

# SYLLABUS

<b>Classification</b>	Required	<b>Course No.</b>	11001	<b>Cr. Hrs.</b>	1:0:0	<b>Instructor</b>	이현주
<b>Course Title</b>	<b>Korean</b>	정보통신 콜로퀴움					
	<b>English</b>	IT(Information Technology) Colloquium					
<b><u>Course Outline</u></b>							
IC 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.							
<b>Prerequisite</b>		N/A					
<b>Textbook and References</b>		N/A					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>							
<b>2nd week</b>							
<b>3rd week</b>							
<b>4th week</b>							
<b>5th week</b>							
<b>6th week</b>							
<b>7th week</b>							
<b>8th week</b>							
<b>9th week</b>							
<b>10th week</b>							
<b>11th week</b>							
<b>12th week</b>							
<b>13th week</b>							
<b>14th week</b>							
<b>15th week</b>							
<b>16th week</b>							

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

Coordinator    Hyunju Lee

Dept. Chair    JongWon Kim



# SYLLABUS

<b>Classification</b>	elective	<b>Course No.</b>	11401	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Chang Soo Park
<b>Course Title</b>	<b>Korean</b>	광통신 네트워크					
	<b>English</b>	Optical Networks					
<b><u>Course Outline</u></b>							
The organization of this course is as follows : first, the basic information to understand optical technologies applicable to optical networks is introduced including optical fiber, transmission and swiching systems, and signal modulation and demodulation. Then, information about network, optical design technologies will be presented with optical access networks of our concern.							
<b>Prerequisite</b>		Fiber Optic Communication Systems, G. P. Agrawal					
<b>Textbook and References</b>		Optical Networks, R. Ramaswami and K. Sivarajan WDM Optical Networks, C. Murtys and M. Gurusamy					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Introduction to optical networks						
<b>2nd week</b>	Propagations of signals in optical fiber						
<b>3rd week</b>	Optical components						
<b>4th week</b>	Modulation and demodulation						
<b>5th week</b>	Transmission system engineering						
<b>6th week</b>	Client layers of the optical layer						
<b>7th week</b>	WDM network elements						
<b>8th week</b>	Mid term exam						
<b>9th week</b>	WDM network design						
<b>10th week</b>	Control and management						
<b>11th week</b>	Network survivalibity						
<b>12th week</b>	Transport networks						
<b>13th week</b>	Access networks						
<b>14th week</b>	Photonic packet switching						
<b>15th week</b>	Development consideration						
<b>16th week</b>	Final term exam						

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

Coordinator   Chang Soo Park

Dept. Chair   JongWon Kim



# SYLLABUS

<b>Classification</b>	elective	<b>Course No.</b>	11402	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Hyuk Lim
<b>Course Title</b>	<b>Korean</b>	무선 네트워크					
	<b>English</b>	Wireless Networks					
<b><u>Course Outline</u></b>							
Several topics related to wireless networking will be covered, including a brief overview of physical layer issues, wireless network architecture, wireless network capacity analysis, multiple access protocols, routing protocols for wireless LANs and adhoc networks, and TCP over wireless networks, sensor networks, mesh networks, and some security related issues.							
<b>Prerequisite</b>		DIC 11635 컴퓨터 네트워킹 (Computer Networking)					
<b>Textbook and References</b>		Mobile Communications, by Jochen Schiller, Addison-Wesley, second edition					
<b><i>Weekly Course Schedule</i></b>							
<b>Calendar</b>	<b>Description</b>					<b>Remarks</b>	
<b>1st week</b>	Course overview / Network protocol stack						
<b>2nd week</b>	Physical layer discussion						
<b>3rd week</b>	Capacity analysis of wireless networks						
<b>4th week</b>	MAC lecture: Basic/modified ALOHA						
<b>5th week</b>	MAC lecture: Hidden/exposed terminal prob.						
<b>6th week</b>	MAC lecture: P-persistent proto. IEEE 802.11 DCF						
<b>7th week</b>	MAC lecture: Scheduling and Fairness						
<b>8th week</b>	MAC lecture: Power/rate/carrier sense control					Mid term exam	
<b>9th week</b>	Routing lecture: Proactive adhoc routing						
<b>10th week</b>	Routing lecture: Reactive adhoc routing						
<b>11th week</b>	Routing lecture: Handling link failure / optimization issues						
<b>12th week</b>	Routing lecture: Geographic routing / mutlipath routing						
<b>13th week</b>	Address assignment in adhoc networks / mobile IP						
<b>14th week</b>	TCP over wireless networks						
<b>15th week</b>	Sensor networks: Energy effic. MAC / Query						
<b>16th week</b>	Security issues in adhoc networks / RFID					Final term exam	

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

**Cordinator**  
**Dept. Chair**

**Hyuk Lim**  
**JongWon Kim**



# SYLLABUS

Classification	Elective	Course No.	11405	Cr. Hrs.	3	Instructor	Moon Gu Jeon
Course Title	Korean	알고리즘의 디자인과 분석					
	English	Design and Analysis of Algorithms					
<u>Course Outline</u>							
This course provides fundamental paradigms for designing algorithms with the supporting data structures. We will start with simple algorithms in sorting and its analysis and further deal with graph theory, dynamic programming, greedy algorithms, starting matching, and several special topics. If time is allowed we will touch NP-complete problems.							
Prerequisite		Programming language					
Textbook and References		Introduction to Algorithmss, 2nd ed. by T. H. Cormen, C. E. Leiserson and R. L. Rivest, MIT Press, Cambridge, MA					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Introduction						
2nd week	Insertion sorting						
3rd week	Recurrences						
4th week	Heap sort, Quick sort						
5th week	Elementary data structures						
6th week	Hash Tables						
7th week	Binary search Trees, Red-Black Trees						
8th week	Dynamic programming, Greedy algorithms						
9th week	Midterm Exam.						
10th week	Advanced data structures						
11th week	Advanced data structures						
12th week	MST						
13th week	Shortest Paths						
14th week	Maximum Flow						
15th week	String Matching						
16th week	NP-Complete, Final Exam.						

