss, Fiber Optical Communications (design Book); J. palais, Fiber Optic Communications.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11635	Hrs.:E.:Crs	3: 0: 3	Instructor	임혁
Course Title	Korean	컴퓨터 네트워킹					
	English	Computer Networking					

Course Outline

This lecture consists of three parts. In the first part, we will discuss various issues on data networking in a top-down manner, by beginning at the application layer and moving on towards the physical layer as done in the main textbook. In the second part, we will read several research papers to deal with the state-of-the-art research on data communication and networking areas. In the third part, we will carry out a research project to have a hand-on experience in computer networking systems and to understand how they work in an algorithm level.

Prerequisite	Experience with C/C++ programming
Textbook and References	J.F. Kurose and K.W. Ross, Computer Networking: A Top Down Approach Featuring the Internet, Addison-Wesley Longman [Supplementary] L. Peterson and B. Davies, Computer Networks: A Systems Approach, Morgan Kaufman

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Network characteristics and measurement	
3rd we	Application layer	
4th we	Unix network programming	
5th we	Transport Layer : Multiplexing/demultiplexing	
6th we	Transport Layer: UDP / TCP	
7th we	Transport Layer: Cogestion control	
8th we	Network Layer: Virtual circuit and datagram network	Midterm exam
9th we	Network Layer: Internet Protocol	
10th w	Network Layer: Routing	
11th w	Network Layer: Broadcast and multicast	
12th w	Link Layer: Multiple Access Protocol	
13th w	Link Layer: Ethernet	
14th w	Wireless and Mobile Networks	
15th w	Multimedia Networking	
16th w	Security	Finalterm exam

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11637	Hrs.:E.:Crs	3 : 0 : 3	Instructor	하동수
Course Title	Korean	랜덤프로세스					
	English	Random Process					

Course Outline

The course provides the methodology to interpret the basic concepts of probability, random variable, random vectors and random processes for electrical engineering and computer science.

Prerequisite	Elementary Probability Theory, Linear Algebra
Textbook and References	Probability, Random Processes, and Estimation Theory for Engineers, by H. Stark Probability and random processes for electrical engineering, by A. Leon-Garcia

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction: uncertainty and randomness, probability space	S1.1-1.4, LG1.1-2.3
2nd we	Conditional probability and independence	S1.5-1.10, LG2.4-2.7
3rd we	Random variables, cdf, pdf, functions of RVs	S2.1-2.6,3.1,3.2, LG3.1-3.5
4th we	Expectation and variance	S4.1,4.3, LG3.6
5th we	Joint distributions, marginals, independence/uncorrelatedness	S2.7, LG4.1-4.3
6th we	Functions of two RVs, their sums and their products	S3.3-3.4, LG4.5-4.7,5.1
7th we	?Conditional distribution, conditional expectation, and applications	S2.7,4.2, LG4.4
8th we	Midterm	
9th we	Correlation, jointly Gaussian RVs, and applications	S4.3, LG4.8
10th w	Estimation of RVs	S6.7, LG4.9
11th w	Characteristic function and Moment Generating functions	S4.7,5.6,5.5,4.4, LG3.7,3.9
12th w	Convergence of RVs, Limit theorems (LLN, CLT)	S7.4,7.5, LG5.2-5.6
13th w	Random process/Stochastic process	S7.1,8.1,8.2 LG6.1-6.4
14th w	Stationary RP, continuity, derivatives, integrals, ergodicity, and interpretations	S9.1-9.4, LG6.5-6.7
15th w	Analysis and processing of random signals	S8.3,10.1-10.4, LG7.1-7.4
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11646	Hrs.:E.:Crs	3: 0: 3	Instructor	최태선
Course Title	Korean	디지털 신호처리					
	English	Digital Signal Processing					

Course Outline

In this course, we study the fundamentals of discrete-time signals, systems, modern digital processing algorithms and applications. The main topics to be covered in this course are: Discrete-Time Signals and Systems, Frequency Analysis of Signals and Systems, The z-Transform, DFT and FFT, Digital Filter Design, Sampling and Reconstruction of Signals, Multi-Rate Digital Signal Processing

Prerequisite	Advanced Calculus including Complex Variables, Linear System Theory including Laplace and Fourier Transforms, Probability and Stochastic Processes. C Programming Language or MATLAB
Textbook and References	A. Oppenheim R. Schafer and J. Buck, Discrete-time Signal Processing: 2/e, Prentice Hall 1999.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to DSP	
2nd we	Discrete-time Signals	
3rd we	Discrete-time Systems	
4th we	z-transform	Quiz
5th we	Sampling of Continuous-time Signals	
6th we	Multi-rate Signal Processing	
7th we	Transform Analysis of LTI Systems	
8th we	Midterm Exam	
9th we	Structures for Discrete-time Systems	
10th w	Filter Design Techniques	
11th w	Optimum Approximations of FIR Filters	
12th w	The Discrete Fourier Transform	Quiz
13th w	Computation of DFT	
14th w	Fourier Analysis of Signals using DFT	
15th w	Discrete Hilbert Transform	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11654	Hrs.:E.:Crs	3: 0: 3	Instructor	조영달
Course Title	Korean	양자역학					
	English	Quantum Physics for Engineering					

Course Outline

Quantum physics has not only been central in answering fundamental questions in science, but has served to further our capability to design and exploit phenomena for applications in materials engineering, electrical engineering and of course applied physics. Devices such as semiconductor lasers, light-emitting diodes, and transistors cannot be understood without considering quantum physics. This course provides the background in this field of science, including various examples for practical applications in device physics and photonics. Examples include: electronic energy levels in semiconductor transistors; the Kronig-Penney model for bandstructures; tunneling phenomena in semiconductor devices; impurities and excitons in semiconductors; time-dependent perturbation theory and optical transitions; carrier scattering processes; ferromagnetism and magnetic recording; and semiconductor light-emitting diodes.

Prerequisite	Mathematical Methods for Physics or Applied Engineering Mathematics
Textbook and References	Quantum Mechanics: Fundamentals & Applications to Technology by J. Singh (John Wiley & Sons, 1999). USEFUL REFERENCES: Introduction to Quantum Mechanics by D.J. Griffiths Wave mechanics applied to semiconductor heterostructures by G. Bastard The physics of low-dimensional semiconductors by J. H.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	General overivew	
2nd we	Review of classical mechanics	
3rd we	The limits of classical mechanics	
4th we	Mathematical formulation of quantum physics	
5th we	Schr?dinger wave equation	
6th we	Particles in simple potentials	
7th we	Kronig-Penny model for band structure	
8th we	Mid-term exam	
9th we	Tunneling problem	
10th w	Spherical symmtric potential	
11th w	Symmetries and conservation laws	
12th w	Time-independent approxiamtions-I	
13th w	Time-independent approximations-II	
14th w	Practical examples of variational method	
15th w	Contemporary application examples of quantum physics	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11658	Hrs.:E.:Crs	3: 0: 3	Instructor	백운출
Course Title	Korean	광섬유공학					
	English	Fiber Optics					

Course Outline

Ray and wave theory of lightguiding fibers are introduced to present their wave propagation characteristics, and the dispersion properties of single, multi-mode, and speciality fibers. The design and fabrication method of optical fibers and their applications to photonic devices and components are also discussed. The quality of the system is evaluated in terms of transmission performances.

Prerequisite	
Textbook and References	1) M. G. Kuzyk, "Polymer Fiber Optics, Taylor & Francis, 2006. 2) K. Okamoto, "Fundamentals of Optical Waveguides", Academic press, 2000. 3) J. A. Buck, "Fundamentals of Optical Fibers", John Wiley, 1995.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Historical Background of Optical Communications	
2nd we	Optical Fiber Fabrication and its Applications	
3rd we	Ray Theory of Optical Fibers	
4th we	Wave Theory of Optical Fibers	
5th we	Propagation of Modes in Cylindrical Fibers	
6th we	Linearly Polarized Modes and Mode Designations	
7th we	Inhomogeneous Core Single-Mode Fibers	
8th we	Midterm Exam	
9th we	Mode Analysis by W. K. B. Method	
10th w	Impulse Response and Dispersion Relation	
11th w	Doping Materials and Material Dispersions	
12th w	Electric Field Distributions and Mode Patterns	
13th w	Arbitrary Index-Profiled Fibers by Semi-Numerical Method	
14th w	Fiber Draw and Coating Mechanics	
15th w	Strength of Optical Fibers	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11659	Hrs.:E.:Crs	3: 0: 3	Instructor	정영주
Course Title	Korean	광학과 레이저					
	English	Optics and Lasers					

Course Outline

Review of electromagnetic theory, light propagation, geometrical optics, polarization, interference, wave optics, coherence, light amplification, characteristics of lasers, nonlinear optics.

Prerequisite	Electromagnetics
Textbook and References	Textbook: Pedrotti & Pedrotti, Introduction to Optics, 3rd ed. References: Born and Wolf, Principles of Optics, 7th ed. E. Hecht, Optics A. Yariv & P. Yeh, Optical Waves in Crystals A. E. Siegman, Lasers

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Historical review and background	
2nd we	Geometrical optics, optical instrumentation	
3rd we	Wave equations, superposition of waves	
4th we	Properties of lasers, interference of light	
5th we	Optical interferometry, coherence	
6th we	Fiber optics, Fraunhofer diffraction	
7th we	Fresnel diffraction, polarization, Mid-term exam	
8th we	Holography	
9th we	Matrix methods in paraxial optics	
10th w	Aberration theory, Fourier optics	
11th w	Theory of multilayer films, Fresnel equations	
12th w	Nonlinear optics and modulation of light	
13th w	Optical properties of materials, laser operation	
14th w	Characteristics of laser beams, laser applications	
15th w	Dead week	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11670	Hrs.:E.:Crs	3: 0: 3	Instructor	김덕영
Course Title	Korean	비선형 광학					
	English	Nonlinear Optics					

Course Outline

Basic concepts of Nonlinear optics and their mathmatical expressions will be covered. Applications such as second harmonic generation, electro optic modulators, all-optical switches and solitons will be included as well.

Prerequisite	Nonlinear Optics E.G. Sauter Nonlinear Optics A.C. Newell, J.V. Moloney
Textbook and References	The Principles of Nonlinear Optics by Y.R. Shen

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Wave equation and refractive index	
3rd we	Coupled mode equations	
4th we	Anharmonic Oscillator model	
5th we	Second harmonic generation	
6th we	Optical crystals and susceptibility tensors	
7th we	Parametric amplication	
8th we	Electro optic modulator	
9th we	Third harmonic generation	
10th w	Optical Kerr effect and Self-Phase modulation	
11th w	Cascaded effects	
12th w	Four-wave mixing	
13th w	All-Optical switching devices	
14th w	Stimulated Raman/Brillioun scattering	
15th w	Nonlinear schrodinger equation	
16th w	Solitons	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11678	Hrs.:E.:Crs	1: 4: 3	Instructor	이용탁,이동선
Course Title	Korean	화합물 반도체 소자 공정 및 실습					
	English	Compound Semiconductor Device Processing					

Course Outline

This course includes 1 hour discussion session and Four hours Lab session per week. Teaching assistants will take in charge of Lab sessions and teach students operation techniques of various processing and testing equipments. Most of the materials discussed in the lecture are in classnotes and Lab notebook and reference books. Advanced materials and supplementary materials that are not included in the textbook will be distributed in the classroom. Students are encouraged to read the latest published materials in journals and magazines as well as text and reference books.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction and safety training	Experiment
2nd we	Growth and characterization of compound semiconductors	Experiment
3rd we	Optical lithography	Experiment
4th we	Metallization	Experiment
5th we	Lift-off	Experiment
6th we	Ohmic contacts of semiconductor devices	Experiment
7th we	Sputtering of dielectric films	Experiment
8th we	Mid-term exam	
9th we	Thickness measurement of dielectric thin film	Experiment
10th w	Wet etching of compound semiconductors	Experiment
11th w	PECVD of SiO2 and SiNx film	Experiment
12th w	Dry etching of dielectric films	Experiment
13th w	Dry etching of compound semiconductors	Experiment
14th w	Scanning electron microscopy	Experiment
15th w	Measurement of Schottky diode characteristics	Experiment
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11683	Hrs.:E.:Crs	3: 0: 3	Instructor	전문구
Course Title	Korean	패턴인식					
	English	Pattern Recognition					

Course Outline

Pattern recognition is essential and its importance is growing in the decision making or supporting systems of computer vision, medical diagnostics, business and financial industry, etc. The main concerns of this course are the classification, clustering and feature selection methods. Applications to face recognition, biomedical informatics, and images classification will also be considered to stimulate students' interests.

Prerequisite	Programming language, Linear algebra, Elementary statistics, Calculus, Optimization
Textbook and References	1. Pattern Recognition by S. Theodoridis and K.Koutroumbas, Academic Press 2. Pattern Classification, R. O. Duda, P.E. Hart and D.G.Stork, Wiley 3. Face Recognition, L. Jain, Springer

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction, Bayes decision theory	For evaluation purposes, the course will comprise
2nd we	Bayesian networks	- 5 assignments will be worth 30% of the final
3rd we	Neural networks - linear perceptron	- One term project will be worth 40% of the
4th we	Neural networks - Backpropagation	- A midterm exam. will be worth 30# of the
5th we	Support Vector Machines - Kernels, Regularization	
6th we	Learning Theory	
7th we	Optimization	
8th we	Midterm Exam. Maximum margin classifier	
9th we	Soft margin Classifier	
10th w	Feature selection	
11th w	Feature selection	
12th w	Clustering	
13th w	Clustering	
14th w	Applications	
15th w	Students presentation	
16th w	Students presentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	11690	Hrs.:E.:Crs	3: 0: 3	Instructor	이용탁
Course Title	Korean	반도체 레이저					
	English	Semiconductor Lasers					

Course Outline

To study principles of semiconductor laser operation, heterostructure materials, fabrication processes, structure design for specific application, modulation characteristerics, in addition, recent topics on Quantum Well Lasers, Surface Emitting Lasers, Semiconductor, Laser Amplifiers, etc. are studied.

