

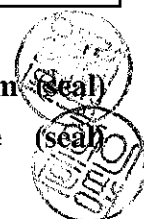
SYLLABUS

Classification	Required	Course No.	11001	Cr. Hrs.	1:0:0	Instructor	김택영
Course Title	Korean	정보통신 콜로퀴움					
	English	IT(Information Technology) Colloquium					
<u>Course Outline</u>							
IT colloquium introduces a broad range of information and communication 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, and computer science.							
Prerequisite		N/A					
Textbook and References		N/A					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week							
2nd week							
3rd week							
4th week							
5th week							
6th week							
7th week							
8th week							
9th week							
10th week							
11th week							
12th week							
13th week							
14th week							
15th week							
16th week							

* If there will be experiments, mark it in the "Remarks".

Coordinator Dug Young Kim (seal)

Dept. Chair Byeong Ha Lee (seal)



SYLLABUS

Classification	Elective	Course No.	11403	Cr. Hrs.	3	Instructor	Do-Kyeong Ko
Course Title	Korean	초고속 광학					
	English	ultrafast optics					
Course Outline Theory and general properties of ultrashort laser pulses, dispersion, spatio-temporal characteristics of the light, measurement techniques of the ultashort pulses, ultrafast laser spectroscopy, stretching, amplification, and the compression of the ultrashort pulses will be described and emphasized in the course.							
Prerequisite		Optics and Laser					
Textbook and References		<ul style="list-style-type: none">■ Femtosecond Laser Pulses (by Claude Rulliere, Springer, 1998)■ Ultrashort Laser Pulse Phenomena (by Jean-Claude Diels & Wolfgang Rudolph, Academic Press Inc., 1996)■ Frequency-Resolved Optical Grating: The Measurement of Ultrashort Laser Pulses(by Rick Trebino, Kluwer Academic Publishers, 2002)					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction to Ultrafast Optics						
2nd week	The Generation of Ultrashort Laser Pulses						
3rd week	Ultrashort Laser Pulses I						
4th week	Ultrashort Laser Pulses II						
5th week	Dispersion of Ultrashort Pulses						
6th week	Spatio-Temporal Characteristics of Light and Light and How to Model Them						
7th week	Nonlinear Optics						
8th week	Midterm Examination						
9th week	Ultrafast Laser Spectroscopy						
10th week	Coherent and Incoherent Control						
11th week	Theory of Ultrashort Laser Pulse Generation						
12th week	The Amplification of Ultrashort Laser Pulses						
13th week	Focusing Ultrashort Pulses						
14th week	Measuring Ultrashort Laser Pulses						
15th week	Ultrafast Optics Lab Tour						
16th week	Final Examination						

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

Cordinator Do-Kyeong Ko

(seal)

Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11404	Cr. Hrs.	3	Instructor	R.S.Ramakrishna
Course Title	Korean	그래프 이론					
	English	Graph Theory					
Course Outline							
The focus of this course is on those parts of graph theory that have found applications in a wide spectrum of areas including computer science and engineering. Starting at the very beginning, the course progresses to a stage where the students should feel at home with current research in the area of graphs and their applications. Creative projects form an integral part of the course.							
Prerequisite		Instructor's consent.					
Textbook and References		1. Chartrand, G. and Lesniak, L. <i>Graphs & Digraphs</i> , 3rd ed. Chapman & Hall / CRC , Washington, D.C., 2000. 2. Gross, J., and Yellen, J. <i>Graph Theory and Applications</i> , CRC Press, Washington, D.C.,1999.					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction. Graph Models						
2nd week	Structure and Representation of Graphs, Operations on Graphs.						
3rd week	Graph Isomorphism						
4th week	The Automorphism Group, Cayley Color Graphs.						
5th week	The Problem of Reconstruction						
6th week	Properties of Trees, Tree Counting: Prufer Codes.						
7th week	Connectivity, Max-Min Duality and Menger's Theorems						
8th week	Eulerian Graphs and Digraphs.						
9th week	Hamiltonian Graphs and Digraphs.						
10th week	Planar Graphs, Euler's Formula						
11th week	Planar Graph Characterization. Kuratowski's Theorem						
12th week	Graph Coloring: Vertex Coloring and Edge Coloring. Map Coloring and Flows.						
13th week	Matchings, Factors and Decomposition.						
14th week	Elements of Extremal Graph Theory, Turan's Theorem.						
15th week	Basics of Random Graphs.						
16th week							

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

Coordinator R.S.Ramakrishna (seal)

Dept. Chair Byeongha Lee



SYLLABUS

<i>Classification</i>	<i>Elective</i>	<i>Course No.</i>	11410	<i>Cr. Hrs.</i>	3:0:3	<i>Instructor</i>	Nooshabadi Saeid
<i>Course Title</i>	<i>Korean</i>	<i>VLSI SDSP 하드웨어 설계</i>					
	<i>English</i>	<i>VLSI DSP Hardware Design</i>					
<i>Course Outline</i>							
<i>Prerequisite</i>							
<i>Textbook and References</i>							
<i>Weekly Course Schedule</i>							
<i>Calendar</i>	<i>Description</i>						<i>Remarks</i>
<i>1st week</i>	Overview						
<i>2nd week</i>	Introduction to custom digital processors including DSP hardware						
<i>3rd week</i>	High-speed digital design techniques for DSP applications						
<i>4rd week</i>	Pipelining & Retiming						
<i>5rd week</i>	Unfolding Transformation						
<i>6th week</i>	Folding Transformation						
<i>7th week</i>	Programmable/Configurable DSP Architectures						
<i>8th week</i>	Systolic Arrays						
<i>9th week</i>	The CORDIC Algorithm						
<i>10th week</i>	Numerical Strength Reduction						
<i>11th week</i>	Algorithmic Strength Reduction						
<i>12th week</i>	Zero-Forcing Equalization						
<i>13th week</i>	Design Example: Polyphase Filtering for Demodulation						
<i>14th week</i>	Fixed point arithmetic						
<i>15th week</i>	Floating point arithmetic						
<i>16th week</i>	Distributive arithmetic						

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

Coordinator

Saeid Nooshabadi



Dept. Chair

Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11412	Cr. Hrs.	3:0:3	Instructor	Jongsoo Lee
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 transmitter architecture for wireless communications and basic theory of analysis and design for the power amplifier which is a critical functional block in the transmitter.							
Prerequisite		None					
Textbook and References		Main Textbook : RF power amplifiers for wireless communications by Steve C. Cripps (Artech House, 2nd edition) References 1. RF System Design of Transceivers for Wireless Communications by Qizheng Gu (Springer, 1st edition)					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction to RF Power amplifier						
2nd week	Linear power amplifier						
3rd week	Linear power amplifier						
4th week	High efficiency amplifier modes						
5th week	High efficiency amplifier modes, Class AB						
6th week	High efficiency amplifier modes, Class AB						
7th week	Overdriven Power amplifier						
8th week	Switching mode power amplifier						
9th week	Switching mode power amplifier						
10th week	Switching mode power amplifier						
11th week	Nonlinearity in power amplifier						
12th week	Nonlinearity in power amplifier						
13th week	Advanced power amplifier design						
14th week	Advanced power amplifier design						
15th week	Advanced power amplifier design						
16th week	Advanced power amplifier design						

* If there will be experiments, mark it in the "Remarks".

Coordinator **Jongsoo Lee**
Dept. Chair **Byeongha Lee**



SYLLABUS

<i>Classification</i>	Elective	<i>Course No.</i>	11413	<i>Cr. Hrs.</i>	3	<i>Instructor</i>	Hyunju Lee
<i>Course Title</i>	<i>Korean</i>	생물정보학					
	<i>English</i>	Bioinformatics					
<u><i>Course Outline</i></u>							
Applying computational algorithms and mathematical models to biological data has been advanced with the rapid accumulation of biological knowledge. This class provides how classical algorithms in computer science have been applied and modified to model complex and dynamic biological data sets including genome, transcriptome, and proteome. Topics include sequence alignment, clustering, analysis of gene expression, protein function. protein interactions, phylogenetic tree, Bayesian and EM algorithms, etc. Young computer scientists will be introduced and motivated to the interdisciplinary field of bioinformatics upon the completion of the class.							
<i>Prerequisite</i>		NA					
<i>Textbook and References</i>		Jonathan Pevsner, Bioinformatics and Functional Genomics, Wiley-Liss					
<i>Weekly Course Schedule</i>							
<i>Calendar</i>	<i>Description</i>						<i>Remarks</i>
<i>1st week</i>	Introduction and basic concepts of molecular biology						
<i>2nd week</i>	Sequence alignment						
<i>3rd week</i>	Local alignment and BLAST						
<i>4th week</i>	Bioinformatics approaches to gene expression						
<i>5th week</i>	Clustering, PCA						
<i>6th week</i>	Analysis of differential gene expression studies						
<i>7th week</i>	Protein analysis and proteomics						
<i>8th week</i>	Mass spectrometry						Mid term exam
<i>9th week</i>	Graphs and networks						
<i>10th week</i>	Gene ontology						
<i>11th week</i>	Protein structure						
<i>12th week</i>	Protein function and localization						
<i>13th week</i>	Protein interactions and EM algorithm						
<i>14th week</i>	Molecular phylogeny and Evolution						
<i>15th week</i>	Integration of multiple biological datasets						
<i>16th week</i>	Bioinformatics in human disease						Final term exam