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

Coordinator      Moon Gu Jeon

Dept. Chair      JongWon Kim



# SYLLABUS

<b>Classification</b>	elective	<b>Course No.</b>	11407	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Hyunju Lee
<b>Course Title</b>	<b>Korean</b>	데이터베이스 시스템					
	<b>English</b>	Database Systems					
<b><u>Course Outline</u></b>							
Large scale data sets have been accumulated for decades and been rapidly increasing in various fields such as internet, biology and biomedicine. It requires advanced technologies in storing and retrieving them. Topics include basics such as data modeling, database query languages, data integrity, transactions and security as well as advanced issues in managing large-scale databases, integration of heterogeneous data sets, and development of tools for mining these databases. Students will be exposed to the construction of large-scale databases with the heterogeneous data sets upon the completion of the class.							
<b>Prerequisite</b>		NA					
<b>Textbook and References</b>		Silberschatz, Korth, and Sudarshan. ``Database System Concepts'', 5th ed., MacGraw Hill					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Introduction and Relational Model						
<b>2nd week</b>	Query Languages and SQL						
<b>3rd week</b>	Database Schema and Design						
<b>4th week</b>	Storage and File Structure						
<b>5th week</b>	Indexing and Query Processing						
<b>6th week</b>	Query Optimization						
<b>7th week</b>	Transactions						
<b>8th week</b>	Concurrent Control						Mid term exam
<b>9th week</b>	Recovery						
<b>10th week</b>	Objects in Database						
<b>11th week</b>	XML						
<b>12th week</b>	Semantic Web and RDF						
<b>13th week</b>	Search Engines						
<b>14th week</b>	Data Analysis and Mining						
<b>15th week</b>	Databases in Life Science						
<b>16th week</b>	Large-scale Database						Final term exam

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

Coordinator Hyun Ju Lee

Dept. Chair JongWon Kim



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11409	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Jongsoo Lee
<b>Course Title</b>	<b>Korean</b>	RF 및 무선 시스템 설계					
	<b>English</b>	RF and Wireless System Designs					
<b>Course Outline</b> : This is the wireless system design course dedicated for RF IC designers and system level engineers in mobile communications. The analysis method and fundamental theories for wireless system design will be addressed and also some practical examples for the commercial wireless systems are given during the course.							
<b>Prerequisite</b>		None					
<b>Textbook and References</b>		Main Textbook : RF System Design of Transceivers for Wireless Communications by Qizheng Gu (Springer, 1st edition)					
		References 1. Microwave and Rf Design of Wireless Systems by David M. Pozar (Wiley, 1st edition)					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>Remarks</b>	
<b>1st week</b>	Introduction to wireless system designs						
<b>2nd week</b>	Fundamentals - Linear and nonlinear system						
<b>3rd week</b>	Fundamentals - Noise						
<b>4th week</b>	Fundamentals - Digital base-band system						
<b>5th week</b>	Radio Architecture - Superheterodyne system						
<b>6th week</b>	Radio Architecture - DRC and Low IF system						
<b>7th week</b>	Radio Architecture - Band pass sampling system						
<b>8th week</b>	Receiver system - Sensitivity and noise figure					Midterm Exam.	
<b>9th week</b>	Receiver system - Intermodulation and single tone						
<b>10th week</b>	Receiver system - ACPR and dynamic range						
<b>11th week</b>	Transmitter system - Modulation						
<b>12th week</b>	Transmitter system - ACPR and ACLR						
<b>13th week</b>	Transmitter system - Noise						
<b>14th week</b>	Transmitter system - other factors						
<b>15th week</b>	Application - Multimode and mutiband system						
<b>16th week</b>	Direct conversion Transceiver					Final Exam.	

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

**Coordinator**      **Jongsoo Lee**  
**Dept. Chair**      **JongWon Kim**



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11414	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Jong-In Song
<b>Course Title</b>	<b>Korean</b>	고급 아날로그 집적회로 설계					
	<b>English</b>	Advanced Analog Integrated Circuit Design					
<b>Course Outline</b> : This course covers advanced analog integrated circuit design issues including feedback, stability and compensation, nonlinear integrated circuits, fully differential operational amplifier, noise in integrated circuits.							
<b>Prerequisite</b>		Analog integrated circuit design (11627) or equivalent, Basic semiconductor device physics					
<b>Textbook and References</b>		P. Gray, Analysis and design of analog integrated circuits, 3rd ed. John Wiley & Sons, Inc.					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Design and analysis of feedback circuits						
<b>2nd week</b>	Design and analysis of feedback circuits						
<b>3rd week</b>	Design and analysis of feedback circuits						
<b>4th week</b>	Design and analysis of feedback circuits						
<b>5th week</b>	Stability and compensation of integrated circuits						
<b>6th week</b>	Stability and compensation of integrated circuits						
<b>7th week</b>	Stability and compensation of integrated circuits						
<b>8th week</b>	Design and analysis of nonlinear integrated circuits						Midterm Exam
<b>9th week</b>	Design and analysis of nonlinear integrated circuits						
<b>10th week</b>	Design and analysis of nonlinear integrated circuits						
<b>11th week</b>	Design and analysis of nonlinear integrated circuits						
<b>12th week</b>	Design and analysis of fully differential operational amplifiers						
<b>13th week</b>	Design and analysis of fully differential operational amplifiers						*
<b>14th week</b>	Noise in integrated circuits						*
<b>15th week</b>	Noise in integrated circuits						*
<b>16th week</b>	Noise in integrated circuits						Final Exam