Prerequisite	Optoelectronics(11653)
Textbook and References	Semiconductor Lasers 2nd Ed. G. P. Agrawal Van Nostrand Reinhold, 1993 Semiconductor Lasers, Past, Present and Future, G. P. Agrawal AIP Press 1995 Quantum Well Lasers, Peter S. Zony, Jr.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Principles of injection Laser Operation	
2nd we	Wave Propagation in waveguide	
3rd we	Modes in Lasers Structure	
4th we	Stimulated Emission	
5th we	Optical Gain	
6th we	Heterostructure Materials	
7th we	Epitaxy of Heterostructure	
8th we	Laser Structure and Fabrication Process	
9th we	Mid Term Exam	
10th w	Quantum Well Lasers	
11th w	Single Mode DFB & DBR Lasers	
12th w	Modulation Characteristics	
13th w	Surface Emitting Lasers	
14th w	Semiconductor Amplifiers	
15th w	Semiconductor Amplifiers	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	11701	Hrs.:E.:Crs	0: 0: 2	Instructor	
Course Title	Korean	개별연구 I					
	English	Individual Research I					

Course Outline

각 분야별 개별연구 주제선택

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15400	Hrs.:E.:Crs	3: 0: 3	Instructor	바뎃 사에이드
Course Title	Korean	신호처리공학 특론 I					
	English	Special Topics on Signal Processing & Systems I					

Course Outline

This course will focus on emerging parallel systems: Multi-core (MC) architectures and graphics processing unit (GPU) systems. Virtually all semiconductor market . Starting from the basic notions of computer organization, and applications programming, we will examine the current state of computer architecture with multi-core and GPU trends. This course will illustrate methods of designing computing systems to best address the needs of an application space given the capabilities and constraints of the underlying implementation technologies. Case studies will examine multi-core processor designs: Intel's Nehalem (2, 4, 8 cores per chip), AMD's Quad-core Opteron, IBM's Cell, Tilera's and Sun Microsystem's Niagara/Rock processors, as well as graphics processing engines such as NVIDIA's processors and combinations of CPU with GPUs such as Intel's Larrabee. The target audiences of the course are research students in computer graphics, computer animation, multimedia processing, and cur

Prerequisite	Embedded Systems, Computer Programming, Computer Architecture
Textbook and References	On-line Resources

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	MultiCore and GPU Introduction	
2nd we	Mylti Core and GPU: Architectural Features	
3rd we	GPU: Programmability (OpenGL/Cg)	
4th we	Stream Programming and Unified Driver Architecture (CUDA)	
5th we	Geometric Algorithms	
6th we	Dense Matrix Multiplications ()	
7th we	Sparse Matrix Multiplications and Linear Algebra Algorithms ().	
8th we	Non-linear Optimization ()	
9th we	Mid Sem Exam	
10th w	Scientific Computing on GPUs ()	
11th w	Caching Architectures ()	
12th w	Sorting and Searching ()	
13th w	Stream Mining ().	
14th w	Cryptography on GPUs ()	
15th w	olume Rendering using GPUs ()	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15401	Hrs.:E.:Crs	3 : 0 : 3	Instructor	우운택
Course Title	Korean	컴퓨터 과학 및 공학 특론 I					
	English	Special Topics on Computer Science and Engineering I					

Course Outline

This course covers advanced topics and recent trend of machine learning and computational intelligence such as evolutionary computation, swarm intelligence, and so forth. The class will consist of instructor's lecture and student's presentation after reading recent research papers each week. At the end of the course, students are expected to have strong background of computational intelligence, and write and submit their own research papers on the topics to the referred journal.

Prerequisite	Machine learning (15681), instructor's permission
Textbook and References	Computational Intelligence by Andries P. Engelbrecht, Wiley 2002, journal papers.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction	
2nd we	Genetic algorithm	
3rd we	Genetic programming	
4th we	Differential evolution	
5th we	Culture algorithm	
6th we	Coevolution (competitive coevolution)	
7th we	Coevolution (cooperative coevolution)	
8th we	Midterm exam.	
9th we	Particle swarm optimization	
10th w	Particle swarm optimization	
11th w	Particle swarm optimization	
12th w	Ant colony	
13th w	Ant colony	
14th w	Ant colony	
15th w	Parallelization	
16th w	Final Exam.	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15418	Hrs.:E.:Crs	3 : 0 : 3	Instructor	양성
Course Title	Korean	기본유체역학					
	English	Fundamentals of Fluid Mechanics					

Course Outline

"Fundamentals of Fluid Mechanics" course is aiming at graduate students in the fluid/thermal sciences. The course will begin with a short primer on mathematical constructs and notation, followed by a derivation of the conservation equations. Thus you should expect the first few weeks of the course to be quite theoretical. Once we have derived the conservation equations, including the Navier-Stokes equations, we will focus on the solutions of the equations, both exact and approximate. this course emphasizes laminar flows so that topics such as transition to turbulence, flow stability, and turbulence will not be covered in this course.

Prerequisite	Engineering Mathematics (Required), Basic Fluid Mechanics (Preferred)
Textbook and References	Text and Reference Books 1. "Fluid Mechanics", 2nd Ed., Pijush K. Kundu and Ira M. Cohen, Academic Press, 2002 2. "Transport Phenomena", 2nd Ed., Bird, Steward, and Lightfoot, Wiley, 2007 Grading Pop Quizzes(10%), Homework(20%), Term Project(30%), FInal Exam(40%)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Mathematical constructs/representation	
2nd we	Mathematical constructs/representation, Kinematics	
3rd we	Kinematics	
4th we	Conservation Laws	
5th we	Conservation Laws	
6th we	Navier-Stokes eqn.	
7th we	Navier-Stokes eqn.	
8th we	Laminar Flows: Exact solutions of special cases	
9th we	Laminar Flows: Exact solutions of special cases	
10th w	Laminar Flows: Exact solutions of special cases	
11th w	Transient Flows	
12th w	Transient Flows / Vorticity Dynamics	
13th w	Vorticity Dynamics / Irrotational Flows	
14th w	Irrotational Flows	
15th w	Term Project Presentation	
16th w	Review and Comprehensive Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15424	Hrs.:E.:Crs	3: 0: 3	Instructor	김소희
Course Title	Korean	신경보철학					
	English	Neural Prosthesis					

Course Outline

This course covers the basic anatomy and physiology of the nervous system, principles and technologies for various neural prosthetic devices such as microelectrodes as a key component, prosthetics to recover

Prerequisite	Basic knowledge on electrical engineering, electronics, neurophysiology is recommended, but not required
Textbook and References	To be announced; Read-outs will be distributed for selected topics

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Central and peripheral nervous system	
2nd we	Basic neurophysiology	
3rd we	Action potentials	
4th we	Electrical models	
5th we	Electrode-electrolyte interface	
6th we	Neural electrodes	
7th we	Insulating materials and tissue reaction	
8th we	Mid-term exam	
9th we	Neural recording	
10th w	Electrical stimulation	
11th w	Motor function prostheses	
12th w	Cochlear implant	
13th w	Artificial vision	
14th w	Therapeutic brain stimulation	
15th w	Brain computer interface	
16th w	Term project presentation / Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15601	Hrs.:E.:Crs	3 : 0 : 3	Instructor	박기환
Course Title	Korean	고급자동제어					
	English	Advanced Automatic Control					

Course Outline

The course covers derivation of dynamical system equations of motion, system analysis methods, system characteristics and response analysis, state transformation, design methodology using classical control theory, digital control, and introduction to modern control theory such as controllability, stability, optimal control, robust control, etc. Control system design using computer-aided analysis and design software such as MATLAB will be emphasized.

Prerequisite	Automatic Control
Textbook and References	1) Linear Control System Analysis and Design, John J. D'Azzo, Constantine H. Houpis, McGraw-Hill 2) Digital Control Systems: Theory, Hardware, Software, C.H. Houpis & G.B. Lamont, McGraw-Hill, 1992, 2nd EOł. 3) Control System Design using MATLAB, Bahram Shahian, Michael Hassaul, Prentice-..

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction	
2nd we	Time Response	
3rd we	Frequency Response	
4th we	Electric circuitry for control I	
5th we	〃	
6th we	Modulation Technique I	
7th we	Modulation Technique II	
8th we	Experiment I	
9th we	Experiment II	
10th w	Mid Exam	
11th w	Sliding mode Control I	
12th w	〃	
13th w	Adaptive Control	
14th w	〃	
15th w	Experiment III	
16th w	Final	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15603	Hrs.:E.:Crs	3 : 0 : 3	Instructor	왕세명
Course Title	Korean	고급진동학					
	English	Advanced Vibration					

Course Outline

The course covers fundamental principles of vibration and advanced recent topics. Main topics are: single DOF, multiple DOF, properties of vibrating systems, lagranges equation, computational methods, vibration of continuous systems, introduction to FEM, mode-summation procedures for continuous systems, classical methods, and design sensitivity analysis of vibrating systems.

Prerequisite	1)Ordinary Differential Equations, 2)Fundamentals of Vibrations, 3)Laplace Transformation, 4)Fourier's Transformation, 5)Matrix Linear AlgebraEngineering Mechanics, Dynam ics
Textbook and References	1) Theory of Vibration with Applications, 4th ed, W.T.Thomson,Prentice Hall, 1993. 2) Structural Dynamics : An Introduction to Computer Methods, R.R. Craig, John Wiley & Sons, 1981. 3) Finite Element Procedure, 2nd ed.,K.J.Bathe, Prentice-Hall, 1996. 4) Design Sensitivity Analysis of ...

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Review(Linear Algebra, Laplace Transformation)	
2nd we	"	
3rd we	Single DOF	
4th we	"	
5th we	Multiple DOF	
6th we	"	
7th we	Properties of Vibrating Systems	
8th we	Lagrange's Equation	
9th we	Mid Term Exam	
10th w	Vibration of Continuous Systems	
11th w	"	
12th w	Introduction to FEM	
13th w	Mode-Summation Procedures for Contiguous Sys.	
14th w	Classical Methods	
15th w	Design Sensitivity Analysis of Vibrating Systems	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15613	Hrs.:E.:Crs	3 : 0 : 3	Instructor	정성호
Course Title	Korean	레이저 공학					
	English	Laser Engineering					

Course Outline

Lasers are indispensable tools in many modern manufacturing processes and their applications continue expanding to broad areas of industry including micromachines, electronics, communications, and thin films. In this course, the mechanism and configuration of different types of lasers and their applications are introduced. Thermal, chemical, or other desorption mechanisms during laser-materials interaction and their dependency upon laser beam energy, wavelength, material properties will be covered. Optical techniques for laser energy monitoring, beam profiling, and beam delivery are also covered.

Prerequisite	None
Textbook and References	High Power Lasers in Production Engineering by Dieter Schuocker (World Scientific Publishing, 1999) Laser-beam interactions with materials : Physical principles and applications by M. von Allmen (Springer-Verlag, 1995)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Light and lasers	
2nd we	Laser principles	
3rd we	Characteristics of laser light	
4th we	Lasing medium and laser action	
5th we	Laser systems	
6th we	Laser systems	
7th we	Laser-materials interaction	
8th we	Thermal processes	
9th we	Non-thermal desorption processes	
10th w	High energy processes	
11th w	Laser processings of materials	
12th w	Laser welding	
13th w	Laser cutting	
14th w	Surface processing	
15th w	Optical measurement components	
16th w	Optical instrumentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15614	Hrs.:E.:Crs	3: 0: 3	Instructor	이종현
Course Title	Korean	MEMS/NEMS 공정 및 응용					
	English	MEMS/NEMS process and applications					

Course Outline

MEMS/NEMS devices are expected to be one of the key technologies for man-machine interface and ubiquitous sensor network in the 21st-century of information society. This course will deal with MEMS/NEMS (Micro/Nano Electro Mechanical Systems) material, micro/nano fabrication process, operational principles and applications as shown below. - introduction to MEMS/NEMS devices and materials, semiconductor fundamentals - fabrication of 3D micro/nano structures, low-stress film, dry release, process integration - scaling effects, micro/nano electro-mechanics, optical MEMS and microfluidics - application examples of MEMS/NEMS devices for information and biomedical fields

Prerequisite	None
Textbook and References	'- N. Maluf, "An introduction to MEMS engineering," Artech House, 2000 - S. M. Sze, "Semiconductor Sensors," John Wiley & Sons Inc., 1994 - M. J. Madou, "Fundamentals of microfabrication," CRC press, 2002 - B. G. Streetman et al., "Solid State Electronic Devices," 5th ed., Prentice-Hall, 2000 ..

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction to MEMS/NEMS	
2nd we	Materials for MEMS/NEMS	
3rd we	Basic fabrication process	
4th we	Fundamentals of semiconductor physics	
5th we	Micromachining process design I	
6th we	Micromachining process design II	
7th we	Bulk micromachining I	
8th we	Mid-term exam	
9th we	Bulk micromachining II	
10th w	Surface micromachining	
11th w	Process issues & nano fabrication	
12th w	Micro-electro-mechanics	
13th w	Optical MEMS & medical microdevices	
14th w	Presentation I	
15th w	Presentation II	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15627	Hrs.:E.:Crs	3 : 0 : 3	Instructor	블라디미르 신
Course Title	Korean	에스티메이션 및 디텍션					
	English	Estimation and Detection					

Course Outline

The course will integrate appropriate aspects of estimation and detection with consideration of practical applications. It covers classical detection and estimation theory, random processes, estimation of continuous waveforms, and linear estimation.

Prerequisite	None
Textbook and References	Detection, Estimation, and Modulation Theory Part I, Wiley Harry L. Van Trees

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Classical detection and estimation theory	
3rd we	M hypotheses	
4th we	Composite hypotheses	
5th we	General Gaussian problem	
6th we	Representation of random processes	
7th we	Periodic processes	
8th we	Vector random processes	
9th we	Detection of signals	
10th w	Estimation of signals	
11th w	Multiple parameter estimation	
12th w	Estimation of continuous waveforms	
13th w	Multidimensional waveform estimation	
14th w	Linear estimation	
15th w	Linear modulation	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15630	Hrs.:E.:Crs	3: 0: 3	Instructor	블라디미르 신
Course Title	Korean	응용공업수학					
	English	Applied Engineering Mathematics					

Course Outline

The course covers basic mathematical techniques and theories in applied mechanics, electromagnetics, and systems analysis. Main topics include matrix and linear algebra, calculus of variation, complex variable, and statistics.

Prerequisite	None
Textbook and References	Methods of Applied Mathematics, F. B. Hildebrand, Prentice-Hall

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction, Matrices, Vectors	
2nd we	Inverse Matrix, Linear Vector Space	
3rd we	Characteristic Value Problem	
4th we	Definite Forms, Coordinate Transform	
5th we	Maxima and minima, Lagrange Multiplier	
6th we	Variation of Dynamic Systems	
7th we	Variation of Deformable Bodies	
8th we	Rayleigh-Ritz Method	
9th we	Complex Functions	
10th w	Mapping by Elementary Functions	
11th w	Conformal Mapping	
12th w	Application of Conformal Mapping	
13th w	Statistical Estimation and Hypothetical Testing	
14th w	Regression and Correlation	
15th w	Analysis of Variance	
16th w	Statistical Quality Control	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15644	Hrs.:E.:Crs	3: 0: 3	Instructor	이용구
Course Title	Korean	계산기하학					
	English	Computational Geometry					

Course Outline

The techniques used in the design and analysis of efficient geometric algorithms including: point location, convex hull, constrained triangulation, Voronoi/Delaunay diagrams, intersection, geometric searching, motion planning, 3D applications and triangular mesh data representation will be discussed.. 효율적인 기하 알고리즘에 대해서 알아봅니다. 경계에 대한 점의 내 외부 판별법, 컨벡스 헐, 콘스트레인드 삼각형화, 보로노이/딜로니 다이아그람, 교차성, 기하 탐색, 모션 플래닝, 3D 응용, 3D 메쉬 데이터 등을 중점적으로 다룹니다

Prerequisite	Calculus, Linear algebra, Programming language C
Textbook and References	Computational geometry in C (2nd edition) by Joseph O'Rourke Cambridge University Press 1998

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Introduction to Visual C++ , Introduction to Postscript	
3rd we	Polygon triangulation	
4th we	Polygon partitioning	
5th we	Convex hulls in 2D	
6th we	Convex hulls in 3D	
7th we	Voronoi diagrams	
8th we	Mid exam	
9th we	Voronoi diagrams	
10th w	Arrangements	
11th w	Search and intersection	
12th w	Search and intersection	
13th w	Motion planning	
14th w	3D triangular mesh data representation	
15th w	3D applications	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15652	Hrs.:E.:Crs	3 : 0 : 3	Instructor	류제하
Course Title	Korean	고급 로봇 동력학 및 제어					
	English	Advanced Robot Dynamics and Control					

Course Outline

This course covers basic theories and techniques on the kinematics/dynamics/control of robot manipulators.

Prerequisite	Feedback Control, Linear Algebra
Textbook and References	"Robot Modeling and Control, M.W Spong, S. Hutchinson, M. Vidyasagar Selected Papers and Handouts"

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Rigid Motions and Homogeneous Transformations	
3rd we	Forward/Inverse Kinematics	
4th we	Velocity Kinematics ? The Jacobian	
5th we	Path and Trajectory Planning	
6th we	Path and Trajectory Planning	
7th we	Mid Term Exam	
8th we	Independent Joint Control	
9th we	Independent Joint Control	
10th w	Dynamics	
11th w	Lyapunov Stability Theorem (Appendix C)	
12th w	Multivariable Control	
13th w	Force Control	
14th w	Force Control	
15th w	Computer Vision	
16th w	Vision-Based Control/Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15658	Hrs.:E.:Crs	3: 0: 3	Instructor	안효성
Course Title	Korean	현대제어이론					
	English	Modern Control Theory					

Course Outline

SISO systems: Modeling, Analysis, Design MIMO systems: Modeling, Analysis, Design. Time domain analysis. Frequency domain analysis.