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

Coordinator

Hyunju Lee

Dept. Chair

Byeongha Lee



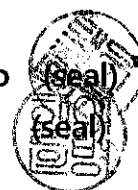
SYLLABUS

Classification	Selective	Course No.	11418	Cr. Hrs.	3	Instructor	WOO, Woontack
Course Title	Korean	증강현실					
	English	Augmented Reality					
Course Outline In this course, we will study theories and algorithms required to develop vision-based AR systems. We also will discuss current research topics in the area of augmented reality in ubiquitous computing era. In addition, we will practical skills and provide hands-on experience in the development of AR systems through team-based term projects.							
Prerequisite	- Knowledge about virtual reality, computer graphics, computer vision, and other related fields could be helpful for the course.						
Textbook and References	Textbook - W. Barfield and T. Caudell, "Fundamentals of Wearable Computers and Augmented Reality," Lawrence Erlbaum Associates, Inc., Publishers, 2001 References: - M. Haller, M. Billinghurst, B. Thomas, "Emerging Technologies of Augmented Reality: Interface and Design," IDEA Group Publishing, 2007 - The list of related papers will be given in the class.						
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction to Augmented Reality						
2nd week	Geometrical Fundamentals						
3rd week	3D Pose Estimation					Preliminary Project Proposal	
4th week	Tracking Fundamentals					Team Assembly	
5th week	Midterm I: Project Proposal					Idea Presentation	
6th week	Registration and Rendering						
7th week	Interaction and Collaboration						
8th week	Way finding and Travel Guide						
9th week	System Control and Symbolic Input						
10th week	Midterm II: Interim talk, demo, report					Interim Result Presentation	
11th week	UI Design & System Performance						
12th week	Performance & Experience Evaluation						
13th week	Information Filtering and Sharing						
14th week	System Architecture for CAMAR						
15th week	Recent CAMAR Applications						
16th week	Final: Final presentation, demo, and final report					Final Exam	

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

Coordinator
Dept. Chair

Woontack Woo
Byeongha Lee



SYLLABUS

Classification	elective	Course No.	11420	Cr. Hrs.	3	Instructor	Kwang Mong Sim
Course Title	Korean	다중 Agent 시스템					
	English	Fundamentals of Multiagent Systems					
<u>Course Outline</u> 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		Programming 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, <u>Multi-Agent Systems: An Introduction to Distributed Artificial Intelligence</u> , Addison Wesley, 1999 2. Michael Wooldridge, <u>An Introduction to MultiAgent Systems</u> , Wiley, 2002					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Principles of Multiagent Systems: Introduction and Definitions						
2nd week	Foundations of Multiagent Systems I: Interactions and Cooperations						
3rd week	Foundations of Multiagent Systems II: Multiagent Organizations						
4th week	Foundations of Multiagent Systems III: Coordination						
5th week	Foundations of Multiagent Systems IV: Cooperative Problem Solving						
6th week	Foundations of Multiagent Systems V: Negotiation						
7th week	Agent Technology I: Agreement Technology						
8th week	Project proposal presentations						
9th week	Agent Technology II: Agent-based Grid Computing						
10th week	Agent Technology III: Biologically-inspired Agents and Collective Intelligence						
11th week	Agent Technology IV: Cooperative Information Agents Part 1						
12th week	Agent Technology V: Cooperative Information Agents Part 2						
13th week	Agent Technology VI: E-commerce Agents						
14th week	Project Presentations						
15th week	Revision						
16th week	Examinations						

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

Coordinator
Dept. Chair

Kwang Mong Sim
Byeongha Lee



SYLLABUS

Classification	Selective	Course No.	11421	Cr. Hrs.	3	Instructor	Dong-Seon Lee
Course Title	Korean	고효율 고체 조명					
	English	Solid-State Lighting					
Course Outline							
LEDs have drawn people's attention because of its very high emission efficiency 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 <i>et al.</i> Light-Emitting Diodes by E. F. Schubert					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	History of Lighting						
2nd week	Lighting Economy & Environmental Needs						
3rd week	Definitions of Terms in Vision, Photometry and Radiometry						
4th week	Basic of All Solid-State Lamps						
5th week	Radiative and Non-radiative Recombinations						
6th week	LED Basics - Optical Properties						
7th week	LED Basics - Electrical Properties						
8th week	Midterm						
9th week	Efficiency						
10th week	High internal efficiency LED designs						
11th week	Light extractions from LED						
12th week	Packaging						
13th week	White-light sources based on LEDs						
14th week	White light sources based on wavelength converters						
15th week	Various Applications						
16th week	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Coordinator Dong-Seon Lee

Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11422	Cr. Hrs.	3	Instructor	Kuk-Jin Yoon
Course Title	Korean	고차원 영상 이해 및 처리					
	English	High-level Image Understanding and Processing					
<u>Course Outline</u> 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 Algebra					
Textbook and References		<ul style="list-style-type: none">- Multiple View Geometry in Computer Vision, Second Edition, R. Hartley and A. Zisserman, Cambridge University Press.- Computer Vision, George Stockman and 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 week	Introduction						
2nd week	Multi-view geometry						
3rd week	Image feature and correspondence						
4th week	Stereo matching					Term-project proposal	
5th week	3D reconstruction using multiple images						
6th week	Motion analysis and tracking						
7th week	Image registration						
8th week	Midterm exam						
9th week	Image segmentation						
10th week	Color constancy, reflection analysis, photometric stereo					Interim presentation	
11th week	Face detection and recognition						
12th week	Object classification and recognition						
13th week	Action Recognition						
14th week	Video applications						
15th week	Applications: Project Presentation					Presentation & Demo	
16th week	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Coordinator **Kuk-Jin Yoon**

Dept. Chair **Byeongha Lee**



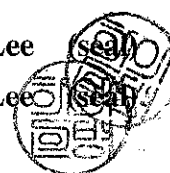
SYLLABUS

Classification	Elective	Course No.	11602	Cr. Hrs.	3	Instructor	Byeong Ha Lee
Course Title	Korean	전자기학					
	English	Electromagnetics					
<u>Course Outline</u> Electrostatics in dielectric media, currents and magnetic fields, Maxwell's equations, Propagation of electromagnetic wave through dsipersive media, Scattering and Radiation							
Prerequisite							
Textbook and References		Foundation of electromagnetic theory, 4'th edition, J. R. Reitz, F. J. Milford, R. W. Christy Engineering electromagnetics, 5'th edition, W. H. Hayt, Jr.					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Introduction to Electrostatics						
2nd week	Electro static energy and potential						
3rd week	Electrsostatic field in dielectric and conducting media						
4th week	Solution of elctrostatic problems						
5th week	Experimental mapping methods						
6th week	Magnetic fields of steady currents						
7th week	Magnetic energy, force, and inductance						
8th week	Midterm Exam						
9th week	Time varying fields and Maxwell's equations						
10th week	Propagation of monochromatic plane elctromagnetic wave						
11th week	Monochromatic plane waves in bounded regions						
12th week	Spherical electromagnetic waves						
13th week	Dispersion and Oscillating fields in dispersive media						*
14th week	The emission of radiation						*
15th week	Transmission line						*
16th week	Final Exam						*

* If there will be experiments, mark it in the "Remarks".

Coordinator Byeong Ha Lee

Dept. Chair Byeong Ha Lee



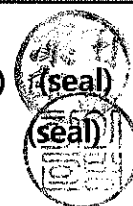
SYLLABUS

Classification	Elective	Course No.	11603	Cr. Hrs.	3	Instructor	전성찬 (S.C. Jun)
Course Title	Korean	이산구조 및 수학					
	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 week	Foundations : Logic, Set Theory, Functions						
2nd week	Counting Methods I : Basic Techniques, Permutations, Combinations						
3rd week	Counting Methods II : Inclusion/Exclusion, Partitions						
4th week	Sequences : Special Sequences, Generating Functions, Recurrence Relations						Quiz
5th week	Number Theory : Basic Concepts, Factorization, Modular						
6th week	Coding Theory and Cryptology : Basics, Public Key, RSA						
7th week	Algebraic Structures : Relations, Groups, Rings, Fields, Lattices, Boolean Algebra						
8th week	Discrete Probability : Fundamental Concepts, Random Walks, Queueing Theory						Midterm Exam
9th week	Graph Theory I : Graph Models, Directed Graphs						
10th week	Graph Theory II : Isomorphic Invariants, Some Graph Theories						
11th week	Graph Theory III : Graph Coloring, Weighted Graphs						
12th week	Trees I : Tree Structures, Tree Traversal, Applications of Tree						Quiz
13th week	Trees II : Spanning Tree, Minimum Spanning Tree						
14th week	Discrete Optimization : Linear Programming, Packing and Covering						
15th week	Computer Science : Computability, Complexity, Sorting and Searching						
16th week	Wrap-up : Review of the Course						Final Exam

* If there will be experiments, mark it in the "Remarks".