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

Coordinator Jong-In Song

Dept. Chair JongWon Kim



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11415	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Un-Chul Paek
<b>Course Title</b>	<b>Korean</b>	고급공업해석학					
	<b>English</b>	Advanced Engineering Analysis					
<b>Course Outline</b> Review for ordinary differential equations. Fourier analysis and study on partial differential equations. Bessel, Legendre functions and the theory of complex functions are dealt with their applications to the solutions of partial differential equations. The emphasis of the course is primarily aimed to the engineering applications.							
<b>Prerequisite</b>		None					
<b>Textbook and References</b>		Textbook: Advanced Calculus for Engineers (2nd edition), by F.B. Hildebrand, Prentice Hall. Reference:1) Introduction to Bessel functions, by Bowman, Dover. 2) Fourier series, by Byerly, Dover.					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>Remarks</b>	
<b>1st week</b>	Review of Ordinary Differential Equations						
<b>2nd week</b>	Review of Ordinary Differential Equations						
<b>3rd week</b>	Laplace Transform and Applications to Partial Diff. Eqs.						
<b>4th week</b>	Fourier Transform and Applications to Partial Diff. Eqs.						
<b>5th week</b>	Separation of Variables-Solution of PDE						
<b>6th week</b>	Solution of Laplace Equation						
<b>7th week</b>	Solution of Wave Equation						
<b>8th week</b>	Midterm Exam						
<b>9th week</b>	Solution of Diffusion Equation						
<b>10th week</b>	Bessel Functions						
<b>11th week</b>	Bessel Equations						
<b>12th week</b>	Legengre Polynomials						
<b>13th week</b>	Analyticity of Complex Functions						
<b>14th week</b>	Theory of Residues						
<b>15th week</b>	Contour Integration Applied for Inverse Laplace Transform						
<b>16th week</b>	Final Exam						

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

Instructor    *Un-Chul Paek*  
Dept. Chair JongWon Kim





# SYLLABUS

Classification	Elective	Course No.	11416	Cr. Hrs.	3	Instructor	Youngjoo Chung
Course Title	Korean	수치해석 컴퓨팅 기법과 응용					
	English	Numerical Computing Methods and Applications					
Course Outline Overview of the C/C++ programing languages, symbolic and numerical computing using <i>Mathematica</i> , numerical algorithms, finite difference method (FDM), finite element method (FEM), finite difference time domain (FDTD) method, applications for electromagnetic problems							
Prerequisite							
Textbook and References		References: Kernighan & Ritchie, <i>The C Programming Language</i> Wolfram, <i>Mathematica</i> Press, Teukolsky, Vettering, Flannery, <i>Numerical Recipes in C</i> Chari & Salon, <i>Numerical Methods in Electromagnetism</i> Kunz & Luebbers, <i>Finite Difference Time Domain Method for Electromagnetics</i>					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Overview of C/C++						
2nd week	Overview of C/C++						
3rd week	Overview of C/C++						
4th week	Numerical algorithms and applications						
5th week	Numerical algorithms and applications						
6th week	Overview of <i>Mathematica</i>						
7th week	Symbolic and numerical computing using <i>Mathematica</i>						
8th week	Linking <i>Mathematica</i> and external applications						
9th week	Theory of FDM						
10th week	Applications of FDM						
11th week	Theory of FEM						
12th week	Applications of FEM						
13th week	Theory of FDTD method						
14th week	Applications of FDTD method						
15th week	Term projects						
16th week	Presentation of the term projects						

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

Instructor Youngjoo Chung

Dept. Chair Jongwon Kim



# SYLLABUS

Classification	Elective	Course No.	11417	Cr. Hrs.	3:0:3	Instructor	JongWon Kim
Course Title	Korean	서비스지향컴퓨팅					
	English	Service Oriented Computing					
<b>Course Outline</b> Covers the concepts, theories, and techniques for Service Oriented Computing. This course intends to formulate higher-level architectures for Web-based service applications and considers sophisticated approaches for the description, discovery, and engagement of Web-based services. More specifically, this course emphasizes dynamic service composition, with key topics such as semantics, transactions, processes, agents, quality of service, compliance, and trust. In addition, we are trying to understand what kind of infrastructure (based on the substrates of computing and networking resource) is required to be developed for service oriented computing. Deep understanding on the selected topics will be pursued and individual research project (or reports) will be carried out to expose students to the building blocks for successful service oriented computing.							
Prerequisite		Computer Networks and Communications (Required) Database Management Systems (Recommended) Experience with Web Service (and Networking) Programming					
Textbook and References		1. Service-Oriented Computing: Semantics, Processes, Agents by Munindar P. Singh and Michael N. Huhns, John Wiley & Sons, 2005. ISBN 0-470-09148-7. 2. SOA Principles of service design by Thomas Erl, Prentice Hall, 2008. 3. List of Selected Papers and Documents (TBA)					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Overview of course						
2nd week	Basic Standards / Principles		Course programming project: preliminary intention (short report)			Reading #1 (Web Service, Grid/Cloud Computing)	
3rd week							
4th week							
5th week	Modeling and Representation					Exam#1	
6th week	RDF / OWL		Course programming project: plan (presentation/report)			Reading #2 (Service Oriented Architecture)	
7th week	Execution / Transactions					Exam#2	
8th week							
9th week	Collaboration (agents, communications)					Reading #3 (Infrastructure for SOA)	
10th week							
11th week	Selection / Engineering		Course programming project: progress (report)			Exam#3	
12th week							
13th week	Challenges & Extensions						
14th week	Case Study: Cloud computing						
15th week			Course programming project: final (presentation/report)				
16th week							