Prerequisite	Automatic Control, Dynamics, Signals and Systems
Textbook and References	1. Control System Design, G. C. Goodwin, S. F. Graebe, M. E. Salgado, Prentice Hall, 2001

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Principle of Feedback	
2nd we	Moddeling	
3rd we	Continuous-time signals and systems	
4th we	PID control	
5th we	SISO control design I	
6th we	SISO control design II	
7th we	SISO control design III	
8th we	Mid Term Exam	
9th we	Digital control	
10th w	Digital control	
11th w	State space analysis I	
12th w	State space analysis II	
13th w	Nonlinear control	
14th w	MIMO control design I	
15th w	MIMO control design II	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15670	Hrs.:E.:Crs	3: 0: 3	Instructor	김용훈
Course Title	Korean	초고주파 밀리미터파 공학 I: 수동회로					
	English	Microwave and mm-Wave Engineering I: passive circuits					

Course Outline

The lecture introduce transmission line theory and signal propagation characteristics for different types of transmission line like microstrip line, strip line and coupled line which are used in the wide area of microwave circuits. Many different types of passive MIC(Microwave Integrated Circuit)s like couplers, filters will be designed with CAD(computer aided design) tool and the designed circuits will be manufactured and validated in experiment from microwave to millimeter-wave range.

Prerequisite	no
Textbook and References	T Edwards, Foundation for Microstrip Circuits Design, John Wiley

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Microwave Transmission System	
2nd we	Signal Transmission on Line	
3rd we	Transmission Line Structures and Properties	
4th we	Microwave Integrated Circuits (MICs)	
5th we	Microstrip Design at Lower Frequencies	
6th we	Microstrip Design at Lower Frequencies	
7th we	Microstrip Design at High Frequencies	
8th we	Microstrip Design at High Frequencies	
9th we	CPW Lines and Fundamentals	
10th w	Circuit Elements of CPW Lines	
11th w	Discontinuities in Microstrip and Strip Lines	
12th w	Parallel-coupled Lines and Directional Couplers	
13th w	Filters in MICs	
14th w	Experiment of Parallel Coupled Lines	experiment
15th w	Experiment of Passive MICs	experiment
16th w	Semester examination	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15676	Hrs.:E.:Crs	3 : 0 : 3	Instructor	김강욱
Course Title	Korean	전자파 복사 및 안테나					
	English	EM Radiation and Antennas					

Course Outline

The fundamentals of electromagnetic radiation and antennas are covered. These include the classical electromagnetism, radiation mechanism, basic principles and theorems, thime-domain properties of antennas, and antenna arrays.

Prerequisite	None
Textbook and References	Constantine A. Balanis, "Antenna Theory: Analysis and Design", 3rd ed., Wiley-Interscience, 2005. ISBN:0-471-66782-X

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Basic theory of electromagnetism	
2nd we	Electromagnetic plane waves in free space	
3rd we	Inhomogeneous plane waves and plane-wave spectrum	
4th we	Radiation from charges and current	
5th we	Radiation from a moving point charge	
6th we	Radiation Integrals and auxiliary potential functions	
7th we	Fundamental theorems and principles	
8th we	Review and Midterm Exam	
9th we	Fundamentals parameters of antennas	
10th w	Radiation from dipole antennas	
11th w	Radiation from loop antennas	
12th w	Radiation from general wire antennas	
13th w	General time dependence of radiation	
14th w	Antenna Arrays and Synthesis	
15th w	Antennas in matter	
16th w	Review and Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15694	Hrs.:E.:Crs	3: 0: 3	Instructor	이용구
Course Title	Korean	나노테크놀로지를 위한 시뮬레이션					
	English	Simulation for Nanotechnology					

Course Outline

The goal of this course is to learn practices and the theory behind an instrument called optical tweezers for manipulating nanoscale objects and measuring the interplaying forces. Firstly, microscopy is covered as it is the foundation

Prerequisite	
Textbook and References	There is no official text.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Basic light microscopy	
3rd we	Microstereolithography	
4th we	Optical tweezers instrumentations	
5th we	"Beam steering and shaping -Scanning laser optical tweezers scanning frequency	
6th we	-Holographic optical tweezers	
7th we	"Force measurements -Particle tracking	
8th we	-Optical Tweezers and Trap stiffness	
9th we	"Optical Tweezers simulation in the Rayleigh regime -Gradient force	
10th w	Optical Tweezers simulation through Ray-Optics	
11th w	Optical Tweezers simulation using the Finite Difference Time Difference method	
12th w	-Numerical representation of tightly focused beams	
13th w	-Time domain near to far field transformation	
14th w	Final exam	
15th w	Term project presentation	
16th w	Term project presentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15695	Hrs.:E.:Crs	3 : 0 : 3	Instructor	고광희
Course Title	Korean	실사 렌더링과 전역 조명					
	English	Photo-realistic Rendering and Global Illumination in Computer Graphics					

Course Outline

The goal of this course is to introduce concepts and algorithms for photo-realistic rendering and global illumination in computer graphics and provide opportunities for students to get the state-of-the-art

Prerequisite	Computer Graphics, Data Structure and Algorithm, Computer Programming Language (C/C++)
Textbook and References	Advanced Global Illumination, Philip Dutre, Kavita Bala, Philippe Bekaert, A K Perters, Ltd, 2006

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Visual Appearance	
2nd we	Light and Shading	
3rd we	Transparency, Alpha & Compositing	
4th we	Advanced Lighting & Shading I	
5th we	Advanced Lighting & Shading II	
6th we	Material Representation I	
7th we	Material Representation II	
8th we	Mid-Term Exam	
9th we	Monte-Carlo Method I	
10th w	Monte-Carlo Method II	
11th w	Strategies for Computing Light Transport	
12th w	Stochastic Path Tracing I	
13th w	Stochastic Path Tracing II	
14th w	Stochastic Radiosity	
15th w	Hybrid Algorithms	
16th w	Ultimate Realism & Speed for Global Illumination	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	15696	Hrs.:E.:Crs	3: 0: 3	Instructor	
Course Title	Korean	혼성신호 직접회로 분석 및 설계					
	English	Analysis and Design of Mixed-Signal Integrated Circuit					

Course Outline

This course will provide fundamentals of mixed-signal integrated circuit analysis and design. Students will learn how to analyze,model,and design mixed-signal ICs. Practical design issues, performance limitations and trade-offs will be discussed in detail.

Prerequisite	Analog Integrated Circuit Design
Textbook and References	David Johns and Ken Martin, Analog Integrated Circuit Design, Wiley, 1997 Behzad Razavi, Principles of Data Conversion System Design, IEEE press, 1995

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Review of basic circuit theories and devices	
2nd we	Analysis of continuous-time and discretie-time signals	
3rd we	Sampling theory, circuits, and non idealities.	Homework #1
4th we	Sampling theory, circuits, and non idealities.	
5th we	Data converter fundamentals : ADCs and DACs	
6th we	Data converter fundamentals : ADCs and DACs	Homework #2
7th we	Basic building blocks of data converters: opamp	
8th we	Basic building blocks of data converters: swtiched-capacitor circuits	Midterm Exam
9th we	Basic building blocks of data converters: comparator	Homework #3
10th w	Nyquist-rate ADCs and DACs	
11th w	Nyquist-rate ADCs and DACs	Homework #4
12th w	Oversampled ADCs and DACs	
13th w	Oversampled ADCs and DACs	Homework #5
14th w	Timing generation circuits	
15th w	Timing generation circuits	
16th w	Practical issues of mixed-signal ICs : ESD, latch-up, layout, noise coupling.	Final exam

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	15901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Research for Master Dissertation					

Course Outline

Research study at the M.S. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	15906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Research for Ph.D. Dissertation					

Course Outline

Research study at the Ph.D. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	24503	Hrs.:E.:Crs	1: 0: 1	Instructor	권혁상
Course Title	Korean	콜로퀴움 I					
	English	Medical Engineering Colloquium I					

Course Outline

Series of seminars by speakers from outside and within GIST on new and developing research areas in medical engineering, and presentations by registered students on their thesis research. All students are required to attend; M.S. degree and PhD students must register at least once during their thesis research. All students registered must present their research achivements at the end of semester according to the schedule designated at the beginning of the semester. The total presentation time for each presentation should be no longer than 15 min. including Q&A.

Prerequisite	None
Textbook and References	None

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Seminar schedule will be regularly announced	All registered students are supposed to submit
2nd we	through a board in	an abstract for their presentations 4 weeks in
3rd we	http://smse.gist.ac.kr	advance of their presentation day
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	24505	Hrs.:E.:Crs	1: 4: 3	Instructor	양성
Course Title	Korean	의생명 기초 계측 실험					
	English	Basic Biomedical Instrumentation Lab.					

Course Outline

Efficient data acquisition and analysis are crucial steps of successful researches in science or engineering fields. This course is designed to provide technical information about how to acquire and analyze data during and after experiments. Throughout semester, LabVIEW will be used as a tool of data acquisition and analysis. In this lecture, students are expected to learn computer interface techniques (GPIB, RS232), analog data acquisition and analysis, image acquisition and processing techniques as well as LabVIEW programming. In addition, students are subject to carry out "independent project", which is closely relate with his or her actual research project conducted in their lab.

Prerequisite	None
Textbook and References	Most course material will be distributed before class start, Grading Attendance (20%), Home work (30%), Term Project (60%

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to LabVIEW	
2nd we	Modular Programming/ Repetition & Loops	
3rd we	Arrays/Clusters/Plotting Data/Decision Making in a VI	
4th we	Strings and File I/O/Data Acquisition & Waveforms	
5th we	Introduction to Instrument Control	Independent project (IP) proposal due
6th we	GPIB Instrument Control	
7th we	RS232 Instrument Control	
8th we	Analog DAQ	
9th we	Analog DAQ	IP contract due
10th w	Image acquisition/processing	
11th w	Image acquisition/processing	
12th w	Independent Project	
13th w	Independent Project	
14th w	Independent Project	
15th w	Independent Project Presentation	
16th w	Independent Project Presentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	24506	Hrs.:E.:Crs	3: 0: 3	Instructor	류제하,이병하,이종현,김용철,[illegible]
Course Title	Korean	의생명공학 개론					
	English	Introduction to Biomedical Engineering					

Course Outline

The aim of this course is to provide an introduction to biomedical engineering for students who have various backgrounds. Course material will cover a wide range of biomedical engineering areas. Throughout semester, basics of

Prerequisite	Engineering Mathematics (Preferred)
Textbook and References	Text and Reference Books 1. Introduction to biomedical engineering, 2nd ed, John Enderle et. al. 2. Medical devices and systems, Joseph D. Bronzino (editor) 3. Supplementary material will be distributed if it is necessary. Grading Homework (20%), Mid term (40%), Final term (40%)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	"Course introduction A historical perspective/Moral and ethical issues"	
2nd we	Introduction to physiology	
3rd we	Introduction to physiology	
4th we	Introduction to molecular and cellular Biology	
5th we	Biomaterials and materials/body interactions	
6th we	Introduction to drug action and mechanism	
7th we	Biomaterials and materials/body interactions	
8th we	Mid term exam	
9th we	Micro/Nano technology for Biomedical engineering	
10th w	Medical ultrasonics	
11th w	Biosignal processing	
12th w	Introduction to Biomechanics	
13th w	Medical Robotics	
14th w	Medical Optics	
15th w	Medical Optics	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24602	Hrs.:E.:Crs	3 : 0 : 3	Instructor	정성호
Course Title	Korean	레이저 공학					
	English	Laser Engineering					

Course Outline

Lasers are indispensable tools in many modern manufacturing processes and their applications continue expanding to broad areas of industry including micromachines, electronics, communications, and thin films. In this course, the mechanism and configuration of different types of lasers and their applications are introduced. Thermal, chemical, or other desorption mechanisms during laser-materials interaction and their dependency upon laser beam energy, wavelength, material properties will be covered. Optical techniques for laser energy monitoring, beam profiling, and beam delivery are also covered.

Prerequisite	None
Textbook and References	High Power Lasers in Production Engineering by Dieter Schuocker (World Scientific Publishing, 1999) Laser-beam interactions with materials : Physical principles and applications by M. von Allmen (Springer-Verlag, 1995)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Light and lasers	
2nd we	Laser principles	
3rd we	Characteristics of laser light	
4th we	Lasing medium and laser action	
5th we	Laser systems	
6th we	Laser systems	
7th we	Laser-materials interaction	
8th we	Thermal processes	
9th we	Non-thermal desorption processes	
10th w	High energy processes	
11th w	Laser processings of materials	
12th w	Laser welding	
13th w	Laser cutting	
14th w	Surface processing	
15th w	Optical measurement components	
16th w	Optical instrumentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24604	Hrs.:E.:Crs	3: 0: 3	Instructor	이종현
Course Title	Korean	MEMS/NEMS 공정 및 응용					
	English	MEMS/NEMS Process and Applications					

Course Outline

MEMS/NEMS devices are expected to be one of the key technologies for man-machine interface and ubiquitous sensor network in the 21st-century of information society. This course will deal with MEMS/NEMS (Micro/Nano Electro Mechanical Systems) material, micro/nano fabrication process, operational principles and applications as shown below. - introduction to MEMS/NEMS devices and materials, semiconductor fundamentals - fabrication of 3D micro/nano structures, low-stress film, dry release, process integration - scaling effects, micro/nano electro-mechanics, optical MEMS and microfluidics - application examples of MEMS/NEMS devices for information and biomedical fields

Prerequisite	None
Textbook and References	- N. Maluf, "An introduction to MEMS engineering," Artech House, 2000 - S. M. Sze, "Semiconductor Sensors," John Wiley & Sons Inc., 1994 - M. J. Madou, "Fundamentals of microfabrication," CRC press, 2002 - B. G. Streetman et al., "Solid State Electronic Devices," 5th ed., Prentice-Hall, 2000

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction to MEMS/NEMS	
2nd we	Materials for MEMS/NEMS	
3rd we	Basic fabrication process	
4th we	Fundamentals of semiconductor physics	
5th we	Micromachining process design I	
6th we	Micromachining process design II	
7th we	Bulk micromachining I	
8th we	Mid-term exam	
9th we	Bulk micromachining II	
10th w	Surface micromachining	
11th w	Process issues & nano fabrication	
12th w	Micro-electro-mechanics	
13th w	Optical MEMS & medical microdevices	
14th w	Presentation I	
15th w	Presentation II	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24606	Hrs.:E.:Crs	3 : 0 : 3	Instructor	김강욱
Course Title	Korean	전자파 복사 및 안테나					
	English	EM Radiation and Antennas					

Course Outline

The fundamentals of electromagnetic radiation and antennas are covered. These include the classical electromagnetism, radiation mechanism, basic principles and theorems, thime-domain properties of antennas, and antenna arrays.