Coordinator
Dept. Chair

전성찬 (S. C. Jun)
Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11608	Cr. Hrs.	3	Instructor	G. Hugh Song
Course Title	Korean	선형 대수론 및 응용					
	English	Linear Algebra and Its Application					
Course Outline A mathematical introduction of linear algebra and its applications to the spectral theory of eigenvalue problems and optimization problems in physics and engineering							
Prerequisite		none					
Textbook and References		Textbooks: Classnote by G. Hugh Song and G. E. Shilov, Linear Algebra Dover Press, 1971					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Determinants and linear space						
2nd week	Linear manifold, hyperspaces, factor spaces simultaneous linear equations						
3rd week	Linear forms, operators, morphisms						
4th week	Eigenvectors/values/spaces, coordinate transformation						
5th week	Jordan canonical forms						
6th week	Operator functions						
7th week	Bilinear forms						
8th week							
9th week	Quadratic forms and canonical bases						
10th week	Euclidean space						
11th week	Orthogonalization						
12th week	Hermitian forms/spaces and adjoint operators						
13th week	Euclidean space embedded into a Hermitian space						*
14th week	Eigenvalue problem as simultaneous canonicalization						*
15th week	Optimization problem and quadric surfaces						*
16th week							*

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

Professor G. Hugh Song

Department Head, Byeong Ha Lee



SYLLABUS

<i>Classification</i>	Elective	<i>Course No.</i>	11612	<i>Cr. Hrs.</i>	3	<i>Instructor</i>	Kiseon Kim
<i>Course Title</i>	<i>Korean</i>	통신 시스템					
	<i>English</i>	Advanced Communication Systems					
<u><i>Course Outline</i></u> Study of various techniques to architecturing and implementing digital communication systems with applications to wireless communications and broadband multimedia systems. Technical perspectives including emerging digital microelectronics and hardware technologies will also be covered.							
<i>Prerequisite</i>		11611 Digital Communication Systems					
<i>Textbook and References</i>		Textbook: M. Simon, S. Hinedi and W. Lindsey, Digital Communication Techniques Signal Design and Detection					
<i>Weekly Course Schedule</i>							
<i>Calendar</i>	<i>Description</i>					<i>Remarks</i>	
<i>1st week</i>	Review of digital communications systems						
<i>2nd week</i>	Review of detection theory and optimal detection						
<i>3rd week</i>	Definition of PSD for communication signals						
<i>4th week</i>	PSD of digital modulations						
<i>5th week</i>	PSD of generalized Markov source						
<i>6th week</i>	Midterm I						
<i>7th week</i>	Scalar communications over memoryless channel						
<i>8th week</i>	Vector communications over memoryless channel						
<i>9th week</i>	Pairwise Probability of Error						
<i>10th week</i>	Coherent waveform communications						
<i>11th week</i>	Noncoherent waveform communications						
<i>12th week</i>	Midterm II						
<i>13th week</i>	Partially coherent waveform communications						
<i>14th week</i>	Multiple symbol waveform communications						
<i>15th week</i>	Communications over bandlimited channels						
<i>16th week</i>	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Instructor *Kiseon Kim*

Dept. Chair Byeong Ha Lee



SYLLABUS

Classification	Eeective	Course No.	1618	Cr. Hrs.	3	Instructor	Yo-Sung Ho
Course Title	Korean	고급 디지털 영상신호 처리					
	English	Advanced digital image processing					
Course Outline : Wavdform coding, vector quantization, subband coding, wavelet coding, hierarchical coding, segmentation-based coding, model-based coding, fractal coding, MPEG algorithms.							
Prerequisite		Digital signal processing(1513,1613), Digital image processing(1617)					
Textbook and References		R.J.Clarke, digital compression of still image and video					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Instruction : overview, HVS, 신호특성						
2nd week	Interframe prediction coding						
3rd week	Interframe tranform coding						
4th week	Vector quantization						
5th week	Subband coding						
6th week	Wavelet coding					Midterm Exam	
7th week	Block truncation coding						
8th week	Fractal coding						
9th week	Interframe coding						
10th week	Multi-resolution coding						
11th week	Motion detection/compensation					Midterm Exam	
12th week	Image sequence coding standards						
13th week	3D transform, interface VO					*	
14th week	Image transmission, FBR/VER					*	
15th week	Error control codes, layered coding					*	
16th week	Final Exam					*	

* If there will be experiments, mark it in the "Remarks".

Instructor Yo-Sung Ho
Dept. Chair Byeong Ha Lee



SYLLABUS

Classification	Elective	Course No.	11624	Cr. Hrs.	3:0:3	Instructor	Heung-No Lee
Course Title	Korean	무선통신					
	English	Wireless Communications					
Course Outline This course is a first-year graduate-level introduction to the students in information and communications area. The theory of modern wireless digital communication systems will be presented with a special emphasis on multiple antenna communication systems. Sample topics include signal modulation/demodulation, channel coding theorems, design of channel codes, design of coded modulation transceivers, and multi-user detection receivers over a variety of wireless channels including AWGN and MIMO fading channels.							
Prerequisite		Undergraduate digital communications					
Textbook and References		Textbook: J.G. Proakis and Masoud Salehi, Digital Communications, 5th Edition, McGraw-Hill, 2007. Reference-1: R.G. Gallager, Information Theory and Reliable Communication, Wiley, 1968.					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	General overview (Shannon's 1948 paper)						
2nd week	Space time representation & Optimal Transceiver						
3rd week	Gallager's Channel Coding Theorem						
4th week	Gallager's Channel Coding Theorem						
5th week	LDPC codes and probabilistic decoders					Midterm 1	
6th week	Multipath fading channels/Diversity systems						
7th week	MIMO capacity theorem						
8th week	MIMO transceivers						
9th week	Design of LDPC and space-time codes and receivers						
10th week	Performance evaluation of MIMO transceivers						
11th week	Multi-user MIMO transceivers					Midterm 2	
12th week	Design of pre-coding MIMO signals						
13th week	Network codes						
14th week	Wireless network codes						
15th week	Overview						
16th week	Final project					Final project due	

* If there will be experiments, mark it in the "Remarks".

Coordinator Heung-No Lee

Dept. Chair Byungha Lee



SYLLABUS

Classification	Elective	Course No.	11627	Cr. Hrs.	3	Instructor	Jong-In Song
Course Title	Korean	아날로그 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 week	Introduction to integrated circuit design						
2nd week	Models for IC active devices						
3rd week	Integrated circuit technologies						
4th week	Single and two transistor amplifiers						
5th week	Current sources and active loads					Midterm Exam	
6th week	Output stages						
7th week	Operational amplifiers						
8th week	Operational amplifiers						
9th week	Operational amplifiers						
10th week	Frequency response and stability of ICs					Midterm Exam	
11th week	Frequency response and stability of ICs						
12th week	Feedback circuits						
13th week	Feedback circuits					*	
14th week	Frequency response stability of ICs					*	
15th week	Frequency response and stability of ICs					*	
16th week	Final Exam					*	

* If there will be experiments, mark it in the "Remarks".

Instructor **Jong-In Song**
 Dept. Chair **Byeongha Lee**



Optical Communication Systems 11631

광통신 시스템

Instructor: Chang-Soo Park, Rm C501

Course Contents:

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

Text: Govind P. Agrawal, Fiber-Optic Communication Systems.

Supplemental References: R. Hoss, Fiber Optical Communications (design Book); J. palais, Fiber Optic Communications.

Course Requirements / Grading Policy

Homework	10% -> 20
Test	30% -> 40
Projects	30%
Final	30% -> 40

All tests will be in class.