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

**Coordinator**      JongWon Kim  
**Dept. Chair**      JongWon Kim



# SYLLABUS

Classification	Elective	Course No.	11603	Cr. Hrs.	3	Instructor	Sung Chan 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, Relations						
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						
5th week	Number Theory : Basic Concepts, Factorization						
6th week	Algebraic Structures : Groups, Rings, Fields, Lattices, Boolean Algebra						
7th week	Discrete Probability : Fundamental Concepts, Random Walks, Queueing Theory						
8th week	Graph Theory I : Graph Models, Directed Graphs						Midterm Exam
9th week	Graph Theory II : Invariants, Coloring, Some Graph Theories						
10th week	Trees						
11th week	Discrete Optimization : Linear Programming, Packing and Covering						
12th week	Coding Theory and Cryptology : Basics						
13th week	Computer Science : Computability, Complexity						
14th week	Information Structures I : Data Types, Data Structures						
15th week	Information Structures II : Sorting and Searching, Hashing						
16th week	Wrap-up : Review of the Course						Final Exam

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

Coordinator      Sung Chan Jun  
Dept. Chair      Jongwon Kim



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11607	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Dongsoo Har
<b>Course Title</b>	<b>Korean</b>	무선통신채널의 해석 및 응용					
	<b>English</b>	Wireless link analysis in modern communication systems					
<b><u>Course Outline</u></b>							
Use of wireless handset for personal communications has been wide spread nowadays. Communication environments for such use of wireless terminals fundamentally determine characteristics of received signal. In order to leverage wave propagation characteristics, practical design for wireless systems is heavily dependent on site specific link analysis. This course will provide tools for wireless link analysis in various real situations and give insights for efficient wireless system design in virtually all type of modern communication environments.							
<b>Prerequisite</b>		Electromagnetics related course					
<b>Textbook and References</b>		H.L Bertoni, "Radio Propagation for Modern Wireless Systems," C.A.Balanis,"Advanced Engineering Electromagnetics"					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Introduction of Wave Propagation in Cellular Environments : Outdoor and Indoor communication channel						
<b>2nd week</b>	Wave propagation characteristics in Line-Of-Sight(LOS) communication channel						
<b>3rd week</b>	Effect of wave propagation modeling on LOS cellular system design						
<b>4th week</b>	Reflection, Transmission and Diffraction Theory of Wave Propagation in Cellular Environments						
<b>5th week</b>	"						
<b>6th week</b>	"						
<b>7th week</b>	2-D and 3-D Wave Propagation Analysis in Dense Urban Environments						
<b>8th week</b>	Midterm Exam						
<b>9th week</b>	Signal Level Prediction with Terrain and Morphology						
<b>10th week</b>	Path Loss Prediction Models for Cellular System Design						
<b>11th week</b>	Effect of Wave Propagation Modeling on Non-LOS Cellular System Design						
<b>12th week</b>	Wave Propagation Characteristics in Indoor Environments : Scattering, Reflection, Transmission, and Diffraction						
<b>13th week</b>	"						
<b>14th week</b>	Wideband Signal Propagation in Indoor Environments and Application of Wave Propagation for Indoor Communication System Design						
<b>15th week</b>	Practice for Predicting Path Loss in Real World						
<b>16th week</b>	Final Exam						

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

Coordinator **Dongsoo Har**

Dept. Chair **JongWon Kim**



# Syllabus

*Classification:* Type: Elective      *Course No.:* 11608      *Credit Hours:* 3:0:3  
*Instructor:* G. hugh Song, A509, ext. 2210, hughsong@gist.ac.kr  
*Course Title:* Linear Algebra and Its Application

*Course Outline:* General theories in Linear Algebra: vector spaces, orthogonality, determinants, matrix diagonalization, eigenvalue problems, and similarity transformations are covered. Topics related with various engineering problems will be presented to help students be exposed to the applications of linear algebra.

## *Textbook and References:*

- *Textbook:* Linear Algebra and its applications, 3<sup>rd</sup> ed. (Gilbert Strang, HBJ)
- *Reference:*
  1. Linear algebra with applications, 3<sup>rd</sup> ed., (Gareth Williams, WCB)
  2. Linear algebra, 3<sup>rd</sup> ed., (Serge Lang, Springer)

## *Evaluation*

- |                          |     |
|--------------------------|-----|
| 1. Mid term examination; | 35% |
| 2. Homework;             | 15% |
| 3. Final examination;    | 50% |

<i>Weekly Course Schedule</i>		
<i>Calendar</i>	<i>Description</i>	<i>Remarks</i>
<i>1 week</i>	Vector Presentation of Matrix Equation	
<i>2~3 week</i>	Gaussian Elimination and LU Decomposition	
<i>4~5 week</i>	Vector Spaces	
<i>6~7 week</i>	Orthogonality in Matrix Equation	
<i>8 week</i>	Midterm Exam	
<i>9~10 week</i>	Determinants	
<i>11 week</i>	Matrix Diagonalization	
<i>12~14 week</i>	Eigenvalue and Eigenvectors	
<i>14~15 week</i>	Finite Element Method	
<i>16th week</i>	Final Exam	