Prerequisite	None
Textbook and References	Constantine A. Balanis, "Antenna Theory: Analysis and Design," 3rd ed., Wiley-Interscience, 2005. ISBN:0-471-66782-X

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Basic theory of electromagnetism	
2nd we	Electromagnetic plane waves in free space	
3rd we	Inhomogeneous plane waves and plane-wave spectrum	
4th we	Radiation from charges and current	
5th we	Radiation from a moving point charge	
6th we	Radiation Integrals and auxiliary potential functions	
7th we	Fundamental theorems and principles	
8th we	Review and Midterm Exam	
9th we	Fundamentals parameters of antennas	
10th w	Radiation from dipole antennas	
11th w	Radiation from loop antennas	
12th w	Radiation from general wire antennas	
13th w	General time dependence of radiation	
14th w	Antenna Arrays and Synthesis	
15th w	Antennas in matter	
16th w	Review and Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24608	Hrs.:E.:Crs	3: 0: 3	Instructor	이용구
Course Title	Korean	나노테크놀로지를 위한 시뮬레이션					
	English	Simulation for Nanotechnology					

Course Outline

The goal of this course is to learn practices and the theory behind an instrument called optical tweezers for manipulating nanoscale objects and measuring the interplaying forces. Firstly, microscopy is covered as it is the foundation for building this instrument. Secondly, manipulating microscopic objects and measuring picoNewton forces are discussed. Lastly, numerical simulations of laser scattering for computing the trapping forces are covered

Prerequisite	
Textbook and References	There is no official text.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Light microscopy-basic light microscopy-phase contrast and darkfield microscopy	
3rd we	-properties of polarized light and olarization microscopy- DIC, fluroscence, confocal microscopy Microstereolithography	
4th we	Optical Tweezers Instrumentations Microstereolithography	
5th we	Manipulations -Scanning laser optical tweezers scanning frequency	
6th we	-Holographic optical tweezers	
7th we	Force measurements-Particle tracking	
8th we	-Optical Tweezers and Trap stiffness	
9th we	Numerical simulations-Optical Tweezers simulation in the Rayleigh regime	
10th w	-Optical Tweezers simulation through Ray-Optics	HW #1
11th w	-Numerical representation of tightly focused beams	HW #2
12th w	-Optical Tweezers simulation using the Finite Difference Time Difference method	
13th w	-FDTD simulations for trapping metals	Term project out
14th w	Final exam	
15th w	Term project presentation	
16th w	Term project presentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24609	Hrs.:E.:Crs	3: 0: 3	Instructor	김덕영
Course Title	Korean	비선형 광학					
	English	Nonlinear Optics					

Course Outline

Basic concepts of Nonlinear optics and their mathmatical expressions will be covered. Applications such as second harmonic generation, electro optic modulators, all-optical switches and solitons will be included as well.

Prerequisite	Nonlinear Optics E.G. Sauter Nonlinear Optics A.C. Newell, J.V. Moloney
Textbook and References	The Principles of Nonlinear Optics by Y.R. Shen

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Wave equation and refractive index	
3rd we	Coupled mode equations	
4th we	Anharmonic Oscillator model	
5th we	Second harmonic generation	
6th we	Optical crystals and susceptibility tensors	
7th we	Parametric amplication	
8th we	Electro optic modulator	
9th we	Third harmonic generation	
10th w	Optical Kerr effect and Self-Phase modulation	
11th w	Cascaded effects	
12th w	Four-wave mixing	
13th w	All-Optical switching devices	
14th w	Stimulated Raman/Brillioun scattering	
15th w	Nonlinear schrodinger equation	
16th w	Solitons	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24610	Hrs.:E.:Crs	3: 0: 3	Instructor	김영하
Course Title	Korean	생체의료용 고분자					
	English	Biomedical Polymers					

Course Outline

Lecture and discussion on biological background and the design strategy for polymeric materials for blood compatibility, tissue compatibility, drug delivery, and artificial organs. Application of polymers to various areas including cardiovascular, ophthalmic, orthopedical, dental or plastic surgical applications will be discussed.

Prerequisite	None
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Definition and Criteria of Biomaterials	
2nd we	Classification of Materials	
3rd we	Natural Polymers	
4th we	Materials / Body Interactions and Biocompatibility	
5th we	Blood-material Interactions and Coagulation	
6th we	Cardiovascular Application and Blood Compatible Polymers	
7th we	Inflammation and Immune System	
8th we	Wound Healing	
9th we	Hard/Soft Tissue Replacements	
10th w	Surgical Application	
11th w	Ophthalmic Application	
12th w	Dental Application	
13th w	Biodegradable Polymers and Application	
14th w	Tissue Engineering	
15th w	Drug / Gene Delivery Systems	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24612	Hrs.:E.:Crs	3: 0: 3	Instructor	김강욱
Course Title	Korean	의료시스템공학을 위한 전자공학 개론					
	English	Introduction to Electrical Engineering for Medical System Applications					

Course Outline

Fundamentals of electric and electronic engineering for medical system engineers. AC and DC circuit analysis, electronic circuits, logic circuits, communications theory, and electrical safety.

Prerequisite	None
Textbook and References	W. H. Roadstrum and D. H. Wolaver, Electrical Engineering for All Engin

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Basic circuit concepts - voltage, current, resistance, etc.	
2nd we	DC circuit analysis I	
3rd we	DC circuit analysis II	
4th we	AC circuit analysis I	
5th we	AC circuit analysis II	
6th we	Review and Exam I	
7th we	Electronic circuit components	
8th we	Digital signals and logic I	
9th we	Digital signals and logic II	
10th w	Feedback control systems	
11th w	Communications I	
12th w	Communications II	
13th w	Operational amplifiers I	
14th w	Operational amplifiers II	
15th w	Electrical safety	
16th w	Review and final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24613	Hrs.:E.:Crs	3 : 0 : 3	Instructor	류제하,정성호,양성,김영하,권
Course Title	Korean	의료시스템공학을 위한 기계 및 재료공학 개론					
	English	Intro. to Mech. and Materials Engineering for Medical System App.					

Course Outline

The course is offered to the student whose undergraduate major is in non-mechanics and/ or materials engineering area. This subject offers lecture on the fundamental mechanics and materials engineering in the solid mechanics, dynamics, heat transfer and materials for their potential applications to medical system design.

Prerequisite	Physics, Mathematics
Textbook and References	- T.J. Larder&S.H. Crandall, "An Introduction to the Mechanics of Solids, "the 2nd ed., Mcgraw-Hill, 1999 - S. Timoshenko& D.H. Young, "Elements of Strength of Materials." the 5th ed., Wadsworth publishing, 1998. - Theory of ibration with Applications, 5thed., Thomson and Dahleh, Prentice Hall,

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Solid Mechanics	
2nd we	Defromable Bodies	
3rd we	General Principle & Kinematics of Particle	
4th we	Kinematics of Rigid Bodies	
5th we	Kinetics of Particles and Rigid Bodies, Work & Energy Methods in	
6th we	Free and forced vibration	
7th we	Transient vibration (impulse, arbitrary), vibration analysis	
8th we	Mid-term Exam	
9th we	Heat conduction	
10th w	Heat convection	
11th w	Mass Transfer	
12th w	Crystalline Structure-Perfection	
13th w	Noncrystalline Structure-Imperfection	
14th w	Structural Materials	
15th w	Electronic and Magnetic Materials	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24624	Hrs.:E.:Crs	3: 0: 3	Instructor	양성
Course Title	Korean	기본유체역학					
	English	Fundamentals of Fluid Mechanics					

Course Outline

"Fundamentals of Fluid Mechanics" course is aiming at graduate students in the fluid/thermal sciences. The course will begin with a short primer on mathematical constructs and notation, followed by a derivation of the conservation equations. Thus you should expect the first few weeks of the course to be quite theoretical. Once we have derived the conservation equations, including the Navier-Stokes equations, we will focus on the solutions of the equations, both exact and approximate. this course emphasizes laminar flows so that topics such as transition to turbulence, flow stability, and turbulence will not be covered in this course.

Prerequisite	Engineering Mathematics (Required), Basic Fluid Mechanics (Preferred)
Textbook and References	Text and Reference Books 1. "Fluid Mechanics", 2nd Ed., Pijush K. Kundu and Ira M. Cohen, Academic Press, 2002 2. "Transport Phenomena", 2nd Ed., Bird, Steward, and Lightfoot, Wiley, 2007 Grading Pop Quizzes(10%), Homework(20%), Term Project(30%), FInal Exam(40%)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Mathematical constructs/representation	
2nd we	Mathematical constructs/representation, Kinematics	
3rd we	Kinematics	
4th we	Conservation Laws	
5th we	Conservation Laws	
6th we	Navier-Stokes eqn.	
7th we	Navier-Stokes eqn.	
8th we	Laminar Flows: Exact solutions of special cases	
9th we	Laminar Flows: Exact solutions of special cases	
10th w	Laminar Flows: Exact solutions of special cases	
11th w	Transient Flows	
12th w	Transient Flows / Vorticity Dynamics	
13th w	Vorticity Dynamics / Irrotational Flows	
14th w	Irrotational Flows	
15th w	Term Project Presentation	
16th w	Review and Comprehensive Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24630	Hrs.:E.:Crs	3 : 0 : 3	Instructor	김형일
Course Title	Korean	공학자를 위한 기초 신경학					
	English	Basic neuroscience for Engineers					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24631	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이보름
Course Title	Korean	공학도를 위한 생리학					
	English	Physiology for the Engineers					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24632	Hrs.:E.:Crs	3: 0: 3	Instructor	권혁상
Course Title	Korean	의생명 광학					
	English	Biomedical optics					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	24633	Hrs.:E.:Crs	3: 0: 3	Instructor	김용철
Course Title	Korean	의약화학 I					
	English	Medicinal Chemistry I					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	24901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Research for Master Thesis					

Course Outline

Opportunity for advanced MS students to study independently in consultation with their academic advisor.

Prerequisite	None
Textbook and References	None

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	None	None
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	24906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Research for Ph.D. Dissertation					

Course Outline

Opportunity for advanced PhD students to study independently in consultation with their academic advisor.

Prerequisite	None
Textbook and References	None

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	None	None
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22601	Hrs.:E.:Crs	3 : 0 : 3	Instructor	송계휴
Course Title	Korean	전자기학					
	English	Electromagnetics					

Course Outline

Electrostatics in dielectric media, Currents and magnetic fields, Origin of electricity and magnetism, Maxwell's equations, Propagation of electromagnetic wave, Radiation of electromagnetic wave.

Prerequisite	
Textbook and References	Foundations of electromagnetic theory, 4th edition, J. R. Reitz, F. J. Milford, R. W. Christy Classical Electrodynamics, 3rd ed. John David Jackson Introduction to Electromagnetic Theory, Tal L. Chow Engineering electromagnetics, 5th edition, W. H. Hayt, Jr.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to Electrostatics	
2nd we	Electrostatic energy and potential	
3rd we	Electrostatic field in dielectric and conducting media	
4th we	Solutions of some electrostatic problems	
5th we	Introduction to Magnetism	
6th we	Magnetic properties of matter	
7th we	Magnetic energy, force, and inductance	
8th we	Midterm Exam	
9th we	Boundary value problems in magnetism	
10th w	Plasma Physics	
11th w	Maxwell`s equations	
12th w	Electromagnetic waves	
13th w	Polarization and propagation	
14th w	Introduction to cavity and waveguide	
15th w	Dispersion and dielectric constant	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22603	Hrs.:E.:Crs	3 : 0 : 3	Instructor	박창수
Course Title	Korean	광통신시스템					
	English	Optical Communication Systems					

Course Outline

- Optical comm. system and network overview - Optical fibers -Optical transmitters - Optical receivers - Optical amplifiers
- Signal multiplexing and demultiplexing - System design and perform ance

Prerequisite	If any, Optics, Communication Theory, Semiconductor Physics, Waveguide Theory
Textbook and References	Text: Govind P. Agrawal, Fiber-Optic Communication Systems. Supplemental References: R. Hoss, Fiber Optical Communications (design Book); J. palais, Fiber Optic Communications.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22605	Hrs.:E.:Crs	3: 0: 3	Instructor	조영달
Course Title	Korean	양자역학					
	English	Quantum Physics for Engineering					

Course Outline

Quantum physics has not only been central in answering fundamental questions in science, but has served to further our capability to design and exploit phenomena for applications in materials engineering, electrical engineering and of course applied physics. Devices such as semiconductor lasers, light-emitting diodes, and transistors cannot be understood without considering quantum physics. This course provides the background in this field of science, including various examples for practical applications in device physics and photonics. Examples include: electronic energy levels in semiconductor transistors; the Kronig-Penney model for bandstructures; tunneling phenomena in semiconductor devices; impurities and excitons in semiconductors; time-dependent perturbation theory and optical transitions; carrier scattering processes; ferromagnetism and magnetic recording; and semiconductor light-emitting diodes.

Prerequisite	Mathematical Methods for Physics or Applied Engineering Mathematics
Textbook and References	Quantum Mechanics: Fundamentals & Applications to Technology by J. Singh (John Wiley & Sons, 1999). USEFUL REFERENCES: Introduction to Quantum Mechanics by D.J. Griffiths Wave mechanics applied to semiconductor heterostructures by G. Bastard The physics of low-dimensional semiconductors by J. H.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	General overivew	
2nd we	Review of classical mechanics	
3rd we	The limits of classical mechanics	
4th we	Mathematical formulation of quantum physics	
5th we	Schr?dinger wave equation	
6th we	Particles in simple potentials	
7th we	Kronig-Penny model for band structure	
8th we	Mid-term exam	
9th we	Tunneling problem	
10th w	Spherical symmtric potential	
11th w	Symmetries and conservation laws	
12th w	Time-independent approxiamtions-I	
13th w	Time-independent approximations-II	
14th w	Practical examples of variational method	
15th w	Contemporary application examples of quantum physics	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22606	Hrs.:E.:Crs	3 : 0 : 3	Instructor	정영주
Course Title	Korean	광학과 레이저					
	English	Optics and Lasers					

Course Outline

Review of electromagnetic theory, light propagation, geometrical optics, polarization, interference, wave optics, coherence, light amplification, characteristics of lasers, nonlinear optics.

Prerequisite	Electromagnetics
Textbook and References	Textbook: Pedrotti & Pedrotti, Introduction to Optics, 3rd ed. References: Born and Wolf, Principles of Optics, 7th ed. E. Hecht, Optics A. Yariv & P. Yeh, Optical Waves in Crystals A. E. Siegman, Lasers

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Historical review and background	
2nd we	Geometrical optics, optical instrumentation	
3rd we	Wave equations, superposition of waves	
4th we	Properties of lasers, interference of light	
5th we	Optical interferometry, coherence	
6th we	Fiber optics, Fraunhofer diffraction	
7th we	Fresnel diffraction, polarization, Mid-term exam	
8th we	Holography	
9th we	Matrix methods in paraxial optics	
10th w	Aberration theory, Fourier optics	
11th w	Theory of multilayer films, Fresnel equations	
12th w	Nonlinear optics and modulation of light	
13th w	Optical properties of materials, laser operation	
14th w	Characteristics of laser beams, laser applications	
15th w		
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22614	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이용탁
Course Title	Korean	반도체 레이저					
	English	Semiconductor Lasers					

Course Outline

To study principles of semiconductor laser operation, heterostructure materials, fabrication processes, structure design for specific application, modulation characteristerics, in addition, recent topics on Quantum Well Lasers, Surface Emitting Lasers, Semiconductor, Laser Amplifiers, etc. are studied.