Prerequisites: If any, Optics, Communication Theory,
Semiconductor Physics, Waveguide Theory

Instructor Chang-Soo Park

Dept. Chair Byeongha Lee



SYLLABUS

<i>Classification</i>	Elective	<i>Course No.</i>	11635	<i>Cr. Hrs.</i>	3	<i>Instructor</i>	Hyuk Lim
<i>Course Title</i>	<i>Korean</i>	컴퓨터 네트워킹					
	<i>English</i>	Computer Networking					
<u><i>Course Outline</i></u>							
Understand the fundamentals and the state-of-the-art developments of data and media (i.e. multimedia) networking issues. Reflecting the ubiquitous convergence toward IP-based (i.e. Internet) networking, emphasis will be given on conceptual and experimental issues in the design and implementation of media inter-networking systems and protocols							
<i>Prerequisite</i>		Experience with C/C++ programming					
<i>Textbook and References</i>		L. Peterson and B. Davies, Computer Networks: A Systems Approach, Morgan Kaufman, 2nd Ed. J.F. Kurose and K.W. Ross, Computer Networking: A Top Down Approach Featuring the Internet, Addison-Wesley Longman					
<i>Weekly Course Schedule</i>							
<i>Calendar</i>	<i>Description</i>					<i>Remarks</i>	
<i>1st week</i>	Introduction						
<i>2nd week</i>	Probability and Queueing Models						
<i>3rd week</i>	Application Protocols and Services: HTTP, FTP, E-Mail, DNS						
<i>4th week</i>	UNIX network programming						
<i>5th week</i>	Transport Layer: Multiplexing/demultiplexing						
<i>6th week</i>	Transport Layer: UDP						
<i>7th week</i>	Transport Layer: TCP						
<i>8th week</i>	Transport Layer: QoS						
<i>9th week</i>	Internetworking						
<i>10th week</i>	Network Layer: Routing						
<i>11th week</i>	Queue Management and Congestion Control						
<i>12th week</i>	Packet Switching						
<i>13th week</i>	Bridges and Switches						
<i>14th week</i>	Direct Link Networks						
<i>15th week</i>	Advanced Topic: Quality of Service, Mobility & Adhoc Networks						
<i>16th week</i>	Advanced Topic: Overlay Networks, P2P Networks						

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

Coordinator
Dept. Chair

Hyuk Lim
Byeong Ha Lee



SYLLABUS

Classification	Elective	Course No.	11637	Cr. Hrs.	3	Instructor	Dongsoo Har
Course Title	Korean	랜덤 프로세스					
	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 Reference		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 week	Introduction: uncertainty and randomness, probability space					S1.1-1.4, LG1.1-2.3	
2nd week	Conditional probability and independence					S1.5-1.10, LG2.4-2.7	
3rd week	Random variables, cdf, pdf, functions of RVs					S2.1-2.6,3.1,3.2, LG3.1-3.5	
4th week	Expectation and variance					S4.1,4.3, LG3.6	
5th week	Joint distributions, marginals, independence/uncorrelatedness					S2.7, LG4.1-4.3	
6th week	Functions of two RVs, their sums and their products					S3.3-3.4, LG4.5-4.7,5.1	
7th week	Conditional distribution, conditional expectation, and applications					S2.7,4.2, LG4.4	
8th week	Midterm						
9th week	Correlation, jointly Gaussian RVs, and applications					S4.3, LG4.8	
10th week	Estimation of RVs					S6.7, LG4.9	
11th week	Characteristic function and Moment Generating functions					S4.7,5.6,5.5,4.4, LG3.7,3.9	
12th week	Convergence of RVs, Limit theorems (LLN, CLT)					S7.4,7.5, LG5.2-5.6	
13th week	Random process/Stochastic process					S7.1,8.1,8.2 LG6.1-6.4	
14th week	Stationary RP, continuity, derivatives, integrals, ergodicity, and interpretations					S9.1-9.4, LG6.5-6.7	
15th week	Analysis and processing of random signals					S8.3,10.1-10.4, LG7.1-7.4	
16th week	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Coordinator Dongsoo Har
Dept. Chair Byeong Ha Lee



SYLLABUS

<i>Classification</i>	Elective	<i>Course No.</i>	11646	<i>Cr. Hrs.</i>	3	<i>Instructor</i>	Hong-Kook Kim
<i>Course Title</i>	<i>Korean</i>	디지털 신호처리					
	<i>English</i>	Digital Signal Processing					
<i>Course Outline</i> 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							
<i>Prerequisite</i>		Advanced Calculus including Complex Variables, Linear System Theory including Laplace and Fourier Transforms, Probability and Stochastic Processes. C Programming Language or MATLAB					
<i>Textbook and References</i>		A. Oppenheim R. Schafer and J. Buck, Discrete-time Signal Processing: 2/e, Prentice Hall 1999.					
<i>Weekly Course Schedule</i>							
<i>Calendar</i>	<i>Description</i>					<i>Remarks</i>	
<i>1st week</i>	Introduction to DSP						
<i>2nd week</i>	Discrete-time Signals						
<i>3rd week</i>	Discrete-time Systems						
<i>4th week</i>	z-transform					Quiz	
<i>5th week</i>	Sampling of Continuous-time Signals						
<i>6th week</i>	Multi-rate Signal Processing						
<i>7th week</i>	Transform Analysis of LTI Systems						
<i>8th week</i>	Midterm Exam						
<i>9th week</i>	Structures for Discrete-time Systems						
<i>10th week</i>	Filter Design Techniques						
<i>11th week</i>	Optimum Approximations of FIR Filters						
<i>12th week</i>	The Discrete Fourier Transform					Quiz	
<i>13th week</i>	Computation of DFT						
<i>14th week</i>	Fourier Analysis of Signals using DFT						
<i>15th week</i>	Discrete Hilbert Transform						
<i>16th week</i>	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Instructor Hong-Kook Kim
Dept. Chair Byeongha Lee



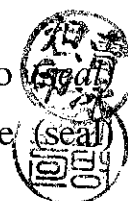
SYLLABUS

Classification	Selective	Course No.	11654	Cr. Hrs.	3:0:3	Instructor	Young-Dahl Jho
Course Title	Korean	양자 역학					
	English	Quantum Physics for Engineering					
Course Outline							
<p>(국문) 소자 물리나 광공학 소자 등의 연구에 필요한 양자 역학과 고체 물리의 기본적인 토대를 제공하는 과목입니다. 다룰 문제들은 다음을 포함합니다: Schrodinger 파동식; 반도체에서 에너지 준위; 이성질 구조에서 크로니그-페니 모델; 터널링 효과; 반도체에서 불순물과 엑시톤; 반도체에서 스핀-궤도 상호작용; 정상 상태에 대한 근사 방법; 시간에 의존하는 문제에 대한 근사 방법과 광학적 전이; 입자의 산란; 강자성과 자기 기록; NMR과 자기 공명 영상; 반도체 레이저; 나노 광공학 소개</p> <p>(영문) This course provides the background in quantum mechanics and solid state physics necessary for further studies in device physics and photonics devices. Examples include: electronic energy levels in semiconductor transistors; the Kronig-Penney model for heterostructures; tunneling phenomena in semiconductor devices; impurities and excitons in semiconductors; effects of spin-orbit interactions in semiconductors; time-dependent perturbation theory and optical transitions; carrier scattering processes; ferromagnetism and magnetic recording; nuclear magnetic resonance and magnetic resonance imaging; semiconductor lasers; and introduction to nanophotonics.</p>							
Prerequisite	전자기학 (Electricity and Magnetism) 고급 수학 (Advanced Calculus)						
Textbook and References	Textbook: Quantum Mechanics: Fundamentals & Applications to Technology by J. Singh (John Wiley & Sons, 1999). USEFUL REFERENCES: Modern Quantum Mechanics by J. J. Sakurai (Addison-Wesley, 1994). The Meaning of Quantum Theory by J. Baggott (Oxford University Press, 1992). Electrical Properties of Materials, Sixth Edition by L. Solymar and D. Walsh (Oxford University Press, 1998). Introduction to the Electronic Properties of Materials by D. Jiles (Chapman & Hall, 1994). Electrons in Solids by R. H. Bube (Academic Press, 1992). Introduction to Solid State Physics, 7th Edition by C. Kittel (John Wiley & Sons, 1996). Solid State Physics by N. W. Ashcroft and N. D. Mermin (Holt, Rinehart and Winston, 1976). Future Trends in Microelectronics: The Road Ahead edited by S. Luryi, J. Xu and A. Zaslavsky (John Wiley & Sons, 1999). Quantum Mechanics: For Engineering, Materials Science and Applied Physics by H. Kroemer (Prentice Hall, 1994). Physics of Semiconductors and Their Heterostructures by J. Singh (McGraw-Hill, 1993). An Introduction to Theory and Applications of Quantum Mechanics by A. Yariv (John Wiley & Sons, 1982).						
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Review of classical mechanics						
2nd week	Mathematical formulation of quantum mechanics						
3rd week	Atoms, molecules, and lattice						
4th week	Particles in simple potentials						
5th week	Tunneling problem						
6th week	Particles in spherically symmetric potentials						
7th week	Operators, symmetry and conservation						
8th week	Mid-term exam						
9th week	Identical particles and 2nd quantization						
10th week	Approximation: time-independent problems						
11th week	Approximation: time-dependent problems						
12th week	Collision and scatterings						
13th week	Magnetic effects						
14th week	Overview of semiconductor laser and optics						
15th week	Introduction to nanophotonics.						
16th week	Final exam						

* If there will be experiments, mark it in the "Remarks".