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

Coordinator  
 Dept. Chair

G. Hugh Song  
 JongWon Kim



# SYLLABUS

Classification	Elective	Course No.	11611	Cr. Hrs.	3:0:3	Instructor	Kiseon Kim
Course Title	Korean	디지털통신시스템					
	English	Digital Communication Systems					
<u>Course Outline</u> : Introduction of modern digital communication systems and comparison of digital and analog communication systems. Digital source coding, data, voice and image. Hypothetical decision problems to detect, equalize and synchronize digital signals.							
Prerequisite		Random Process (11637)					
Textbook and References		B. Sklar, Digital communications, 1988, Prentice-Hall Inc.					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Signal and system						
2nd week	Correlation and Spectrum						
3rd week	Linear Systems						
4th week	Communication parameters						
5th week	Midterm Exam						
6th week	Dicision and detection						
7th week	Digital Modulation						
8th week	Coherent detection						
9th week	Noncoherent detection						
10th week	Midterm Exam						
11th week	Performance Analysis						
12th week	Synchronization						
13th week	Linear codes						
14th week	Block codes						
15th week	Convolutional code						
16th week	Final Exam						

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

Instructor    Kiseon Kim  
Dept. Chair   JongWon Kim



## SYLLABUS

<i>Classification</i>	<i>Elective</i>	<i>Course No.</i>	11615	<i>Cr. Hrs.</i>	3:0:3	<i>Instructor</i>	G. Shevlyakov
<i>Course Title</i>	<i>Korean</i>	큐잉이론 및 응용					
	<i>English</i>	Queueing Theory and Practice					
<b><u>Course Outline:</u></b> Consideration of principle models of queueing theory with the practice in computation skills of queueing model characteristics. This course is the necessary basis of the approach to design and analysis of networks.							
<i>Prerequisite</i>			The course in probability is desirable but not necessary.				
<i>Textbook and References</i>			Kleinrock, L. (1974) Queueing Systems. Vol. 1. Chapters: 1- 4.				
<i>Weekly Course Schedule</i>							
<i>Calendar</i>	<i>Description</i>						<i>Remarks</i>
<i>1<sup>st</sup> week</i>	<b><u>Introduction to Queueing Systems</u></b>						
<i>2<sup>nd</sup> week</i>	<b><u>Background material: the necessary facts and mathematical tools from probability theory.</u></b>						
<i>3<sup>rd</sup> week</i>	<b><u>Important Stochastic Processes: discrete-time Markov chains.</u></b>						
<i>4<sup>th</sup> week</i>	<u>Continuous-time Markov chains.</u>						
<i>5<sup>th</sup> week</i>	<u>Birth-death processes.</u>						
<i>6<sup>th</sup> week</i>	<u>Poisson process and related topics.</u>						
<i>7<sup>th</sup> week</i>	<b><u>Elementary Queueing Theory: Little's formulas.</u></b>						
<i>8<sup>th</sup> week</i>	<u>The general equilibrium solution.</u>						
<i>9<sup>th</sup> week</i>	<u>The classical M/M/1 queue.</u>						<b><u>Midterm Exam</u></b>
<i>10<sup>th</sup> week</i>	<u>The M/M, M/M/m, and M/M/1/K queues.</u>						
<i>11<sup>th</sup> week</i>	<u>The M/M/m/m, M/M/1//M, M/M///M, and M/M/m/K/M queues.</u>						
<i>12<sup>th</sup> week</i>	<b><u>Intermediate Queueing Theory: the method of stages.</u></b>						
<i>13<sup>th</sup> week</i>	<u>The M/Er/1 queue.</u>						
<i>14<sup>th</sup> week</i>	<u>Some further extensions of the M/Er/1 system: bulk arrival and service systems; series-parallel stages.</u>						
<i>15<sup>th</sup> week</i>	<u>The M/G/1 queue and the Pollaczek-Khinchin formula.</u>						
<i>16<sup>th</sup> week</i>	<b><u>Review of Modern Trends in Queueing Theory.</u></b>						

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

Coordinator  
Dept. Chair

G. Shevlyakov  
JongWon Kim

(seal)



# SYLLABUS

Classification	Elective	Course No.	11616	Cr. Hrs.	3:0:3	Instructor	Yo-Sung Ho
Course Title	Korean	데이터 압축 이론					
	English	Data Compression					
<u>Course Outline</u> This course provides the underlying concepts and basic techniques for signal compression of multimedia data. Main topics of this course include source models, information and entropy, lossless source coding, rate distortion theory, redundancy reduction, predictive coding, transform coding, subband coding, and optimum source coding. It also covers various international coding standards for multimedia communications.							
Prerequisite		Linear System Theory including Laplace and Fourier Transforms, Probability and Stochastic Processes, C Programming Language					
Textbook and References		K. Sayood, <i>Introduction to Data Compression</i> (2nd Ed.), MK, 2000. D. Salomon, <i>Data Compression</i> (2nd Ed.), Springer-Verlag, 2000.					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction, Mathematical Preliminaries						
2nd week	Huffman Coding						
3rd week	Adaptive Huffman Coding						
4th week	Arithmetic Coding						
5th week	The JBIG Algorithm						
6th week	Dictionary Techniques						
7th week	Predictive Coding						
8th week	Midterm Exam						
9th week	Mutual Information, Rate Distortion Theory						
10th week	Scalar Quantization, Optimum Quantization						
11th week	Vector Quantization						
12th week	Differential Encoding						
13th week	Transform Coding						
14th week	Subband Coding						
15th week	Coding Standard						
16th week	Final Exam						