Prerequisite	Optoelectronics(11653)
Textbook and References	Semiconductor Lasers 2nd Ed. G. P. Agrawal Van Nostrand Reinhold, 1993 Semiconductor Lasers, Past, Present and Future, G. P. Agrawal AIP Press 1995 Quantum Well Lasers, Peter S. Zony, Jr.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Principles of injection Laser Operation	
2nd we	Wave Propagation in waveguide	
3rd we	Modes in Lasers Structure	
4th we	Stimulated Emission	
5th we	Optical Gain	
6th we	Heterostructure Materials	
7th we	Epitaxy of Heterostructure	
8th we	Laser Structure and Fabrication Process	
9th we	Mid Term Exam	
10th w	Quantum Well Lasers	
11th w	Single Mode DFB & DBR Lasers	
12th w	Modulation Characteristics	
13th w	Surface Emitting Lasers	
14th w	Semiconductor Amplifiers	
15th w	Semiconductor Amplifiers	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22615	Hrs.:E.:Crs	3 : 0 : 3	Instructor	정성호
Course Title	Korean	레이저 공학					
	English	Laser Engineering					

Course Outline

Lasers are indispensable tools in many modern manufacturing processes and their applications continue expanding to broad areas of industry including micromachines, electronics, communications, and thin films. In this course, the mechanism and configuration of different types of lasers and their applications are introduced. Thermal, chemical, or other desorption mechanisms during laser-materials interaction and their dependency upon laser beam energy, wavelength, material properties will be covered. Optical techniques for laser energy monitoring, beam profiling, and beam delivery are also covered.

Prerequisite	None
Textbook and References	High Power Lasers in Production Engineering by Dieter Schuocker (World Scientific Publishing, 1999) Laser-beam interactions with materials : Physical principles and applications by M. von Allmen (Springer-Verlag, 1995)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Light and lasers	
2nd we	Laser principles	
3rd we	Characteristics of laser light	
4th we	Lasing medium and laser action	
5th we	Laser systems	
6th we	Laser systems	
7th we	Laser-materials interaction	
8th we	Thermal processes	
9th we	Non-thermal desorption processes	
10th w	High energy processes	
11th w	Laser processings of materials	
12th w	Laser welding	
13th w	Laser cutting	
14th w	Surface processing	
15th w	Optical measurement components	
16th w	Optical instrumentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22616	Hrs.:E.:Crs	3: 0: 3	Instructor	이종현
Course Title	Korean	MEMS/NEMS 공정 및 응용					
	English	MEMS/NEMS process and applications					

Course Outline

MEMS/NEMS devices are expected to be one of the key technologies for man-machine interface and ubiquitous sensor network in the 21st-century of information society. This course will deal with MEMS/NEMS (Micro/Nano Electro Mechanical Systems) material, micro/nano fabrication process, operational principles and applications as shown below. - introduction to MEMS/NEMS devices and materials, semiconductor fundamentals - fabrication of 3D micro/nano structures, low-stress film, dry release, process integration - scaling effects, micro/nano electro-mechanics, optical MEMS and microfluidics - application examples of MEMS/NEMS devices for information and biomedical fields

Prerequisite	None
Textbook and References	- N. Maluf, "An introduction to MEMS engineering," Artech House, 2000 - S. M. Sze, "Semiconductor Sensors," John Wiley & Sons Inc., 1994 - M. J. Madou, "Fundamentals of microfabrication," CRC press, 2002 - B. G. Streetman et al., "Solid State Electronic Devices," 5th ed., Prentice-Hall, 2000

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to MEMS/NEMS	
2nd we	Materials for MEMS/NEMS	
3rd we	Basic fabrication process	
4th we	Fundamentals of semiconductor physics	
5th we	Micromachining process design I	
6th we	Micromachining process design II	
7th we	Bulk micromachining I	
8th we	Mid-term exam	
9th we	Bulk micromachining II	
10th w	Surface micromachining	
11th w	Process issues & nano fabrication	
12th w	Micro-electro-mechanics	
13th w	Optical MEMS & medical microdevices	
14th w	Presentation I	
15th w	Presentation II	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22619	Hrs.:E.:Crs	3 : 0 : 3	Instructor	조병기
Course Title	Korean	자성재료					
	English	Magnetic Materials					

Course Outline

In this lecture, we review the basis concepts in electromagnetism and magnetic interaction required in understanding magnetic materials. The phase and phase transitions related to magnetism shall be studied in detail. Variety of magnetic properties such as magnetic anisotropy, magnetostriction, and magnetic hysteresis are discussed. Finally, we cover the magnetic thin films and multilayers as well as giant magneto-resistance with the perspective of material science.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Review of the basic Electromagnetism	
2nd we	Classical description of magnetism	
3rd we	Atomic magnetic dipole moment	
4th we	Exchange interaction	
5th we	Exchange interaction	
6th we	Paramagnetism	
7th we	Ferromagnetism	
8th we	Antiferromagnetism	
9th we	Magnetic phase transitions/Mid term exam	
10th w	Magnetic anisotropy	
11th w	Magnetic anisotropy	
12th w	Magnetostriction	
13th w	Shape and exchange anisotropy	
14th w	Nanomagnetism	
15th w	Applications of magnetic thin films	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22627	Hrs.:E.:Crs	3: 0: 3	Instructor	석희용
Course Title	Korean	고급 전자기학					
	English	Advanced Electromagnetics					

Course Outline

This is an dvanced electromagnetics course that covers basic Maxwell ' s equations and their applications, especially for electromagnetic waves and coherent radiations.

Prerequisite	undergraduate-level electromagnetics
Textbook and References	Classical Electrodynamics by J.D. Jackson and some other materials

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Maxwell ' s equations	
2nd we	electromagnetic waves and wave propagation	
3rd we	"	
4th we	waveguides, resonant cavities, optical fibers	
5th we	"	
6th we	radiating systems	
7th we	special theory of relativity	
8th we	mid-term exam	
9th we	radiation by moving charges	
10th w	"	
11th w	special topics : free electron laser	
12th w	"	
13th w	special topics :microwave source	
14th w	special topics :"	
15th w	final-term exam	
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22628	Hrs.:E.:Crs	3 : 0 : 3	Instructor	지상윤
Course Title	Korean	기하 광학					
	English	Geometrical Optics					

Course Outline

1. Basic nature of light 2. Image formation 3. Aberration 4. Optical systems 5. Optical computation

Prerequisite	General physic
Textbook and References	Modern optical engineering, Warren Smith

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Basic nature of light	
2nd we	Image formation	
3rd we	Image formation	
4th we	Aberration	
5th we	Aberration	
6th we	Prisms and mirror	
7th we	Prisms and mirror	
8th we	Mid term	
9th we	Stops and Apertures	
10th w	Stops and Apertures	
11th w	Optical systems	
12th w	Optical systems	
13th w	Optical computation	
14th w	Optical computation	
15th w	Optical computation	
16th w	Final	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22632	Hrs.:E.:Crs	1: 4: 3	Instructor	카롤야눌레비치
Course Title	Korean	현대 광학 실험론					
	English	Experimental methods of modern optics					

Course Outline

Essential goal of this course is preparation students to an experimental work with optical sources/lasers. The students will have an opportunity to learn and apply some fundamental measurement techniques useful for more advanced research. This laboratory practice-oriented part will be supported by the lectures on processing of the experimental data and error analysis both in a practice-oriented form. There will be introductory lectures to the topics of the experiments.

Prerequisite	
Textbook and References	P.R. Bevington, D. K. Robinson, Data reduction and error analysis for the physical sciences, McGraw Hill, 2003, 3rd edition Text for given experiments will be specified in the preparatory lectures

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Elementary error analysis	
2nd we	Data processing/analysis	
3rd we	Preparation to the first experimental work.I (part1)	
4th we	Preparation to the first experimental work.I (part 2)	
5th we	Student laboratory workI: 4 groups based on the rotational principle (every week a group changes its experimental stand)	6 hrs in a week 4 different experiments at
6th we		
7th we		
8th we		
9th we	Preparation to the first experimental work.II (part1)	
10th w	Preparation to the first experimental work.II (part 2)	
11th w	Student laboratory work II:4 groups based on the rotational principle (every week a group changes its experimental stand)	6 hrs in a week 4 different experiments at
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	22634	Hrs.:E.:Crs	3 : 0 : 3	Instructor	와테커
Course Title	Korean	광과학기술특론 I					
	English	Special Topics in Photonics I					

Course Outline

This course is intended to understand in-depth physics behind various phenomenon observed in optical fibers by using the simulation. Therefore, simulation techniques needed to study the characteristics will be discussed and used.

Prerequisite	No fundamental knowledge of optical fibers is expected. Students will have to solve simulation problems; therefore, they will have to learn Mathematica.
Textbook and References	1. G P Agrawal, FiberOptics Communication Systems, John Wiley and Sons Inc., 2002. 2. S. Sudo, Optical Fiber Amplifiers, Artech House Inc., 1997 3. Ghatak and Thyagarajan, Introduction to Optical Fibers, Cambridge University Press, 1999.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	"(a) Introduction to Optical Fibers: Its advantages, applications, limitations. Wave equation. (b) Basic Parameters: Linearly polarized modes, propagation constant, attenuation	
2nd we	"Matrix method to simulate arbitrary profile optical fiber: (a) Propagation characteristics: Modes, cutoff, propagation constant	
3rd we	"Chromatic dispersion: (a) Phase velocity, (b) Group velocity, (c) Material dispersion (d) Waveguide dispersion	
4th we	"(a) Chromatic dispersion effects: Pulse broadening, Chirping (b) Dispersion management and compensation"	
5th we	"Optical fiber amplifiers-1: (a) Introduction and types	
6th we	"Optical fiber amplifiers-2: (a) Simultaneous amplification and dispersion management	
7th we	"Introduction to Optical fiber Lasers: (a) Laser design, cavity optimization	
8th we	Mid Term Examination	
9th we	"Nonlinearity in optical fibers: part-1 (a) Self phase modulation, (b) Chirping due to SPM"	
10th w	"Specialty topics: (a) Soliton generation, (b) Super-continuum generation	
11th w	"Fiber Bragg gratings: (a) Physics and engineering behind FBG, (b) Couple moden equations, (c) FBG applications	
12th w	Long period gratings: Couple mode equations and it special application for measuring resonant nonlinearity in the optical fiber	
13th w	Raman effect, Raman amplifier, Raman laser	
14th w	"Nonlinearity in optical fibers: part-2 (a) Four wave mixing	
15th w	"Introduction to special topics: (a) Magneto-optic effect in optical fibers	
16th w	End Term Examination	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	22801	Hrs.:E.:Crs	1: 0: 1	Instructor	
Course Title	Korean	세미나					
	English	Seminar					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	22901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Thesis Research / M.S.					

Course Outline

석사학위논문 준비를 위한 연구

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	22906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Thesis Research / Ph.D.					

Course Outline

박사학위논문 준비를 위한 연구

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00003	Hrs.:E.:Crs	3 : 0 : 0	Instructor	이소림
Course Title	Korean	한국어 I					
	English	Beginner Korean I					

Course Outline

일상 생활에 필요한 회화에 익숙해지도록 학습하며, 생각이나 감정을 표현하거나 한국인들과 더 깊이 있는 의사소통이 되도록 학습한다.

Prerequisite	한국어 2 수료자 또는 그에 상당한 실력을 갖춘 자.
Textbook and References	Active Korean 13 Language Education Institute Seoul national University, Moonjinmedia. 2008.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	COURSE ORIENTATION , PRE-TEST	
2nd we	1과 경험 EXPERIENCE	
3rd we	1과 경험 EXPERIENCE	
4th we	2과 취미 HOBBIES	STUDENT`S ACTIVITY
5th we	2과 취미 HOBBIES	
6th we	3과 취업 EMPLOYMENT	
7th we	복습 REVIEW	
8th we	MID TERM EXAM	
9th we	4과 유행 FASHON	
10th w	5과 고장 OUT OF ORDER	
11th w	6과 변화 CHANGE	
12th w	7과 정보 INFORMATION	STUDENT`S ACTIVITY
13th w	문화체험학습 CULTURE CLASS	
14th w	8과 진실과 거짓 TRUE AND FALSE	
15th w	9과 갈등과 고민CONFLICT AND WORRY	
16th w	복습, 기말고사 REVIEW & FINAL EXAM	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00006	Hrs.:E.:Crs	3: 0: 0	Instructor	존 맥도날드
Course Title	Korean	영어 1 : 영작문					
	English	English I : Writing & Grammar					

Course Outline

This course will provide instruction and practice in academic and business writing skills. Students will learn to recognize and use patterns of organization commonly used in academic writing. Students will also develop skills of appropriate business communication, specifically email and job applications. This course follows an 'integrated skills' approach to expose learners to authentic models of English (i.e. listening and reading texts) as an essential stage in the writing process. Students will engage in all stages of the writing process i.e. planning, drafting, revising and final submission.

Prerequisite	None
Textbook and References	English I Writing & Grammar: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations, Self Evaluation.	
2nd we	Instruction & practice: Email communication	Assessment
3rd we	Writing Basics	
4th we	Error Recognition; Proofreading; Integrated skills: Writing task "Problem solving"	
5th we	Articles (A, An, The, and Ø); Punctuation & Grammar	
6th we	Parts of a paragraph: Topic sentences. Paragraph Structure	
7th we	Parts of a paragraph: Coherence	Assessment
8th we	Cover Letters and CVs ? Skills vocabulary	
9th we	CV Building: Brainstorming Skills and Experiences w/ Job Ad; CV Organization	
10th w	Cover Letter Building: Cover Letter structure	Assessment
11th w	Writing Summaries	
12th w	Essay Organization: Chronological Order; Logical Division of Ideas	
13th w	Essay Organization: Comparison & Contrast; Assignment Development: "Personality Comparisons" Preparation	
14th w	Assignment Development	Assessment
15th w	In-class writing: Assignment	Assessment
16th w	Final comments	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00006	Hrs.:E.:Crs	3: 0: 0	Instructor	데이빗 롤란드
Course Title	Korean	영어 1 : 영작문					
	English	English I : Writing & Grammar					

Course Outline

This course will provide instruction and practice in academic and business writing skills. Students will learn to recognize and use patterns of organization commonly used in academic writing. Students will also develop skills of appropriate business communication, specifically email and job applications. This course follows an 'integrated skills' approach to expose learners to authentic models of English (i.e. listening and reading texts) as an essential stage in the writing process. Students will engage in all stages of the writing process i.e. planning, drafting, revising and final submission.

Prerequisite	None
Textbook and References	English I Writing & Grammar: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations, Self Evaluation.	
2nd we	Instruction & practice: Email communication	Assessment
3rd we	Writing Basics	
4th we	Error Recognition; Proofreading; Integrated skills: Writing task "Problem solving"	
5th we	Articles (A, An, The, and Ø); Punctuation & Grammar	
6th we	Parts of a paragraph: Topic sentences. Paragraph Structure	
7th we	Parts of a paragraph: Coherence	Assessment
8th we	Cover Letters and CVs ? Skills vocabulary	
9th we	CV Building: Brainstorming Skills and Experiences w/ Job Ad; CV Organization	
10th w	Cover Letter Building: Cover Letter structure	Assessment
11th w	Writing Summaries	
12th w	Essay Organization: Chronological Order; Logical Division of Ideas	
13th w	Essay Organization: Comparison & Contrast; Assignment Development: "Personality Comparisons" Preparation	
14th w	Assignment Development	Assessment
15th w	In-class writing: Assignment	Assessment
16th w	Final comments	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00006	Hrs.:E.:Crs	3: 0: 0	Instructor	데이빗 롤란드
Course Title	Korean	영어 1 : 영작문					
	English	English I : Writing & Grammar					

Course Outline

This course will provide instruction and practice in academic and business writing skills. Students will learn to recognize and use patterns of organization commonly used in academic writing. Students will also develop skills of appropriate business communication, specifically email and job applications. This course follows an 'integrated skills' approach to expose learners to authentic models of English (i.e. listening and reading texts) as an essential stage in the writing process. Students will engage in all stages of the writing process i.e. planning, drafting, revising and final submission.