Coordinator Young-Dahl Jho

Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11655	Cr. Hrs.	3	Instructor	Jae-Hyung Jang
Course Title	Korean	초고주파 소자 및 네트워크					
	English	Microwave Devices and Network					
<u>Course Outline</u> This course provides deep understanding of passive microwave networks and antenna design technologies. Network synthesis based on transmission lines and s-parameters and ABCD parameters will be provided. Fundamentals of antenna, planar antennas, and antenna arrays will also be discussed.							
Prerequisite							
Textbook and References		Microwave Engineering, David Pozar Antenna for all application, Kraus					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction						
2nd week	Wave equations and transmission line equations						
3rd week	Impedances and admittances						
4th week	Smith Charts						
5th week	Z, Y, and ABCD parameters						
6th week	Application of ABCD parameters						
7th week	Network Synthesis						
8th week	Midterm Exam						
9th week	Scattering Matrices						
10th week	Resonant circuits						
11th week	Filter design						
12th week	Power dividers and combiners						
13th week	Fundamentals of Antenna						
14th week	Planar Antennas						
15th week	Antenna Arrays						
16th week	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Coordinator Jae Hyung Jang

Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11658	Cr. Hrs.	3	Instructor	Un-Chul Paek
Course Title	Korean	광섬유 공학					
	English	Fiber Optics					
<u>Course Outline</u> 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 week	Historical Background of Optical Communications						
2nd week	Optical Fiber Fabrication and its Applications						
3rd week	Ray Theory of Optical Fibers						
4th week	Wave Theory of Optical Fibers						
5th week	Propagation of Modes in Cylindrical Fibers						
6th week	Linearly Polarized Modes and Mode Designations						
7th week	Inhomogeneous Core Single-Mode Fibers						
8th week	Midterm Exam						
9th week	Mode Analysis by W. K. B. Method						
10th week	Impulse Response and Dispersion Relation						
11th week	Doping Materials and Material Dispersions						
12th week	Electric Field Distributions and Mode Patterns						
13th week	Arbitrary Index-Profiled Fibers by Semi-Numerical Method						
14th week	Fiber Draw and Coating Mechanics						
15th week	Strength of Optical Fibers						
16th week	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Instructor Un-Chul Paek
Dept. Chair Byungha Lee

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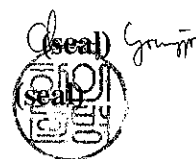


SYLLABUS

Classification	Elective	Course No.	11659	Cr. Hrs.	3	Instructor	Youngjoo Chung
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, Q-switching, passive and active mode-locking							
Prerequisite		Electromagnetics					
Textbook and References		Textbook: Pedrotti & Pedrotti, <i>Introduction to Optics</i> , 2nd ed. References: Born and Wolf, <i>Principles of Optics</i> , 7th ed. E. Hecht, <i>Optics</i> A. Yariv & P. Yeh, <i>Optical Waves in Crystals</i> A. E. Siegman, <i>Lasers</i>					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Historical review and background						
2nd week	Geometrical optics						
3rd week	Matrix methods in paraxial optics						
4th week	Optical instrumentation						
5th week	Wave optics and superposition of waves						
6th week	Interference of light						
7th week	Coherence and holography, <i>Mid-term</i>						
8th week	Polarization						
9th week	Diffraction theory						
10th week	Theory of multilayer films						
11th week	Light amplification and basic of lasers						
12th week	Characteristics of lasers						
13th week	Fiber optics and Fourier optics						
14th week	Nonlinear optics						
15th week	Dead week						
16th week	<i>Final Exam</i>						

* If there will be experiments, mark it in the "Remarks".

Instructor Youngjoo Chung
Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11670	Cr. Hrs.	3:0:3	Instructor	Dug Young Kim
Course Title	Korean	비선형 광학					
	English	Nonlinear Optics					
Course Outline : Basic concepts of Nonlinear optics and their mathematical 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 - Y.R. Shen					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction						
2nd week	Wave equation and refractive index						
3rd week	Coupled mode equations						
4th week	Anharmonic Oscillator model						
5th week	Second harmonic generation						
6th week	Optical crystals and susceptibility tensors						
7th week	Parametric amplication						
8th week	Electro optic modulator						
9th week	Third harmonic generation						
10th week	Optical Kerr effect and Self-Phase modulation						
11th week	Cascaded effects						
12th week	Four-wave mixing						
13th week	All-Optical switching devices						
14th week	Stimulated Raman/Brillioun scattering						
15th week	Nonlinear schrodinger equation						
16th week	Solitons						

* If there will be experiments, mark it in the "Remarks".

Homework 30%
 Pop Quiz 20%
 Mid Test 20%
 Final Test 30%

Coordinator Dug Young Kim

Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11678	Cr. Hrs.	1:4:0	Instructor	Yong-Tak Lee Lee, Dong-Seon
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 week	Introduction and safety training						Experiment
2nd week	Growth and characterization of compound semiconductors						Experiment
3rd week	Optical lithography						Experiment
4th week	Metallization						Experiment
5th week	Lift-off						Experiment
6th week	Ohmic contacts of semiconductor devices						Experiment
7th week	Sputtering of dielectric films						Experiment
8th week	Mid-term exam						
9th week	Thickness measurement of dielectric thin film						Experiment
10th week	Wet etching of compound semiconductors						Experiment
11th week	PECVD of SiO ₂ and SiN _x film						Experiment
12th week	Dry etching of dielectric films						Experiment
13th week	Dry etching of compound semiconductors						Experiment
14th week	Scanning electron microscopy						Experiment
15th week	Measurement of Schottky diode characteristics						Experiment
16th week	Final Exam						

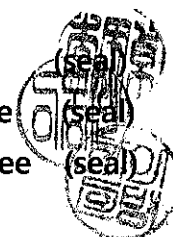
* If there will be experiments, mark it in the "Remarks".

Coordinator

Yong-Tak Lee

Dong-Seon Lee

Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	11690	Cr. Hrs.	3	Instructor	Yong-Tak Lee
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 characteristics, in addition, recent topics on Quantum Well Lasers, Surface Emitting Lasers, Semiconductor, Laser Amplifiers, etc. are studied.							
Prerequisite		Optoelectronics					
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 week	Principles of injection Laser Operation						
2nd week	Wave Propagation in waveguide						
3rd week	Modes in Lasers Structure						
4th week	Stimulated Emission						
5th week	Optical Gain						
6th week	Heterostructure Materials						
7th week	Epitaxy of Heterostructure						
8th week	Laser Structure and Fabrication Process						
9th week	Mid Term Exam						
10th week	Quantum Well Lasers						
11th week	Single Mode DFB & DBR Lasers						
12th week	Modulation Characteristics						
13th week	Surface Emitting Lasers						
14th week	Semiconductor Amplifiers						
15th week	Semiconductor Amplifiers						
16th week	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Instructor Yong-Tak Lee
Dept. Chair Byeongha Lee



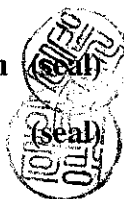
SYLLABUS

<i>Classification</i>	Elective	<i>Course No.</i>	11698	<i>Cr. Hrs.</i>	3	<i>Instructor</i>	JongWon Kim
<i>Course Title</i>	<i>Korean</i>	고급 컴퓨터 네트워킹					
	<i>English</i>	Advanced Topics in Computer Networking					
<u><i>Course Outline</i></u> Covers the advanced developments of computer networking systems and protocols. The specific topics can vary to catch up the latest trends in advanced computer networking. Deep understanding on several selected topics will be pursued and individual research project will complement the experimental design and implementation issues. For year 2002, advanced application networking issues featuring media networking and GRID over the Internet will be covered							
<i>Prerequisite</i>		DIC11641 Computer Networks and Communications (Required) DIC11635 Data Communications (Recommended)					
<i>Textbook and References</i>		No fixed textbook					
<i>Weekly Course Schedule</i>							
<i>Calendar</i>	<i>Description</i>					<i>Remarks</i>	
<i>1st-2nd week</i>	Overview of Course/ Background Review						
<i>3rd-4th week</i>	Reliable Media Transport and Application (Rate and error control over unicast) Course Project preliminary intention (short report)					EXAM #1 Project#1-1(Streaming Client)	
<i>5th-6th week</i>	Media application programming Project team grouping					Exam #2 Project#1-2(+Display)	
<i>7th-8th week</i>	Course project plan (presentation/report)					Paper Review PPT	
<i>9th-10th week</i>	Reliable multicast transport and application					Exam #3	
<i>11th-12th week</i>	Peer-to-peer application networking/content delivery network (Proxy/Caching)					Exam #4	
<i>13th-14th week</i>	Course project progress (Discussion/report)						
<i>15th-16th week</i>	GRID: Internet Middleware Course project final (presentation/report)					Exam #5	

* If there will be experiments, mark it in the "Remarks".