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

Coordinator Yo-Sung Ho

Dept. Chair JongWon Kim





# SYLLABUS

<b>Classification</b>	elective	<b>Course No.</b>	11617	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Kuk-Jin Yoon
<b>Course Title</b>	<b>Korean</b>	디지털영상처리					
	<b>English</b>	Digital Image Processing					
<b>Course Outline</b>							
The course will provide basic concepts, mathematical foundations, and practical techniques for digital image manipulation. It will cover a wide scope of low- and high-level image processing; image formation/acquisition, image models, data structures for image analysis, image representation, pre-processing, image enhancement/restoration, segmentation, shape representation, object recognition, 3D vision, motion analysis, In addition, computer projects and/or homeworks will be assigned to students for improving the ability to deal with their real problems.							
<b>Prerequisite</b>		<ul style="list-style-type: none"><li>- Elementary Probability</li><li>- Linear Algebra</li><li>- Rudimentary Programming</li></ul>					
<b>Textbook and References</b>		<ul style="list-style-type: none"><li>- Digital Image Processing, 3rd Edition, by Gonzalez and Woods, Prentice Hall</li><li>- Image Processing, Analysis, and Machine Vision, 3rd Edition, by Milan Sonka, Vaclav Hlavac, and Roger Boyle, Thomson Engineering</li><li>- CVonline (<a href="http://homepages.inf.ed.ac.uk/rbf/CVonline/">http://homepages.inf.ed.ac.uk/rbf/CVonline/</a>)</li></ul>					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>Remarks</b>	
<b>1st week</b>	Introduction						
<b>2nd week</b>	Digital Image Fundamentals						
<b>3rd week</b>	Transformations and Filtering						
<b>4th week</b>	Image Restoration and Reconstruction					Project Proposal & Presentation	
<b>5th week</b>	Color Image Processing						
<b>6th week</b>	Image Segmentation						
<b>7th week</b>	Midterm Exam						
<b>8th week</b>	Representation and Description						
<b>9th week</b>	Image Compression						
<b>10th week</b>	Morphological Image Processing					Interim Presentation	
<b>11th week</b>	Object Recognition						
<b>12th week</b>	3D Vision and Its Applications						
<b>13th week</b>	Motion Analysis						
<b>14th week</b>	Selected Advance Topics						
<b>15th week</b>	Final Exam						
<b>16th week</b>	Applications: Project Presentation					Presentation & Demo	

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

**Coordinator**

**Kuk-Jin Yoon**

(seal)

**Dept. Chair**

**JongWon Kim**



## SYLLABUS

Classification	Elective	Course No.	11619	Cr. Hrs	3:0:3	Instructor	Saied Nooshabadi
Course Title	Korean	컴퓨터 구조					
	English	Computer Architecture					
<u>Course Outline</u> Give students an insight into Pentium computer architecture, instruction formats and addressing, pipelining, bus and memory organization, knowledge of different modern architectural implementations (RISC, vector, superscalar), parallel computation and microprogramming control issues							
Prerequisite		Some basic knowledge in computer hardware and software, knowledge of programming in Assembly language					
Textbook and References		W.Stallings, Computer Organization and Architecture, 5 <sup>th</sup> Edition					
Weekly Course Schedule							
Calendar	Description					Remarks	
1 <sup>st</sup> week	Pentium & Power PC Evolution						
2 <sup>nd</sup> week	Pentium Processor Organization						
3 <sup>d</sup> week	Pentium Addressing Modes & Instruction Formats						
4 <sup>th</sup> week	Instruction Pipelining						
5 <sup>th</sup> week	System Buses						
6 <sup>th</sup> week	Pentium Memory Organization & Management						
7 <sup>th</sup> week	RISC Architecture						
8 <sup>th</sup> week	Instruction-level Parallelism					Mid-term exam	
9 <sup>th</sup> week	Superscalar Processors						
10 <sup>th</sup> week	Architecture of Parallel Computation						
11 <sup>th</sup> week	Vector Computation						
12 <sup>th</sup> week	VLIW Architecture						
13 <sup>th</sup> week	Control Unit Microoperations						
14 <sup>th</sup> week	Microprogrammed Control						
15 <sup>th</sup> week	Revision Lecture						
16 <sup>th</sup> week	Final exam						

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

Coordinator

Saied Noosabadi

(seal)

Dept. Chair

JongWon Kim



Project- 30%, Mid-term-35%, Final-35%

# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11620	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Hong Kook Kim
<b>Course Title</b>	<b>Korean</b>	디지털 음성신호처리					
	<b>English</b>	Digital Speech Processing					
<b>Course Outline</b> The main objective of this course is to provide a fundamental background for research and development of digital speech processing technologies. Topics covered include fundamentals of speech science, acoustic-phonetics, short-term analysis of speech signals, linear predictive models, and cepstral analysis. Furthermore, this course provides the overview of important and interesting areas of speech signal processing.							
<b>Prerequisite</b>		Digital Signal Processing, Random Process, Linear Algebra					
<b>Textbook and References</b>		J. R. Deller, J. H. L. Hansen, and J. Proakis, <i>Discrete-Time Processing of Speech Signals</i> , IEEE Press, 2nd Edition, 2000.					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>Remarks</b>	
<b>1st week</b>	Course Introduction: Speech Chain					Chap. 2.1-2.2, Supplement	
<b>2nd week</b>	Speech Production					Supplement	
	Acoustic-Phonetics					Chap. 2-3	
<b>3rd week</b>	Speech Production Model					Chap. 3	
<b>4th week</b>	Discrete-time model of Speech Production						
<b>5th week</b>	Short-Term Processing of Speech - Time domain feature					Chap. 4	
<b>6th week</b>	Short-Term Processing of Speech - Frequency domain feature						
<b>7th week</b>	Linear Prediction: Fundamentals					Chap. 5	
<b>8th week</b>						Mid-term Exam	
<b>9th week</b>	Solution of LPC					Chap. 5 (Term-project proposal)	
<b>10th week</b>	Applications of Linear Prediction					Supplement	
<b>11th week</b>	Issues in Linear Prediction for Speech Processing						
<b>12th week</b>	Cepstral Analysis					Chap. 6	
<b>13th week</b>	Applications of Cepstral Analysis						
<b>14th week</b>	Application of Speech Processing: Speech Coding					Supplement (Term-project Presentation)	
<b>15th week</b>	Application of Speech Processing: Speech Recognition					Supplement	
<b>16th week</b>						Final Exam	