Prerequisite	None
Textbook and References	English I Writing & Grammar: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations, Self Evaluation.	
2nd we	Instruction & practice: Email communication	Assessment
3rd we	Writing Basics	
4th we	Error Recognition; Proofreading; Integrated skills: Writing task "Problem solving"	
5th we	Articles (A, An, The, and Ø); Punctuation & Grammar	
6th we	Parts of a paragraph: Topic sentences. Paragraph Structure	
7th we	Parts of a paragraph: Coherence	Assessment
8th we	Cover Letters and CVs ? Skills vocabulary	
9th we	CV Building: Brainstorming Skills and Experiences w/ Job Ad; CV Organization	
10th w	Cover Letter Building: Cover Letter structure	Assessment
11th w	Writing Summaries	
12th w	Essay Organization: Chronological Order; Logical Division of Ideas	
13th w	Essay Organization: Comparison & Contrast; Assignment Development: "Personality Comparisons" Preparation	
14th w	Assignment Development	Assessment
15th w	In-class writing: Assignment	Assessment
16th w	Final comments	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00006	Hrs.:E.:Crs	3: 0: 0	Instructor	
Course Title	Korean	영어 1 : 영작문					
	English	English I : Writing & Grammar					

Course Outline

This course will provide instruction and practice in academic and business writing skills. Students will learn to recognize and use patterns of organization commonly used in academic writing. Students will also develop skills of appropriate business communication, specifically email and job applications. This course follows an 'integrated skills' approach to expose learners to authentic models of English (i.e. listening and reading texts) as an essential stage in the writing process. Students will engage in all stages of the writing process i.e. planning, drafting, revising and final submission.

Prerequisite	None
Textbook and References	English I Writing & Grammar: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations, Self Evaluation.	
2nd we	Instruction & practice: Email communication	Assessment
3rd we	Writing Basics	
4th we	Error Recognition; Proofreading; Integrated skills: Writing task "Problem solving"	
5th we	Articles (A, An, The, and Ø); Punctuation & Grammar	
6th we	Parts of a paragraph: Topic sentences. Paragraph Structure	
7th we	Parts of a paragraph: Coherence	Assessment
8th we	Cover Letters and CVs ? Skills vocabulary	
9th we	CV Building: Brainstorming Skills and Experiences w/ Job Ad; CV Organization	
10th w	Cover Letter Building: Cover Letter structure	Assessment
11th w	Writing Summaries	
12th w	Essay Organization: Chronological Order; Logical Division of Ideas	
13th w	Essay Organization: Comparison & Contrast; Assignment Development: "Personality Comparisons" Preparation	
14th w	Assignment Development	Assessment
15th w	In-class writing: Assignment	Assessment
16th w	Final comments	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00006	Hrs.:E.:Crs	3: 0: 0	Instructor	
Course Title	Korean	영어 1 : 영작문					
	English	English I : Writing & Grammar					

Course Outline

This course will provide instruction and practice in academic and business writing skills. Students will learn to recognize and use patterns of organization commonly used in academic writing. Students will also develop skills of appropriate business communication, specifically email and job applications. This course follows an 'integrated skills' approach to expose learners to authentic models of English (i.e. listening and reading texts) as an essential stage in the writing process. Students will engage in all stages of the writing process i.e. planning, drafting, revising and final submission.

Prerequisite	None
Textbook and References	English I Writing & Grammar: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations, Self Evaluation.	
2nd we	Instruction & practice: Email communication	Assessment
3rd we	Writing Basics	
4th we	Error Recognition; Proofreading; Integrated skills: Writing task "Problem solving"	
5th we	Articles (A, An, The, and Ø); Punctuation & Grammar	
6th we	Parts of a paragraph: Topic sentences. Paragraph Structure	
7th we	Parts of a paragraph: Coherence	Assessment
8th we	Cover Letters and CVs ? Skills vocabulary	
9th we	CV Building: Brainstorming Skills and Experiences w/ Job Ad; CV Organization	
10th w	Cover Letter Building: Cover Letter structure	Assessment
11th w	Writing Summaries	
12th w	Essay Organization: Chronological Order; Logical Division of Ideas	
13th w	Essay Organization: Comparison & Contrast; Assignment Development: "Personality Comparisons" Preparation	
14th w	Assignment Development	Assessment
15th w	In-class writing: Assignment	Assessment
16th w	Final comments	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00006	Hrs.:E.:Crs	3: 0: 0	Instructor	
Course Title	Korean	영어 1 : 영작문					
	English	English I : Writing & Grammar					

Course Outline

This course will provide instruction and practice in academic and business writing skills. Students will learn to recognize and use patterns of organization commonly used in academic writing. Students will also develop skills of appropriate business communication, specifically email and job applications. This course follows an 'integrated skills' approach to expose learners to authentic models of English (i.e. listening and reading texts) as an essential stage in the writing process. Students will engage in all stages of the writing process i.e. planning, drafting, revising and final submission.

Prerequisite	None
Textbook and References	English I Writing & Grammar: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations, Self Evaluation.	
2nd we	Instruction & practice: Email communication	Assessment
3rd we	Writing Basics	
4th we	Error Recognition; Proofreading; Integrated skills: Writing task "Problem solving"	
5th we	Articles (A, An, The, and Ø); Punctuation & Grammar	
6th we	Parts of a paragraph: Topic sentences. Paragraph Structure	
7th we	Parts of a paragraph: Coherence	Assessment
8th we	Cover Letters and CVs ? Skills vocabulary	
9th we	CV Building: Brainstorming Skills and Experiences w/ Job Ad; CV Organization	
10th w	Cover Letter Building: Cover Letter structure	Assessment
11th w	Writing Summaries	
12th w	Essay Organization: Chronological Order; Logical Division of Ideas	
13th w	Essay Organization: Comparison & Contrast; Assignment Development: "Personality Comparisons" Preparation	
14th w	Assignment Development	Assessment
15th w	In-class writing: Assignment	Assessment
16th w	Final comments	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00007	Hrs.:E.:Crs	3: 0: 0	Instructor	존 맥도날드
Course Title	Korean	영어 1 : 영어회화					
	English	English I : Speaking & Listening					

Course Outline

This course covers areas pertaining to personal communication and presentation skills. Students will participate in small group discussions on topics of general interest as well as activities that require them to explain factual information. Effective speech presentation techniques are dealt with, including those involving formal feedback. A rapid overview of the English vowel and consonant sound systems and selected features of phrasing, stress, rhythm, and intonation will be covered. Methods pertaining to the improvement of note-taking and summarizing skills will be the focus of writing tasks given in this course.

Prerequisite	None
Textbook and References	English I Speaking & Listening: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations; SILL Self-Assessment	
2nd we	Goal Setting; Self Assessment Presentation	Assessment
3rd we	Questioning Skills; Opinion Language: Agree & Disagree; Egg Drop Competition	
4th we	Understanding Communication; Presentation Basics: Articulation, Body posture, Confidence	
5th we	Presentation Basics: Visual Aids; Language Organization: Lists, Sequences	
6th we	Language Organization: Cause & Effect; News; Story writing; Story boards	Assessment
7th we	Story Presentations; Story Presentations	Assessment
8th we	"Phobias": Listening for Main Idea, Notetaking & Summarizing; Listening for Specific Information & Presentation Preparation	
9th we	"Why": Adding reasons & Giving support to arguments; Phobias Presentations	Assessment
10th w	Cross-cultural Communication: Translations & Interpretations	
11th w	Poster Presentations: Instruction and Presentation	Assessment
12th w	Summarizing; Listening Practice	
13th w	Final Task: Recruiting (Instruction)	
14th w	Using what you know: Inclusive Language; Introducing yourself to others: Recruiting in English	
15th w	Recruiting Presentation; Listening Evaluation	Assessment
16th w	Personal Interviews concerning/determining student achievement	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00007	Hrs.:E.:Crs	3 : 0 : 0	Instructor	데이빗 롤란드
Course Title	Korean	영어 1 : 영어회화					
	English	English I : Speaking & Listening					

Course Outline

This course covers areas pertaining to personal communication and presentation skills. Students will participate in small group discussions on topics of general interest as well as activities that require them to explain factual information. Effective speech presentation techniques are dealt with, including those involving formal feedback. A rapid overview of the English vowel and consonant sound systems and selected features of phrasing, stress, rhythm, and intonation will be covered. Methods pertaining to the improvement of note-taking and summarizing skills will be the focus of writing tasks given in this course.

Prerequisite	None
Textbook and References	English I Speaking & Listening: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations; SILL Self-Assessment	
2nd we	Goal Setting; Self Assessment Presentation	Assessment
3rd we	Questioning Skills; Opinion Language: Agree & Disagree; Egg Drop Competition	
4th we	Understanding Communication; Presentation Basics: Articulation, Body posture, Confidence	
5th we	Presentation Basics: Visual Aids; Language Organization: Lists, Sequences	
6th we	Language Organization: Cause & Effect; News; Story writing; Story boards	Assessment
7th we	Story Presentations; Story Presentations	Assessment
8th we	"Phobias": Listening for Main Idea, Notetaking & Summarizing; Listening for Specific Information & Presentation Preparation	
9th we	"Why": Adding reasons & Giving support to arguments; Phobias Presentations	Assessment
10th w	Cross-cultural Communication: Translations & Interpretations	
11th w	Poster Presentations: Instruction and Presentation	Assessment
12th w	Summarizing; Listening Practice	
13th w	Final Task: Recruiting (Instruction)	
14th w	Using what you know: Inclusive Language; Introducing yourself to others: Recruiting in English	
15th w	Recruiting Presentation; Listening Evaluation	Assessment
16th w	Personal Interviews concerning/determining student achievement	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00007	Hrs.:E.:Crs	3: 0: 0	Instructor	
Course Title	Korean	영어 1 : 영어회화					
	English	English I : Speaking & Listening					

Course Outline

This course covers areas pertaining to personal communication and presentation skills. Students will participate in small group discussions on topics of general interest as well as activities that require them to explain factual information. Effective speech presentation techniques are dealt with, including those involving formal feedback. A rapid overview of the English vowel and consonant sound systems and selected features of phrasing, stress, rhythm, and intonation will be covered. Methods pertaining to the improvement of note-taking and summarizing skills will be the focus of writing tasks given in this course.

Prerequisite	None
Textbook and References	English I Speaking & Listening: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations; SILL Self-Assessment	
2nd we	Goal Setting; Self Assessment Presentation	Assessment
3rd we	Questioning Skills; Opinion Language: Agree & Disagree; Egg Drop Competition	
4th we	Understanding Communication; Presentation Basics: Articulation, Body posture, Confidence	
5th we	Presentation Basics: Visual Aids; Language Organization: Lists, Sequences	
6th we	Language Organization: Cause & Effect; News; Story writing; Story boards	Assessment
7th we	Story Presentations; Story Presentations	Assessment
8th we	"Phobias": Listening for Main Idea, Notetaking & Summarizing; Listening for Specific Information & Presentation Preparation	
9th we	"Why": Adding reasons & Giving support to arguments; Phobias Presentations	Assessment
10th w	Cross-cultural Communication: Translations & Interpretations	
11th w	Poster Presentations: Instruction and Presentation	Assessment
12th w	Summarizing; Listening Practice	
13th w	Final Task: Recruiting (Instruction)	
14th w	Using what you know: Inclusive Language; Introducing yourself to others: Recruiting in English	
15th w	Recruiting Presentation; Listening Evaluation	Assessment
16th w	Personal Interviews concerning/determining student achievement	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00007	Hrs.:E.:Crs	3 : 0 : 0	Instructor	
Course Title	Korean	영어 1 : 영어회화					
	English	English I : Speaking & Listening					

Course Outline

This course covers areas pertaining to personal communication and presentation skills. Students will participate in small group discussions on topics of general interest as well as activities that require them to explain factual information. Effective speech presentation techniques are dealt with, including those involving formal feedback. A rapid overview of the English vowel and consonant sound systems and selected features of phrasing, stress, rhythm, and intonation will be covered. Methods pertaining to the improvement of note-taking and summarizing skills will be the focus of writing tasks given in this course.

Prerequisite	None
Textbook and References	English I Speaking & Listening: Fall, 2008 original text to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation; Previous learning experience; Expectations; SILL Self-Assessment	
2nd we	Goal Setting; Self Assessment Presentation	Assessment
3rd we	Questioning Skills; Opinion Language: Agree & Disagree; Egg Drop Competition	
4th we	Understanding Communication; Presentation Basics: Articulation, Body posture, Confidence	
5th we	Presentation Basics: Visual Aids; Language Organization: Lists, Sequences	
6th we	Language Organization: Cause & Effect; News; Story writing; Story boards	Assessment
7th we	Story Presentations; Story Presentations	Assessment
8th we	"Phobias": Listening for Main Idea, Notetaking & Summarizing; Listening for Specific Information & Presentation Preparation	
9th we	"Why": Adding reasons & Giving support to arguments; Phobias Presentations	Assessment
10th w	Cross-cultural Communication: Translations & Interpretations	
11th w	Poster Presentations: Instruction and Presentation	Assessment
12th w	Summarizing; Listening Practice	
13th w	Final Task: Recruiting (Instruction)	
14th w	Using what you know: Inclusive Language; Introducing yourself to others: Recruiting in English	
15th w	Recruiting Presentation; Listening Evaluation	Assessment
16th w	Personal Interviews concerning/determining student achievement	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00008	Hrs.:E.:Crs	3: 0: 0	Instructor	존 맥도날드
Course Title	Korean	영어 2 : 학술작문					
	English	English II : Academic Writing					

Course Outline

The class deals with using your own materials as much as possible, to prepare short texts of the following types: problem solution, general-specific, process description, and data commentary as well as article summary and critique. In the second half of the course, students will write a "research paper", work-in-progress, for example, a literature review, a draft introductory chapter to a thesis or dissertation, or a draft of an article they are preparing for publication.

Prerequisite	English 1: Writing and Grammar
Textbook and References	English II Academic Writing: Fall, 2008 to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation, Introductions, Expectations; Formal Emails: Politeness, Errors	
2nd we	Formal Emails: Practice; Task: Formal Email & Writing sample	Assessment
3rd we	Guide to Science Writing; Word Choice in Academic Writing	
4th we	Word Choice & Practice	Assessment
5th we	Sentence Writing: Instruction and Practice	
6th we	Paragraph Writing: Instruction and Practice	
7th we	General-Specific Texts; Problem-Solution Texts	
8th we	Mid-session Assessment; Research Paper (RP) Construction: Introduction	Assessment
9th we	RP Construction: Methods	
10th w	RP Construction: Data Commentary	
11th w	RP Construction: Results/Discussion/Conclusion I	
12th w	RP Construction: Results/Discussion/Conclusion II	
13th w	Bring Draft for Discussion; RP Review/Consultations	
14th w	RP Construction: Titles/Abstracts	
15th w	Final Project Preparation: Consultations; Final Assessment	Assessment
16th w	Final Reports and Feedback	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00008	Hrs.:E.:Crs	3: 0: 0	Instructor	데이빗 롤란드
Course Title	Korean	영어 2 : 학술작문					
	English	English II : Academic Writing					

Course Outline

The class deals with using your own materials as much as possible, to prepare short texts of the following types: problem solution, general-specific, process description, and data commentary as well as article summary and critique. In the second half of the course, students will write a "research paper", work-in-progress, for example, a literature review, a draft introductory chapter to a thesis or dissertation, or a draft of an article they are preparing for publication.