Instructor Jong Won Kim

Dept. Chair Byeongha Lee



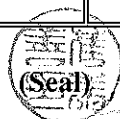
The Spring Semester 2009

SYLLABUS

Classification		Course No.	15400	Cr. Hrs.	3;0:3	Instructor	Tae-Sun Choi
Course Title	Korean	신호처리공학 특론 1					
	English	Special Topics in Signal Processing & Systems 1					
<u>Course Outline</u>							
This course deals with advanced topics in machine vision theory and mathematical methods for shape recovery techniques. One of the main purpose of this course to introduce students to the fundamentals of machine vision. It covers signal theory, focus measure, illumination effect, shape recovery, defocus, neural network, principal component analysis, and applications.							
Prerequisite	Special Issues for Signal and Image Processing						
Textbook and References	1. Handout 2. B.K.P. Horn, <i>Robot Vision</i> , McGraw-Hill, NY.						
Weekly Course Schedule							
Calendar	Description						Remarks
1 st week	Signal Theory						
2 nd week	Discrete Signal Representations						
3 rd week	Linear Transformation						
4 th week	Focus Measure						
5 th week	Illumination Effect						
6 th week	Shape Recovery from Focus						
7 th week	Depth Map						
8 th week	Planar Approximation						
9 th week	Curved Approximation						
10 th week	Defocus						
11 th week	Defocus using Wavelet Analysis						
12 th week	Neural Network Model						
13 th week	Dynamic Programming						
14 th week	Fuzzy Logic						
15 th week	Principal Component Analysis						
16 th week	Applications						

Instructor

Tae-Sun Choi



Dept. Chair

Wang, Se-Myung (Seal)

SYLLABUS

Classification	Elective	Course No.	15401	Cr. Hrs.	3	Instructor	전성찬 (S.C. Jun)
Course Title	Korean	컴퓨터 과학 및 공학 특론 I - 뇌기능매핑을 위한 수학적 모델링과 과학 계산					
	English	Special Topics on Computer Science and Engineering I - Mathematical Modelling and Scientific Computing fo Human Brain Mapping.					
Course Outline The course aims to introduce the students with human brain mapping and brain biosignal analysis. In-depth mathematical modelling and scientific computing related to this field is discussed in this course. This course is focused on MEG, EEG, fMRI, and MRI imaging systems.							
Prerequisite		Strong background of calculus and linear algebra, and proficiency on computing language are required.					
Textbook and References		Lecture Notes will be provided on a weekly basis					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Brain Structures, Brain Diseases, Brain Imaging Techniques						
2nd week	Human Brain Mapping : Brain Dynamics and Connectivities						1st Project
3rd week	Dynamical Imaging Systems and Measurements : MEG, EEG						
4th week	Neuronal Signal Analysis : Noise Treatments, PCA, ICA						2nd Project
5th week	Head & Brain Activity Modelling						
6th week	Mathematical Modelling for MEG/EEG : Computing Methods						3rd Project
7th week	Neuronal Source Imaging : Mathematical General Concepts						
8th week	Neuronal Source Imaging : Dipole Fitting and Linear Estimation						4th Project
9th week	Neuronal Source Imaging : Scanning Methods						
10th week	Neuronal Source Imaging : Statistical Methods						5th Project
11th week	Indirect Neuronal Source Imaging : fMRI/MRI Basics, Experiments						
12th week	Indirect Neuronal Source Imaging : fMRI Data Analysis, Group Analysis						6th Project
13th week	Indirect Neuronal Source Imaging : fMRI/MRI Visualization						
14th week	Multimodality Brain Imaging : Integration of MEG/EEG.MRI/fMRI						7th Project
15th week	Applications : Brain Computer Interface, Neurofeedback						
16th week	Wrap-up : Review of the Course						Final Project

* If there will be experiments, mark it in the "Remarks".

Coordinator
Dept. Chair

전성찬 (S. C. Jun)
Byeongha Lee



SYLLABUS

Classification	Optional	Course No.	15418	Cr. Hrs.	3:0:3	Instructor	Yang, Sung
Course Title	Korean	기본 유체역학					
	English	Fundamentals of Fluid Mechanics					
<u>Course Outline</u> "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		<u>Text and Reference Books</u> 1. "Fluid Mechanics", 2nd Ed., Pijush K. Kundu and Ira M. Cohen, Academic Press, 2002 2. "Transport Phenomena", 2nd Ed., Bird, Stewart, and Lightfoot, Wiley, 2007 <u>Grading</u> Pop Quizzes (10%), Homework (20%) Term Project (30%), Final Exam (40%)					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Mathematical constructs/representation						
2nd week	Mathematical constructs/representation, Kinematics						
3rd week	Kinematics						
4th week	Conservation Laws						
5th week	Conservation Laws						
6th week	Navier-Stokes eqn.						
7th week	Navier-Stokes eqn.						
8th week	Laminar Flows: Exact solutions of special cases						
9th week	Laminar Flows: Exact solutions of special cases						
10th week	Laminar Flows: Exact solutions of special cases						
11th week	Transient Flows						
12th week	Transient Flows / Vorticity Dynamics						
13th week	Vorticity Dynamics / Irrotational Flows						
14th week	Irrotational Flows						
15th week	Term Project Presentation						
16th week	Review and Comprehensive Final Exam						

* If there will be experiments, mark it in the "Remarks".

Instructor
Dept. Chair

Yang, Sung
Wang, Se-Myung




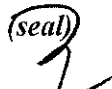
SYLLABUS

Classification	Elective	Course No.	15420	Cr. Hrs.	3	Instructor	Lee, Yeon Soo
Course Title	Korean	생체역학					
	English	Biomechanics					
<u>Course Outline</u> Biomechanics is a mechanics to biology and physiology. This class provides fundamental musculoskeletal anatomy, mechanical interpretation of musculoskeletal issues, and cell mechanics. This class is designed for graduate students who want to expand their current knowledge to biomedical science, mechanobiology, rehabilitation, and sports engineering.							
Prerequisite		Engineering mathematics, Fundamental material mechanics					
Textbook and References		Home-made study material edited by Instructor Intro. to Biomedical Engineering, 2nd Edt, John Enderle et al., Elsevier, 2005 Ref.: Biomechanics, 2nd Edt. - Y.C. Fung, Springer					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	What is biomechanics?, Cellular Organization						
2nd week	Cellular biomechanics						
3rd week	Cellular biomechanics						
4th week	Application of statics to biomechanics						
5th week	Mechanics of hard tissue						
6th week	Mechanics of soft tissues						
7th week	Nano/Micro control for cell mechanics						
8th week	Mid term						
9th week	Introduction to Musculoskeletal biomechanics						
10th week	Upper extremity						
11th week	Spine						
12th week	Hip and knee						
13th week	Foot and ankle						
14th week	Teeth						
15th week	Biomechanical analysis of clinical problems						
16th week	Final term						

* If there will be experiments, mark it in the "Remarks".

Instructor
Dept. Chair

Lee, Yeon Soo
Wang, Se-Myoung


 (Seal)

 (Seal)

SYLLABUS

Classification		Course No.	15422	Cr. Hrs.	3:0:3	Instructor	Yong Hoon Kim
Course Title	Korean	초고주파 밀리미터파 공학-II: 능동회로					
	English	Microwave & mm-Wave Engineering II: active circuits					
<u>Course Outline</u> The lecture introduce the microwave devices for active circuits and two-ports network. Based on the knowledge of "Microwave and mm-wave engineering I", the theory of different types of active circuits on planar circuits and design methods will be introduced. The theory and design methods of amplifiers, oscillators and mixer will be introduced in detail and the practical circuits will be designed using CAD(computer aided design) tool like ADS and the designed circuits will be manufactured and validated the circuit design by student in the experiment.							
Prerequisite		Microwave & mm-Wave Engineering I					
Textbook and References		G.D. Vendelin, Microwave Circuit Design, Wiley					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Two-ports and S-parameters						
2nd week	Noise in Linear Two-ports						
3rd week	Microwave Transistor Fundamental						
4th week	S-parameters of Active Two-ports						
5th week	Smith Chart and Amplifier Design using Smith Chart						
6th week	Amplifier Design - One-stage						
7th week	Amplifier Design - Multi-stage						
8th week	Low Noise Amplifier Design						
9th week	Midterm examination						
10th week	Oscillator Theory						
11th week	Oscillator Design						
12th week	Microwave Mixer Design on Microstrip Line						
13th week	Microwave CMOS Design						
14th week	Experiment of Amplifiers						experiment
15th week	Experiments of Active Circuits						experiment
16th week	Semester examination						

* If there will be experiments, mark it in the "Remarks".