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

Coordinator    Hong Kook Kim  
Dept. Chair    JongWon Kim



# SYLLABUS

Classification	Selective	Course No.	11644	Cr. Hrs.	3	Instructor	R.S.Ramakrishna
Course Title	Korean	컴퓨터 그래픽스					
	English	Computer graphics					
<u>Course Outline</u> : Introduction, an overview of the graphics system, 2D graphics, 3D graphics, graphics user interfaces input devices, interaction techniques and tasks, and some advanced topics will be discussed.							
Prerequisite							
Textbook and References		1. James D. Foley et al., Introduction to computer graphics, Addison Wesley publishing co., New York 1994. 2. Donald Heann & Pauline Baker, M., Computer graphics(2nd edition), Prentice Hall, Englewood Cliffs, 1994.					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Overview of Computer Graphics						
2nd week	Transformations (Translation, Rotation, Scaling, Shear)						
3rd week	Concatenation of Transformations						
4th week	Computer viewing (Projection)						
5th week	Shading						
6th week	Hidden Face Removal						
7th week	Clipping						
8th week	Midterm Exam						
9th week	Hidden Surface Removal						
10th week	Scan conversion - circle and polygon						
11th week	Beizier Curves and Surfaces						
12th week	B-Spline Curves and Surfaces						
13th week	Cubic B-Splines						
14th week	Rendering of Curves and surfaces I						
15th week	Rendering of Curves and surfaces II						
16th week	Final Exam						

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

**Coordinator**  
**Dept. Chair**

**R. S. Ramakrishna (seal)**  
**JongWon Kim**



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11653	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Yong-Tak Lee
<b>Course Title</b>	<b>Korean</b>	광 전자공학					
	<b>English</b>	Optoelectronics					
<b>Course Outline</b> : Optical processes in semiconductor, heterojunction, LED, laser diode operation theory and structures, laser diode modulation, photodetectors, optical amplifier, optoelectronic modulation and switching devices, OEICs.							
<b>Prerequisite</b>		Semiconductor Physics (1648)					
<b>Textbook and References</b>		1. Class Note 2. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall, 1994. 3. Selected papers.					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>Remarks</b>	
<b>1st week</b>	Fundamentals of compound semiconductors						
<b>2nd week</b>	Optical processes in semiconductors						
<b>3rd week</b>	Heterojunctions						
<b>4th week</b>	Light emitting diodes						
<b>5th week</b>	Laser diode : Operation theory						
<b>6th week</b>	Laser diode structures						
<b>7th week</b>	Advanced laser diode structure						
<b>8th week</b>	Mid-term Exam						
<b>9th week</b>	Modulation of laser diode						
<b>10th week</b>	Photodiodes : Principle and structure						
<b>11th week</b>	High speed detection techniques						
<b>12th week</b>	Optoelectronic modulator						
<b>13th week</b>	Optical amplifier						
<b>14th week</b>	Optical switch and logic devices						
<b>15th week</b>	Optoelectronic integrated circuits						
<b>16th week</b>	Final Exam						

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

Coordinator  
Dept. Chair

Yong-Tak Lee  
JongWon Kim



# 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). <u>USEFUL REFERENCES:</u> 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 JongWon Kim



# SYLLABUS

Classification	Elective	Course No.	11672	Cr. Hrs.	3:0:3	Instructor	Byeong Ha Lee
Course Title	Korean	광도파로 이론					
	English	Optical Waveguide Theory					
<b>Course Outline</b> : Study of the coupled-mode theory, optical waveguides, phase matching, dispersion relationship, arrayed waveguides, fiber gratings, couplers. Discussion of their applications on the telecommunication and sensin							
Prerequisite							
Textbook and References		Main: Optical Waves in Crystal (A. Yariv, P. Yeh) Sub 1: Theory of Dielectric Optical Waveguides (Dietrich Marcuse) Sub 2: Foundations of Electromagnetic Theory (John R. Reitz)					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Introduction and Boundary conditions of waveguides						
2nd week	Boundary conditions of waveguide						
3rd week	Helmholtz equation						
4th week	Dispersion of Optical Material						
5th week	Propagation of plane wave						
6th week	Planar waveguides						
7th week	Cylindrical waveguides						
8th week	Midterm Exam						
9-10th week	Coupled-mode theory						
11-12th week	Mode Coupling by Fiber gratings						
13th week	Cascaded Fiber Grating						
14th week	Mode coupling devices						
15th week	Presentation of Term Project						
16th week	Final Exam						