Prerequisite	English 1: Writing and Grammar
Textbook and References	English II Academic Writing: Fall, 2008 to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation, Introductions, Expectations; Formal Emails: Politeness, Errors	
2nd we	Formal Emails: Practice; Task: Formal Email & Writing sample	Assessment
3rd we	Guide to Science Writing; Word Choice in Academic Writing	
4th we	Word Choice & Practice	Assessment
5th we	Sentence Writing: Instruction and Practice	
6th we	Paragraph Writing: Instruction and Practice	
7th we	General-Specific Texts; Problem-Solution Texts	
8th we	Mid-session Assessment; Research Paper (RP) Construction: Introduction	Assessment
9th we	RP Construction: Methods	
10th w	RP Construction: Data Commentary	
11th w	RP Construction: Results/Discussion/Conclusion I	
12th w	RP Construction: Results/Discussion/Conclusion II	
13th w	Bring Draft for Discussion; RP Review/Consultations	
14th w	RP Construction: Titles/Abstracts	
15th w	Final Project Preparation: Consultations; Final Assessment	Assessment
16th w	Final Reports and Feedback	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	required	Course No.	00009	Hrs.:E.:Crs	3: 0: 0	Instructor	존 맥도날드
Course Title	Korean	영어 2 : 프리젠테이션					
	English	English II : Presentation & Pronunciation					

Course Outline

English II: Presentation & Pronunciation encourages informal interaction to develop confidence and fluency. The 2nd half of the course has greater emphasis on formal seminar skills, effective public speaking and academic presentation skills. There will be a strong emphasis on remedial phonology in order to analyze and minimize pronunciation errors at the word and sentence level. Students' progress will be monitored with regular assessment. Participation in class activities will also be monitored. Active participation by learners will ensure incidental development in related skills such as advanced vocabulary, grammar and listening skills.

Prerequisite	English 1: Speaking and Listening
Textbook and References	English II Pronunciation and Presentations: Fall, 2008 to be purchased.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Orientation, self-evaluation, and needs analysis	
2nd we	Interactive communication: Developing fluency and confidence	
3rd we	Skills seminar: Preparation for 2-minute video (body language & public speaking)	Assessment
4th we	Effective public speaking: Instruction & Practice; Stress, intonation, and pausing	
5th we	Phonology Practice & Assessment; Skills development: Giving advice, using appropriate language and style	Assessment
6th we	Role-play: Advising & Counseling; Toastmasters topics	Assessment
7th we	Review of skills: Fluency plus accuracy; Presentation Practice "GIST Influences"	
8th we	Seminar: Instructions and practice for 1st presentations; Fluency practice and informal, individual feedback on skills	
9th we	Preparation for Presentation (News Influence) and First Presentations	Assessment
10th w	Discussion skills: Effective speaking; Content & style of expressing opinion in an academic context	Assessment
11th w	Expressing your point of view: "Heart-felt Speech" ; Short presentations of effective speaking	
12th w	Debating skills: Instruction & Practice; The Great Debate	Assessment
13th w	Poster Presentations: Instruction and Practice	Assessment
14th w	PowerPoint Presentations: Instructions & Criteria; Effective Interview skills: Instructions & Practice	
15th w	PowerPoint Presentations	Assessment
16th w	Final grades	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	00606	Hrs.:E.:Crs	3 : 0 : 0	Instructor	이소림
Course Title	Korean	한국어 II					
	English	Low Intermediate Korean II					

Course Outline

한글 공부를 마친 학생들을 대상으로 일상 생활에 필요한 회화를 익힌다.

Prerequisite	한국어 1 수료자 또는 그에 상당한 수준을 갖춘 자.
Textbook and References	Active Korean 2, Language Education Institute Seoul national University, Moonjinmedia. 2008.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	COURSE ORIENTATION , PRE-TEST	
2nd we	1과 가족 FAMILY	
3rd we	1과 가족 FAMILY	
4th we	2과 교통 TRANSPORTATION	STUDENT`S ACTIVITY
5th we	3과 이유 REASON	
6th we	4과 우체국 POST OFFICE	
7th we	복습 REVIEW	
8th we	MID TERM EXAM	
9th we	5과 예약 RESERVATIONS	
10th w	5과 예약 RESERVATIONS	
11th w	6과 예의 ETIQUETTE	STUDENT`S ACTIVITY
12th w	7과 병원 HOSPITAL	
13th w	문화체험학습 CULTURE CLASS	
14th w	8과 충고와 제안 ADVUCE&SUGGESTIONS	
15th w	9과 쇼핑 SHOPPING	
16th w	복습, 기말고사 REVIEW & FINAL EXAM	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	00609	Hrs.:E.:Crs	3: 0: 0	Instructor	이소림
Course Title	Korean	한국어 III					
	English	High Intermediate Korean III					

Course Outline

일상 생활에 필요한 회화에 익숙해지도록 학습하며, 생각이나 감정을 표현하거나 한국인들과 더 깊이 있는 의사소통이 되도록 학습한다.

Prerequisite	한국어 2 수료자 또는 그에 상당한 실력을 갖춘 자.
Textbook and References	Active Korean 13 Language Education Institute Seoul national University, Moonjinmedia. 2008.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	COURSE ORIENTATION , PRE-TEST	
2nd we	1과 경험 EXPERIENCE	
3rd we	1과 경험 EXPERIENCE	
4th we	2과 취미 HOBBIES	STUDENT`S ACTIVITY
5th we	2과 취미 HOBBIES	
6th we	3과 취업 EMPLOYMENT	
7th we	복습 REVIEW	
8th we	MID TERM EXAM	
9th we	4과 유행 FASHON	
10th w	5과 고장 OUT OF ORDER	
11th w	6과 변화 CHANGE	
12th w	7과 정보 INFORMATION	STUDENT`S ACTIVITY
13th w	문화체험학습 CULTURE CLASS	
14th w	8과 진실과 거짓 TRUE AND FALSE	
15th w	9과 갈등과 고민CONFLICT AND WORRY	
16th w	복습, 기말고사 REVIEW & FINAL EXAM	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	26601	Hrs.:E.:Crs	3 : 0 : 3	Instructor	송계휴
Course Title	Korean	전자기학					
	English	Electromagnetics					

Course Outline

Electrostatics in dielectric media, Currents and magnetic fields, Origin of electricity and magnetism, Maxwell's equations, Propagation of electromagnetic wave, Radiation of electromagnetic wave.

Prerequisite	
Textbook and References	Foundations of electromagnetic theory, 4th edition, J. R. Reitz, F. J. Milford, R. W. Christy Classical Electrodynamics, 3rd ed. John David Jackson Introduction to Electromagnetic Theory, Tal L. Chow Engineering electromagnetics, 5th edition, W. H. Hayt, Jr.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to Electrostatics	
2nd we	Electrostatic energy and potential	
3rd we	Electrostatic field in dielectric and conducting media	
4th we	Solutions of some electrostatic problems	
5th we	Introduction to Magnetism	
6th we	Magnetic properties of matter	
7th we	Magnetic energy, force, and inductance	
8th we	Midterm Exam	
9th we	Boundary value problems in magnetism	
10th w	Plasma Physics	
11th w	Maxwell`s equations	
12th w	Electromagnetic waves	
13th w	Polarization and propagation	
14th w	Introduction to cavity and waveguide	
15th w	Dispersion and dielectric constant	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	26606	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이광희
Course Title	Korean	유기물광전자 I					
	English	Organic Materials for Electronics and Photonics I					

Course Outline

The main purpose of this course is to understand basic concepts, mechanisms, and current issues in Polymer Electronics and Optoelectronics, so called 'Plastic Electronics", which utilizes novel materials exhibiting the electrical and optical properties of metals or semiconductors 'and' which retain the attractive mechanical properties and processing advantages of polymers.

Prerequisite	"Introduction to Solid State Physics" (C. Kittel)
Textbook and References	- Pope and Swenberg, "Electronic Processes in Organic Crystals and Polymers", Second Edition, Oxford Univ. Press, 1999. - Hadziioannou and P.F. van Hutten (eds), `Semiconducting Polymers`, Wiley-VCH, 2000.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction: Vision of `Plastic Electronics`	
2nd we	Semiconducting Polymers I: Basic	
3rd we	Semiconducting Polymers II: Electronic Structure	
4th we	Semiconducting Polymers III: Bond Relaxation	Quiz 1
5th we	Semiconducting Polymers IV: Photoexcitation	
6th we	Semiconducting Polymers V: Photoinduced Charge Transfer	
7th we	Metallic Polymers I: Basic	
8th we	Metallic Polymers II: Doping	Midterm
9th we	Metallic Polymers III: Metal-Insulator Transition	
10th w	Metallic Polymers IV: True Metallic Transport	
11th w	Polymer Light-Emitting Diodes I: Basic	
12th w	Polymer Light-Emitting Diodes II: Advanced	Quiz2
13th w	Polymer Solar Cells I: Basic	
14th w	Polymer Solar Cells II: Advanced	
15th w	Polymer Field-Effect Transistors I: Basic	
16th w	Polymer Field-Effect Transistors II: Advanced	Final

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	26608	Hrs.:E.:Crs	3 : 0 : 3	Instructor	정영주
Course Title	Korean	광학과 레이저					
	English	Optics and Lasers					

Course Outline

Review of electromagnetic theory, light propagation, geometrical optics, polarization, interference, wave optics, coherence, light amplification, characteristics of lasers, nonlinear optics.

Prerequisite	Electromagnetics
Textbook and References	Textbook: Pedrotti & Pedrotti, Introduction to Optics, 3rd ed. References: Born and Wolf, Principles of Optics, 7th ed. E. Hecht, Optics A. Yariv & P. Yeh, Optical Waves in Crystals A. E. Siegman, Lasers

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Historical review and background	
2nd we	Geometrical optics, optical instrumentation	
3rd we	Wave equations, superposition of waves	
4th we	Properties of lasers, interference of light	
5th we	Optical interferometry, coherence	
6th we	Fiber optics, Fraunhofer diffraction	
7th we	Fresnel diffraction, polarization, Mid-term exam	
8th we	Holography	
9th we	Matrix methods in paraxial optics	
10th w	Aberration theory, Fourier optics	
11th w	Theory of multilayer films, Fresnel equations	
12th w	Nonlinear optics and modulation of light	
13th w	Optical properties of materials, laser operation	
14th w	Characteristics of laser beams, laser applications	
15th w		
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	26901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Research for Master Dissertation					

Course Outline

Research study at the M.S. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	26906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Research for Ph.D. Dissertation					

Course Outline

Research study at the Ph.D. level.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02607	Hrs.:E.:Crs	3 : 0 : 3	Instructor	우루
Course Title	Korean	나노공정특론					
	English	Introduction to Nanofabrication and Nanomanufacturing					

Course Outline

1. Students will learn the fundamentals of nano-fabrication and manufacturing technologies. 2. Students will be exposed to the instrumentation and equipment for nanoscale device processing and characterization. 3. Students will develop basic understanding of integration of nanoscale devices and systems for biomedical applications.

Prerequisite	graduate student standing or permission of instructor
Textbook and References	Textbook: None, Selected book chapters, journal papers, and handouts. References (supplemental reading): 1) "Introduction to Nanoscale Science and Technology", Edited by Massimiliano Di Ventra, Stephane Evoy, and James R. Heflin Jr. , Springer, 2004. 2) "Nanotechnology: Basic Science and..

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction to nanotechnology	
2nd we	Optical lithography	
3rd we	Optical lithography	
4th we	Electron beam lithography	
5th we	X-ray lithography and LIGA	
6th we	Nanoimprinting and Dip-pen lithography	
7th we	Scanning Probe Microscopy	
8th we	Self-assembly and self-organization	
9th we	Thin film deposition	
10th w	Dry etching technologies	
11th w	Bulk and surface micromachining techniques for the fabrication of master molds	
12th w	Polymer processing for biomedical applications	
13th w	Near-field optical techniques for nanoscale fabrication and characterization	
14th w	Integration of nanoscale biomedical devices and systems	
15th w	Student presentation	
16th w	Student presentation	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02610	Hrs.:E.:Crs	3: 0: 3	Instructor	태기융
Course Title	Korean	생분해성 고분자와 수화젤					
	English	Biodegradable polymer and hydrogel					

Course Outline

This course is to provide the concepts and various kinds of biodegradable polymers and hydrogel systems. Also, it covers from the general concept of diffusion to the release profile of molecules dispersed inside the biodegradable polymer or hydrogel.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Definition of biodegradable polymer	
2nd we	In vivo degradable, synthetic solid polymers	
3rd we	In vivo degradable, biologically originated systems	
4th we	Environmentally degradable synthetic polymer	
5th we	Environmentally degradable natural polymers	
6th we	Elastomer	
7th we	Swelling behavio	
8th we	Chemically crosslinked hydrogel	
9th we	Biodegradable crosslinked hydrogel	
10th w	Physical hydroge	
11th w	Polyelectrolyte hydrogel	
12th w	Diffusion: concept	
13th w	Diffusion profiles in special cases	
14th w	Diffusion in biological system	
15th w	Release of molecules from degradable polymer	
16th w	Release of molecules from hydrogel	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02612	Hrs.:E.:Crs	3: 0: 3	Instructor	김영하
Course Title	Korean	생체의료용 고분자					
	English	Biomedical Polymers					

Course Outline

Lecture and discussion on biological background and the design strategy for polymeric materials for blood compatibility, tissue compatibility, drug delivery, and artificial organs. Application of polymers to various areas including cardiovascular, ophthalmic, orthopedical, dental or plastic surgical applications will be discussed.

Prerequisite	None
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Definition and Criteria of Biomaterials	
2nd we	Classification of Materials	
3rd we	Natural Polymers	
4th we	Materials / Body Interactions and Biocompatibility	
5th we	Blood-material Interactions and Coagulation	
6th we	Cardiovascular Application and Blood Compatible Polymers	
7th we	Inflammation and Immune System	
8th we	Wound Healing	
9th we	Hard/Soft Tissue Replacements	
10th w	Surgical Application	
11th w	Ophthalmic Application	
12th w	Dental Application	
13th w	Biodegradable Polymers and Application	
14th w	Tissue Engineering	
15th w	Drug / Gene Delivery Systems	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02614	Hrs.:E.:Crs	3: 0: 3	Instructor	김동유
Course Title	Korean	고분자 구조 및 특성					
	English	Structure Property Relationship of Polymers					

Course Outline

The main purpose of this course is to collect and organize understanding of the relationships between structure, properties and applications of polymer materials. The important polymer properties such as processability, mechanical, thermal, electrical, optical, acoustic, chemical and surface properties will be discussed from various aspects of polymer structures. (More thorough discussion of the physical and mechanical properties will be given at the course No. 3603.)

Prerequisite	
Textbook and References	Polymer Structure, Properties and Applications, R. D. Deanin, Cahners, Boston, 1972

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	submolecular structure:	
3rd we	chemical composition & properties	
4th we	Molecular structure I:	
5th we	size and shape & properties	
6th we	Molecular structure II:	
7th we	molecular flexibility & properties	
8th we	Intermolecular structure I:	
9th we	intermolecular order & properties	
10th w	Intermolecular structure II:	
11th w	intermolecular bonding & properties	
12th w	Supermolecular structure I: multiple phases	
13th w	Supermolecular structure II: macrostructure	
14th w	Commercial polymers: properties and applications	
15th w	Commercial polymers: properties and applications	
16th w	Commercial polymers: properties and applications	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02616	Hrs.:E.:Crs	3 : 0 : 3	Instructor	이광희
Course Title	Korean	유기물광전자 I					
	English	Organic Materials for Electronics and Photonics I					

Course Outline

The main purpose of this course is to understand basic concepts, mechanisms, and current issues in Polymer Electronics and Optoelectronics, so called 'Plastic Electronics", which utilizes novel materials exhibiting the electrical and optical properties of metals or semiconductors 'and' which retain the attractive mechanical properties and processing advantages of polymers.