Instructor
Dept. Chair

Kim, Yong-Hoon
Wang, Se-Myung

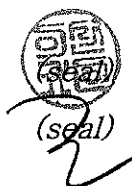


SYLLABUS

Classification	Elective	Course No.	15600	Cr. Hrs.	3:0:3	Instructor	Lee, Sun Kyu
Course Title	Korean	정밀설계원리					
	English	Principle of Precision Design					
<u>Course Outline</u>							
This class focuses on precision mechanical design methodology							
Lectures are delivered about key issues of design in precision or ultraprecision positioning system. It covers precision design principle, motion error analysis, thermo-mechanical design, friction and positioning error, residual vibration and precision measurement.							
Prerequisite	Quiz & Reports 30% Mid Exam 30% Final Exam 30% Project 10%						
Textbook and References	Precision Machine Design,Alexander H.Slocum,Prentice-Hall, 1992						
	Principles of Precision Engineering, H.Nakazawa,Oxford University Press,New York,1994						
	Nanotechnology,Norio Taniguchi,Oxford University Press,1996						
	Ultra precision mechanism design,						
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Machine Accuracy						
2nd week	Principle of Measurement						
3rd week	Error formulation						
4th week	Error correction						
5th week	Ultra-precision Design (1) - Compliance rule -						
6th week	Ultra-precision Design (2) - Kinematic design and Geometric conformity -						
7th week	Ultra-precision Design (3) - Filter effect design -						
8th week	Ultra-precision design (4) - Motion guide design -						
9th week	Mid exam						
10th week	Flexure design						
11th week	Vibration Isolation						
12th week	Residual Vibration and Speed curve design						
13th week	Friction and motion accuracy						
14th week	Positioning control						
15th week	Precision measurement						
16th week	Final Exam, Project presentation						

Instructor
Dept. Chair

Lee, Sun Kyu
Wang, Se Myung



SYLLABUS

Classification	Elective	Course No.	15601	Cr. Hrs.	3:0:3	Instructor	Park, Kyi Hwan
Course Title	Korean	고급자동제어					
	English	Advanced Automatic Control					
<u>Course Outline</u>							
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 EOl. 2) Control System Design using MATLAB, Bahram Shahian, Michael Hassaul, Prentice-Hall 3) Modern Control Engineering, Katsuhiko Ogata, Prentice-Hall					
Weekly Course Schedule							
Calendar	Description					*Remarks	
1st week	Introduction						
2nd week	Time Response						
3rd week	Frequency Response						
4th week	Electric circuitry for control I						
5th week	"						
6th week	Modulation Technique I						
7th week	Modulation Technique II						
8th week	Experiment I						
9th week	Experiment II						
10th week	Mid Exam						
11th week	Sliding mode Control I						
12th week	"						
13th week	Adaptive Control						
14th week	"						
15th week	Experiment III						
16th week	Final						

* If there will be experiments, mark it in the "Remarks".

Instructor Park, Kyi-Hwan

Dept. Chair Wang, Se-Myung



SYLLABUS

Classification	Selective	Course No.	15614	Cr. Hrs.	3:0:3	Instructor	Lee, Jong Hyun
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. <ul style="list-style-type: none">- 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 & References	<ul style="list-style-type: none">- 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- S. S. Saliterman, "Fundamentals of bioMEMS and medical microdevices," Wiley-Interscience, 2006						
Weekly Course Schedule							
Calendar	Description						Remarks
1 st week	Introduction to MEMS/NEMS						
2 nd week	Materials for MEMS/NEMS						
3 rd week	Basic fabrication process						
4 th week	Fundamentals of semiconductor physics						
5 th week	Micromachining process design I						
6 th week	Micromachining process design II						
7 th week	Bulk micromachining I						
8 th week	Mid-term exam						
9 th week	Bulk micromachining II						
10 th week	Surface micromachining						
11 th week	Process issues & nano fabrication						
12 th week	Micro-electro-mechanics						
13 th week	Optical MEMS & medical microdevices						
14 th week	Presentation I						
15 th week	Presentation II						
16 th week	Final exam						

Instructor

Lee, Jong Hyun

Dept. Chair

Wang, Se Myung



SYLLABUS

Classification	Selective	Course No.	15627	Cr. Hrs.	3:0:3	Instructor	Vladimir Shine
Course Title	Korean	에스티메이션 및 디텍션					
	English	Estimation & 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 week	Introduction						
2nd week	Classical detection and estimation theory						
3rd week	M hypotheses						
4th week	Composite hypotheses						
5th week	General Gaussian problem						
6th week	Representation of random processes						
7th week	Periodic processes						
8th week	Vector random processes						
9th week	Detection of signals						
10th week	Estimation of signals						
11th week	Multiple parameter estimation						
12th week	Estimation of continuous waveforms						
13th week	Multidimensional waveform estimation						
14th week	Linear estimation						
15th week	Linear modulation						
16th week	Final Exam						

* If there will be experiments, mark it in the "Remarks".

Instructor

Vladimir Shine



Dept. Chair

Wang, Se-Myung

(Seal)

SYLLABUS

Classification	Required	Course No.	15630	Cr. Hrs.	3:0:3	Instructor	V. Shin
Course Title	Korean	응용공업수학					
	English	Applied Engineering Mathematics					
<u>Course Outline</u>							
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 week	Introduction, Matrices, Vectors						
2nd week	Inverse Matrix, Linear Vector Space						
3rd week	Characteristic Value Problem						
4th week	Definite Forms, Coordinate Transform						
5th week	Maxima and minima, Lagrange Multiplier						
6th week	Variation of Dynamic Systems						
7th week	Variation of Deformable Bodies						
8th week	Rayleigh-Ritz Method						
9th week	Complex Functions						
10th week	Mapping by Elementary Functions						
11th week	Conformal Mapping						
12th week	Application of Conformal Mapping						
13th week	Statistical Estimation and Hypothetical Testing						
14th week	Regression and Correlation						
15th week	Analysis of Variance						
16th week	Statistical Quality Control						

* If there will be experiments, mark it in the "Remarks".

Instructor

V. Shin

Dept. Chair

Wang, Se-Myung



(Seal)

SYLLABUS

Classification	Elective	Course No.	15645	Cr. Hrs..	3:0:3	Instructor	Kwanghee Ko
Course Title	Korean	고급 컴퓨터 그래픽스					
	English	Advanced Computer Graphics					
<u>Course Outline</u> The goal of this course is to introduce advanced concepts and algorithms in computer graphics and provide theoretical backgrounds to develop interactive and real-time graphics applications. It covers basic concepts from mathematics and physics and discusses advanced topics in computer graphics including collision detection, lighting, realistic rendering, etc.							
Prerequisite		Computer Graphics, Linear Algebra, Calculus, Physics					
Textbook and References		- Game Physics, by David H. Eberly, Morgan Kaufmann, 2004. - Computer Graphics: Principles and Practice in C (2nd Edition) by James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughe					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Introduction						
2nd week	Basic Concept From Mathematics						
3rd week	Differential Equations						
4th week	Numerical Methods I						
5th week	Numerical Methods II						
6th week	Quaternion						
7th week	Basic Concept From Physics I						
8th week	Basic Concept From Physics II						
9th week	Collision Detection I						
10th week	Collision Detection II						
11th week	Physics Engines						
12th week	Computer Graphics Revisited						
13th week	Advanced Lighting and Shading						
14th week	Advanced Rendering Topics I						
15th week	Advanced Rendering Topics II						
16th week	Project Presentation						

* If there will be experiments, mark it in the "Remarks".

Instructor
Dept. Chair

Ko, Kwang Hee
Wang, Se-myung



SYLLABUS

Classification	Elective	Course No.	15653	Cr. Hrs.	2:1:3	Instructor	Ryu, Je-ha
Course Title	Korean	가상환경 및 햅틱스					
	English	Virtual Environments and Haptics					
<u>Course Outline</u> This course is a truly multidisciplinary system design course for developing a creative high quality advanced information communication system through Human-Machine-Computer Interface that is a blending of such technologies as Robotics, Mechatronics, Information and Communication, and Computer Graphics. This course firstly introduces very briefly such basic concepts and techniques for developing Virtual Environments as I/O devices, Computing Architectures, Modeling and Programming, Applications. Secondly, basic theories and techniques such as Haptic Sensing and Control, Haptic Rendering and Control, and Applications are presented in detail for developing Haptic devices. Students are required to do in-depth project work for developing or improving VE and/or Haptic Devices.							
Prerequisite	Robotics, Automatic Control, Computer Graphics Programming Language: c/C++						
Textbook and References	T1) Handouts/Papers R1) <i>Force and Touch Feedback for Virtual Reality</i> , by Grigore C. Burdea, 1996, John Wiley and Sons R2) <i>Virtual Reality Technology</i> , by G.C.Burdea and P. Coiffet, 2003, John Wiley and Sons						

Weekly Course Schedule		
Calendar	Description	Remarks
1st week	VE Introduction/ Input/Output Devices	VE (4 Weeks) (Burdea VE 2003)
2nd week	VE Computing Architecture	Lab 1: OpenGL/GPU
3rd week	VE Modeling and Programming	
4th week	VE Human Factors and Applications	Lab 2: Input/Output Devices
5th week	Quiz on VE	
6th week	Human Sensing Mechanism (Chap 1 and 2)	
7th week	Actuators (Chap 3)/ Force/Tactile Feedback Devices (Chap 4, 5, 6)	Haptics (10 Weeks) (Burdea Haptics 1996)
8th week	Physical Modeling/Haptic Rendering (Chap 7)	Lab 3: Haptic Devices
9th week	Physical Modeling/Haptic Rendering (Chap 7)	Lab 4:LOMI-based haptic rendering
10th week	Physical Modeling/Haptic Rendering (Chap 7)	
11th week	Haptic Interface Control (Chap 8)	Lab 5: K-Touch/K-HapticModeller/K-HapticMovie
12th week	Haptic Interface Control (Chap 8)	
13th week	Haptic Interface Control (Chap 8)	Lab 6: Energy-bounding haptic control
14th week	Haptic Interface Control (Chap 8)	
15th week	Human Factors/Applications (Chap 9 and 10)	
16th week	Project Oral Presentation	

Instructor Ryu, Jeha

Dept. Chair Wang, Se-myung



(Seal)

SYLLABUS

Classification	Elective	Course No.	15654	Cr. Hrs.	3:0:3	Instructor	Wang, Se Myung
Course Title	Korean	고급유한 요소법					
	English	Advanced Finite Element Method					
Course Outline To analyze complicating electro-mechanical systems, those systems are modeled using many finite elements. Approximate solutions are obtained using computers. Formulation of truss, beam, plate, solid elements is covered. CAE is carried out using solid modeler(Pro/E, IDEAS), analyzer(MSC/NASTRAN, ANSYS, ABAQUS, COMET), optimizer(IDESIGN, DOT) and postprocessor(PATRAN, HYPERMESH). Many analysis types such as static, eigenvalue, frequency response, transient, and electromagnetic analyses are studied							
Prerequisite		Ordinary Differential Equations / Fundamentals of Vibrations / Beam and Plate Bending / Matrix & Linear Algebra / Calculus of Variation					
Textbook and References		Text book : Finite Element Procedures, K. J. Bathe, Prentice Hall, 1996.					
		References :					
		1. Energy and Finite Element Methods in Structural Mechanics, I. H. Shames and C. L. Dym, Hemisphere, 1985.					
		2. Structural Dynamics : An Introduction to Computer Methods, R. R. Craig, John Wiley & Sons, 1981.					
		3. Methods of Engineering Mathematics, E. J. Haug and K. K. Choi, Prentice Hall, 1993.					
		4. Design Sensitivity Analysis of Structural Systems, E. J. Haug, K. K. Choi, and V. Komkov, Academic, Press, 1986.					
		5. Introduction to Optimum Design, J. S. Arora, McGraw-Hill. 1989.					
Weekly Course Schedule							
Calendar	Description					*Remarks	
1st week	Formulation of FEM						
2nd week	"						
3rd week	isoparametric Element						
4th week	"						
5th week	Numerical Integration						
6th week	Solution of Static Problems						
7th week	Solution of eigenvalue Problems						
8th week	Midterm Exam and Project						
9th week	Solution of Dynamic Problems						
10th week	"						
11th week	Nonlinear FEM						
12th week	Electromagnetic FEM						
13th week	Elastoacoustic FEM						
14th week	Design Sensitivity Analysis						
15th week	Design Optimization						
16th week	Final Exam and Project						

* If there will be experiments, mark it in the "Remarks".

Instructor Wang Se Myung (Seal)

Dept. Chair Wang, Se-Myung (Seal)

SYLLABUS

Classification	Elective	Course No.	15658	Cr. Hrs.	3:0:3	Instructor	Ahn, Hyo-Sung
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 week	Principle of Feedback						
2nd week	Modeling						
3rd week	Continuous-time signals and systems						
4th week	PID control						
5th week	SISO control design I						
6th week	SISO control design II						
7th week	SISO control design III						
8th week	Mid Term Exam						
9th week	Digital control						
10th week	Digital control						
11th week	State space analysis I						
12th week	State space analysis II						
13th week	Nonlinear control						
14th week	MIMO control design I						
15th week	MIMO control design II						
16th week	Final Exam						

Grading Policy: Homework/Term Project/Midterm/Final - 200pt/100pt/100pt/100pt

* If there will be experiments, mark it in the "Remarks".

Instructor Ahn, Hyo-Sung
Dept. Chair Wang, Se-Myung



SYLLABUS

Classification	Elective	Course No	15676	Cr. Hrs.	3	Instructor	Kangwook Kim
Course Title	Korean	전자파 복사 및 안테나					
	English	EM Radiation and Antennas					
<u>Course Outline</u> The fundamentals of electromagnetic radiation and antennas are covered. These include the classical electromagnetism, radiation mechanism, basic principles and theorems, time-domain properties of antennas, and antenna arrays.							
Prerequisite		None					
Textbook and References		[1] Glenn S. Smith, <i>An Introduction to Classical Electromagnetic Radiation</i> , Cambridge University Press, 1997. ISBN:0-521-58698-4 [2] 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 week	Basic theory of electromagnetism						
2nd week	Electromagnetic plane waves in free space						
3rd week	Inhomogeneous plane waves and plane-wave spectrum						
4th week	Radiation from charges and current						
5th week	Radiation from a moving point charge						
6th week	Radiation integrals and auxiliary potential functions						
7th week	Fundamental theorems and principles						
8th week	Review and Midterm Exam						
9th week	Fundamentals parameters of antennas						
10th week	Radiation from dipole antennas						
11th week	Radiation from loop antennas						
12th week	Radiation from general wire antennas						
13th week	General time dependence of radiation						
14th week	Antenna Arrays and Synthesis						
15th week	Antennas in matter						
16th week	Review and Final Exam						

* If there will be experiments, mark it in the "Remarks".

Instructor
Dept. Chair

Kim, Kangwook
Wang, Se-Myung



SYLLABUS

Classification	Elective	Course No.	15681	Cr. Hrs.	3:0:3	Instructor	Moongu Jeon
Course Title	Korean	기계 학습론					
	English	Machine Learning					
Course Outline							
The main concerns of this course are the fundamental machine learning theories including the Bayesian, the artificial neural networks, the Support vector machines, and several clustering algorithms. Applications to speech recognition, face recognition, biomedical data mining, and image segmentation/classification will also be considered to for the term projects							
Prerequisite		Programming language, Linear algebra and its applications, Elementary statistics, Calculus, Optimization					
Textbook and References		1. Pattern Recognitions, S. Theodoridis and K. Koutroumbas, Academic Press 2. Support Vector Machines, Cristianini and Shawe-Taylor, Cambridge Univ. Press 3. Learning with Kernels, B. Scho Ikopf and A. J. Smola, The MIT Press					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction, Bayes decision theory						
2nd week	"						
3rd week	Linear classifier, Paraaptron						
4th week	Nonlinear classifier, Backpropagation						
5th week	"						
6th week	Support Vector Machines, Introduction, Kernel						
7th week	Regularization, Learning Theory						
8th week	Optimization						
9th week	Midterm exam and review						
10th week	Maximal margin classifier						
11th week	Soft Margin classifier						
12th week	Feature generation						
13th week	Feature selection						
14th week	Clustering - sequential algorithm						
15th week	hierarchical algorithm						
16th week	Project presentation						

* If there will be experiments, mark it in the "Remarks".

Coordinator Moon Gu Jeon

Dept. Chair Byeongha Lee



SYLLABUS

Classification	Elective	Course No.	105694	Cr. Hrs.	3:0:3	Instructor	Lee, Yong-Gu
Course Title	Korean	나노테크놀로지를 위한 시뮬레이션					
	English	Simulations for Nanotechnology					
<u>Course Outline</u> 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
1 st week	Introduction	
2 nd week	Light microscopy -basic light microscopy -phase contrast and darkfield microscopy	
3 rd week	-properties of polarized light and polarization microscopy - DIC, fluroscence, confocal microscopy Microstereolithography	
4 th week	Optical Tweezers Instrumentations Microstereolithography	
5 th week	Manipulations -Scanning laser optical tweezers scanning frequency	
6 th week	-Holographic optical tweezers	
7 th week	Force measurements -Particle tracking	
8 th week	-Optical Tweezers and Trap stiffness	
9 th week	Numerical simulations -Optical Tweezers simulation in the Rayleigh regime	
10 th week	-Optical Tweezers simulation through Ray-Optics	HW #1
11 th week	-Numerical representation of tightly focused beams	HW #2
12 th week	-Optical Tweezers simulation using the Finite Difference Time Difference method	
13 th week	-FDTD simulations for trapping metals	Term project out
14 th week	Final exam	
15 th week	Term project presentation	
16 th week	Term project presentation	

Instructor Lee, Yong Gu
 Dept. Chair Wang, Se Myung