Prerequisite	"Introduction to Solid State Physics" (C. Kittel)
Textbook and References	- Pope and Swenberg, "Electronic Processes in Organic Crystals and Polymers", Second Edition, Oxford Univ. Press, 1999. - Hadziioannou and P.F. van Hutten (eds), `Semiconducting Polymers`, Wiley-VCH, 2000.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction: Vision of `Plastic Electronics`	
2nd we	Semiconducting Polymers I: Basic	
3rd we	Semiconducting Polymers II: Electronic Structure	
4th we	Semiconducting Polymers III: Bond Relaxation	Quiz 1
5th we	Semiconducting Polymers IV: Photoexcitation	
6th we	Semiconducting Polymers V: Photoinduced Charge Transfer	
7th we	Metallic Polymers I: Basic	
8th we	Metallic Polymers II: Doping	Midterm
9th we	Metallic Polymers III: Metal-Insulator Transition	
10th w	Metallic Polymers IV: True Metallic Transport	
11th w	Polymer Light-Emitting Diodes I: Basic	
12th w	Polymer Light-Emitting Diodes II: Advanced	Quiz2
13th w	Polymer Solar Cells I: Basic	
14th w	Polymer Solar Cells II: Advanced	
15th w	Polymer Field-Effect Transistors I: Basic	
16th w	Polymer Field-Effect Transistors II: Advanced	Final

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02620	Hrs.:E.:Crs	3: 0: 3	Instructor	이탁희
Course Title	Korean	전자재료과학					
	English	Electronic Properties of Materials					

Course Outline

Basic electrical, optical, magnetic, and thermal properties of various materials such as metals, semiconductors, and ceramics (and superconductors) will be studied based on their electronic structures

Prerequisite	
Textbook and References	Text book: Electronic Properties of Materials by Rolf E. Hummel Reference: Materials science for Electrical and Electronic Engineers by Ian P. Jones

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Fundamentals of electron theory	
2nd we	Energy band	
3rd we	Crystal	
4th we	Metals, alloys	
5th we	Polymers, ceramics	
6th we	Dielectrics, amorphous materials	
7th we	Semiconductors I	
8th we	Semiconductors II	
9th we	Optical properties I	
10th w	Optical properties II	
11th w	Magnetic properties I	
12th w	Magnetic properties II	
13th w	Thermal properties I	
14th w	Thermal properties II	
15th w	Superconductors I	
16th w	Superconductors II	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02624	Hrs.:E.:Crs	3: 0: 3	Instructor	황현상
Course Title	Korean	반도체공정					
	English	Semiconductor Processing					

Course Outline

The purpose of this course is to provide students with technical background on silicon process technology for VLSI. The topics to be discussed by class are as shown below 1. Semiconductor process review 2. Crystal growth and oxidation 3. Doping Process such as ion implantation and diffusion 4. Deposited thin film: polysilicon, oxide, nitride, metals 5. Metallization and Contacts process 6. Lithography & Etching Process 7. Process Integration and SUPREM modeling

Prerequisite	
Textbook and References	1.ULSI Technology, C.Y. CHANG and S. M. SZE, McGrow-Hill Book Co. 1996 2. VLSI Fabrication Principles, 2nd Ed, Ghandhi, John wiley & Sons, 1994 3. Silicon Processing for the VLSI Era. Vol. 3: process integration, S. Wolf, Lattice Press

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	ULSI Process Overview : Introduction	
2nd we	Wafer Cleaning Technology	
3rd we	EPITAXY	
4th we	Conventional and Rapid Thermal Process-I	
5th we	Conventional and Rapid Thermal Process-II	
6th we	Dielectric and Polysilicon Deposition	
7th we	Etching	
8th we	Lithography	
9th we	MIDTERM/ Ion Implantation - I	
10th w	Ion Implantation - II	
11th w	Metallization -I	
12th w	Process Modeling : SUPREM-III, IV part-1	
13th w	Process Modeling : SUPREM-III, IV part-2	
14th w	Process Integration-I	
15th w	Process Integration-II	
16th w	FINAL	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02625	Hrs.:E.:Crs	3: 0: 3	Instructor	조병기
Course Title	Korean	자성재료					
	English	Magnetic Materials					

Course Outline

In this lecture, we review the basis concepts in electromagnetism and magnetic interaction required in understanding magnetic materials. The phase and phase transitions related to magnetism shall be studied in detail. Variety of magnetic properties such as magnetic anisotropy, magnetostriction, and magnetic hysteresis are discussed. Finally, we cover the magnetic thin films and multilayers as well as giant magneto-resistance with the perspective of material science.

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Review of the basic Electromagnetism	
2nd we	Classical description of magnetism	
3rd we	Atomic magnetic dipole moment	
4th we	Exchange interaction	
5th we	Exchange interaction	
6th we	Paramagnetism	
7th we	Ferromagnetism	
8th we	Antiferromagnetism	
9th we	Magnetic phase transitions/Mid term exam	
10th w	Magnetic anisotropy	
11th w	Magnetic anisotropy	
12th w	Magnetostriction	
13th w	Shape and exchange anisotropy	
14th w	Nanomagnetism	
15th w	Applications of magnetic thin films	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02643	Hrs.:E.:Crs	3: 0: 3	Instructor	송종인
Course Title	Korean	아나로그 집적회로 설계					
	English	Analog Integrated Circuit Design					

Course Outline

This course covers analog integrated circuit design including models for passive and active elements, design and analysis of basic building blocks used for integrated circuits.

Prerequisite	Basic electronic circuit design, Basic semiconductor device physics
Textbook and References	P. Gray, Analysis and design of analog integrated circuits, 3rd ed. John Wiley & Sons, Inc.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction to integrated circuit design	
2nd we	Models for IC active devices	
3rd we	Integrated circuit technologies	
4th we	Single- and Multiple-transistor amplifiers	
5th we	Single- and Multiple-transistor amplifiers	
6th we	Current sources and active loads	
7th we	Current sources and active loads	Midterm Exam
8th we	Output stages	
9th we	Operational amplifier	
10th w	Operational amplifier	
11th w	Operational amplifier	
12th w	Operational amplifier	
13th w	Frequency response of integrated circuits	
14th w	Frequency response of integrated circuits	
15th w	Frequency response of integrated circuits	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02645	Hrs.:E.:Crs	3: 0: 3	Instructor	임혁
Course Title	Korean	컴퓨터 네트워킹					
	English	Computer Networking					

Course Outline

This lecture consists of three parts. In the first part, we will discuss various issues on data networking in a top-down manner, by beginning at the application layer and moving on towards the physical layer as done in the main textbook. In the second part, we will read several research papers to deal with the state-of-the-art research on data communication and networking areas. In the third part, we will carry out a research project to have a hand-on experience in computer networking systems and to understand how they work in an algorithm level.

Prerequisite	Experience with C/C++ programming
Textbook and References	J.F. Kurose and K.W. Ross, Computer Networking: A Top Down Approach Featuring the Internet, Addison-Wesley Longman [Supplementary] L. Peterson and B. Davies, Computer Networks: A Systems Approach, Morgan Kaufman

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Network characteristics and measurement	
3rd we	Application layer	
4th we	Unix network programming	
5th we	Transport Layer : Multiplexing/demultiplexing	
6th we	Transport Layer: UDP / TCP	
7th we	Transport Layer: Cogestion control	
8th we	Network Layer: Virtual circuit and datagram network	Midterm exam
9th we	Network Layer: Internet Protocol	
10th w	Network Layer: Routing	
11th w	Network Layer: Broadcast and multicast	
12th w	Link Layer: Multiple Access Protocol	
13th w	Link Layer: Ethernet	
14th w	Wireless and Mobile Networks	
15th w	Multimedia Networking	
16th w	Security	Finalterm exam

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02646	Hrs.:E.:Crs	3: 0: 3	Instructor	이용탁
Course Title	Korean	반도체 레이저					
	English	Semiconductor Lasers					

Course Outline

To study principles of semiconductor laser operation, heterostructure materials, fabrication processes, structure design for specific application, modulation characteristerics, in addition, recent topics on Quantum Well Lasers, Surface Emitting Lasers, Semiconductor, Laser Amplifiers, etc. are studied.

Prerequisite	Optoelectronics(11653)
Textbook and References	Semiconductor Lasers 2nd Ed. G. P. Agrawal Van Nostrand Reinhold, 1993 Semiconductor Lasers, Past, Present and Future, G. P. Agrawal AIP Press 1995 Quantum Well Lasers, Peter S. Zony, Jr.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Principles of injection Laser Operation	
2nd we	Wave Propagation in waveguide	
3rd we	Modes in Lasers Structure	
4th we	Stimulated Emission	
5th we	Optical Gain	
6th we	Heterostructure Materials	
7th we	Epitaxy of Heterostructure	
8th we	Laser Structure and Fabrication Process	
9th we	Mid Term Exam	
10th w	Quantum Well Lasers	
11th w	Single Mode DFB & DBR Lasers	
12th w	Modulation Characteristics	
13th w	Surface Emitting Lasers	
14th w	Semiconductor Amplifiers	
15th w	Semiconductor Amplifiers	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02647	Hrs.:E.:Crs	3: 0: 3	Instructor	김기선
Course Title	Korean	통신신호 처리					
	English	Communication Signal Processing					

Course Outline

This course covers several issues in LDPC codec, which will be very useful for further communications engineering system. In this course an effort will be made to impart an understanding of LDPC codec system, design of LDPC codes, LDPC encoder, LDPC decoder, which are the key blocks to realize a LDPC codec system.

Prerequisite	The learned courses for graduates: Error Correct Coding
Textbook and References	Text: Robert H. Morelos-Zaragoza, The Art of Error Correcting Coding, 2002 John Wiley & Sons Ltd References: The recent papers on LDPC codec.

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Introduction	
2nd we	Hamming. Golay and Reed-Muller codes	
3rd we	Binary cyclic codes and BCH codes	
4th we	Binary cyclic codes and BCH codes	
5th we	Binary convolutional codes	
6th we	Binary convolutional codes	
7th we	Soft-decisiondecoding	
8th we	Midterm exam	
9th we	Iteratively decodable codes	
10th w	Iteratively decodable codes	
11th w	Construction of good LDPC codes	
12th w	LDPC encoding	
13th w	LDPC decoding algorithms	
14th w	LDPC decoding algorithms	
15th w	Evaluation of LDPC codes	
16th w	Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02651	Hrs.:E.:Crs	3: 0: 3	Instructor	양성
Course Title	Korean	기본유체역학					
	English	Fundamentals of Fluid Mechanics					

Course Outline

"Fundamentals of Fluid Mechanics" course is aiming at graduate students in the fluid/thermal sciences. The course will begin with a short primer on mathematical constructs and notation, followed by a derivation of the conservation equations. Thus you should expect the first few weeks of the course to be quite theoretical. Once we have derived the conservation equations, including the Navier-Stokes equations, we will focus on the solutions of the equations, both exact and approximate. this course emphasizes laminar flows so that topics such as transition to turbulence, flow stability, and turbulence will not be covered in this course.

Prerequisite	Engineering Mathematics (Required), Basic Fluid Mechanics (Preferred)
Textbook and References	Text and Reference Books 1. "Fluid Mechanics", 2nd Ed., Pijush K. Kundu and Ira M. Cohen, Academic Press, 2002 2. "Transport Phenomena", 2nd Ed., Bird, Steward, and Lightfoot, Wiley, 2007 Grading Pop Quizzes(10%), Homework(20%), Term Project(30%), FInal Exam(40%)

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we	Mathematical constructs/representation	
2nd we	Mathematical constructs/representation, Kinematics	
3rd we	Kinematics	
4th we	Conservation Laws	
5th we	Conservation Laws	
6th we	Navier-Stokes eqn.	
7th we	Navier-Stokes eqn.	
8th we	Laminar Flows: Exact solutions of special cases	
9th we	Laminar Flows: Exact solutions of special cases	
10th w	Laminar Flows: Exact solutions of special cases	
11th w	Transient Flows	
12th w	Transient Flows / Vorticity Dynamics	
13th w	Vorticity Dynamics / Irrotational Flows	
14th w	Irrotational Flows	
15th w	Term Project Presentation	
16th w	Review and Comprehensive Final Exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02653	Hrs.:E.:Crs	3: 0: 3	Instructor	이종현
Course Title	Korean	MEMS/NEMS 공정 및 응용					
	English	MEMS/NEMS process and applications					

Course Outline

MEMS/NEMS devices are expected to be one of the key technologies for man-machine interface and ubiquitous sensor network in the 21st-century of information society. This course will deal with MEMS/NEMS (Micro/Nano Electro Mechanical Systems) material, micro/nano fabrication process, operational principles and applications as shown below. - introduction to MEMS/NEMS devices and materials, semiconductor fundamentals - fabrication of 3D micro/nano structures, low-stress film, dry release, process integration - scaling effects, micro/nano electro-mechanics, optical MEMS and microfluidics - application examples of MEMS/NEMS devices for information and biomedical fields

Prerequisite	None
Textbook and References	- N. Maluf, "An introduction to MEMS engineering," Artech House, 2000 - S. M. Sze, "Semiconductor Sensors," John Wiley & Sons Inc., 1994 - M. J. Madou, "Fundamentals of microfabrication," CRC press, 2002 - B. G. Streetman et al., "Solid State Electronic Devices," 5th ed., Prentice-Hall, 200

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction to MEMS/NEMS	
2nd we	Materials for MEMS/NEMS	
3rd we	Basic fabrication process	
4th we	Fundamentals of semiconductor physics	
5th we	Micromachining process design I	
6th we	Micromachining process design II	
7th we	Bulk micromachining I	
8th we	Mid-term exam	
9th we	Bulk micromachining II	
10th w	Surface micromachining	
11th w	Process issues & nano fabrication	
12th w	Micro-electro-mechanics	
13th w	Optical MEMS & medical microdevices	
14th w	Presentation I	
15th w	Presentation II	
16th w	Final exam	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02655	Hrs.:E.:Crs	3 : 0 : 3	Instructor	게클러,해럴드푹스
Course Title	Korean	나노재료학					
	English	Nanomaterials					

Course Outline

This course deals with the concepts of self- assembly and selforganization of nanomaterials . The course includes physical, chemical and biological concepts of nanostructures materials and examples for their application.

Prerequisite	Basic knowledge of material science
Textbook and References	articles will be supplied during the course.

Weekly Course Schedule

Calendar	Description	Remarks
1st we	Introduction	
2nd we	Methods of self-assembly	
3rd we	Langmuir-Blodgett films	
4th we	Generation of self assembly films (SAMs)	
5th we	UHV deposition of self assembled films	
6th we	Self organization in Biology	
7th we	Lipid layers	
8th we	Tight junctions	
9th we	Analysis of lung surfactants	
10th w	Molecular motors: Basics	
11th w	Linear Motors	
12th w	Rotary Motors	
13th w	Self cleaning surfaces	
14th w	Quantum materials	
15th w	Novel optical materials	
16th w	Materials for molecular electronics	

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	elective	Course No.	02656	Hrs.:E.:Crs	3: 0: 3	Instructor	이병훈
Course Title	Korean	나노소자물리개론					
	English	Device physics for nanoscale solid state devices					

Course Outline

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	02801	Hrs.:E.:Crs	0 : 0 : 1	Instructor	
Course Title	Korean	WCU 세미나					
	English	Interdisciplinary Seminar					

Course Outline

Covering recent research trends for MS and PhD students from invited experts in the area of nano-bio-Information technology(NBIT).

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	02901	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	석사논문연구					
	English	Research for Master Dissertation					

Course Outline

opportunity for advanced MS students to study independently in consultation with their academic advisros

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)

SYLLABUS

Classification	research	Course No.	02906	Hrs.:E.:Crs	0: 0: 0	Instructor	
Course Title	Korean	박사논문연구					
	English	Research for Ph.D. Dissertation					

Course Outline

opportunity for advanced PhD students to study independently in consultation with their academic advisros

Prerequisite	
Textbook and References	

Weekly Course Schedule

Calendar	*Description*	*Remarks*
1st we		
2nd we		
3rd we		
4th we		
5th we		
6th we		
7th we		
8th we		
9th we		
10th w		
11th w		
12th w		
13th w		
14th w		
15th w		
16th w		

* If there will be experiments, describe them in the "Remarks".

Instructor (seal)

Dept.Chair (seal)