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

Coordinator

Byeong Ha Lee

Dept. Chair

JongWon Kim



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11673	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Do-Kyeong Ko
<b>Course Title</b>	<b>Korean</b>	고급 레이저 응용					
	<b>English</b>	Advanced Laser Systems and their applications					
<b>Course Outline</b> In the first half of the course, the general theories of lasers, how they work, including Paraxial wave eq., Fabry-Perot Interferometer, homo- and inhomogeneous broadening, and laser amplification with small and high gain. And a more advanced treatment of laser physics with emphasis on dynamic, transient and nonlinear effects will be contained in the 2nd half of the course.							
<b>Prerequisite</b>		Optics and Lasers (1659)					
<b>Textbook and References</b>		Lecture notes will be given Lasers (Siegman) University Science Book co. Lasers Electronics (Verdeyen) prentice Hall					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Introduction to Lasers						
<b>2nd week</b>	Basic Laser Physics						
<b>3rd week</b>	PWE & Gaussian beams						
<b>4th week</b>	Fabry Perot Interferometers, Guoy Phase						
<b>5th week</b>	absorption, emission, lifetime						
<b>6th week</b>	homogeneous & inhomogeneous broadening						
<b>7th week</b>	High gain, Rigrod analysis						
<b>8th week</b>	Mid-term exam						
<b>9th week</b>	laser oscillation, frequency puling, Q value						
<b>10th week</b>	Laser Dynamics						
<b>11th week</b>	rate equations, relaxation oscillation						
<b>12th week</b>	Quantative analysis of Q switching						
<b>13th week</b>	mode competition						
<b>14th week</b>	mode locking						
<b>15th week</b>	presentation of the term projects						
<b>16th week</b>	Final exam						

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

Coordinator      Do-Kyeong Ko (seal)  
 Photonics School      JongWon Kim





# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	11678	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Jae-Hyung Jang Yong-Tak Lee Jong In Song
<b>Course Title</b>	<b>Korean</b>	화합물 반도체 소자 공정 및 실습					
	<b>English</b>	Compound Semiconductor Device Processing					
<b>Course Outline</b> 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.							
<b>Prerequisite</b>							
<b>Textbook and References</b>							
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Introduction and safety training						Experiment
<b>2nd week</b>	Growth and characterization of compound semiconductors						Experiment
<b>3rd week</b>	Optical lithography						Experiment
<b>4th week</b>	Metallization						Experiment
<b>5th week</b>	Lift-off						Experiment
<b>6th week</b>	Ohmic contacts of semiconductor devices						Experiment
<b>7th week</b>	Sputtering of dielectric films						Experiment
<b>8th week</b>	Mid-term exam						
<b>9th week</b>	Thickness measurement of dielectric thin film						Experiment
<b>10th week</b>	Wet etching of compound semiconductors						Experiment
<b>11th week</b>	PECVD of SiO <sub>2</sub> and SiN <sub>x</sub> film						Experiment
<b>12th week</b>	Dry etching of dielectric films						Experiment
<b>13th week</b>	Dry etching of compound semiconductors						Experiment
<b>14th week</b>	Scanning electron microscopy						Experiment
<b>15th week</b>	Measurement of Schottky diode characteristics						Experiment
<b>16th week</b>	Final Exam						

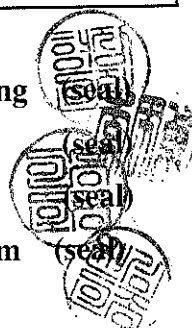
\* If there will be experiments, mark it in the "Remarks".

Coordinator **Jae-Hyung Jang**

**Yong-Tak Lee**

**Jong In Song**

Dept. Chair **JongWon Kim**



# SYLLABUS

<b>Classification</b>	elective	<b>Course No.</b>	11679	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Jang Jae-Hyung
<b>Course Title</b>	<b>Korean</b>	RF 통신회로 설계					
	<b>English</b>	Radio Frequency Communication Circuit Design					
<b>Course Outline</b> This course provide design technologies of RF integrated circuits with CMOS devices on the basis of RF communication theories. Theories on wireless communication system and transceiver architectures will be taught and noise properties and model of CMOS devices will be derived and used to design low noise amplifier. Voltage controlled oscillators and theory on phase locked loops will be presented.							
<b>Prerequisite</b>							
<b>Textbook and References</b>		RF microelectronics by B. Razavi The Design of CMOS Radio-Frequency Integrated Circuits by Thomas H. Lee					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>Remarks</b>	
<b>1st week</b>	Introduction						
<b>2nd week</b>	Basic concepts of RF design						
<b>3rd week</b>	Impedance transformation						
<b>4th week</b>	Analog modulation						
<b>5th week</b>	Digital modulation						
<b>6th week</b>	Receiver architectures						
<b>7th week</b>	Transmitter architectures						
<b>8th week</b>	Midterm Exam						
<b>9th week</b>	Noise theory						
<b>10th week</b>	Noise Model of CMOS devices						
<b>11th week</b>	Bandwidth enhancement techniques						
<b>12th week</b>	The impact of noise on Amplifiers' nonlinearity						
<b>13th week</b>	CMOS low noise amplifiers						
<b>14th week</b>	Voltage controlled oscillators						
<b>15th week</b>	Fundamentals of phase locked loops						
<b>16th week</b>	Final Exam						

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

Coordinator Jae Hyung Jang  
Dept. Chair JongWon Kim



# SYLLABUS

Classification	Elective	Course No.	11686	Cr. Hrs.	3	Instructor	Dug Young Kim
Course Title	Korean	푸리에 광학					
	English	Fourier Optics and Adaptive Optics					
<u>Course Outline</u> : Applications of the Fourier transform and linear systems theory to the analysis of optical systems such as wave propagation, diffraction, coherent and incoherent and incoherent imaging, pattern recognition and holography. Computational work will be emphasized.							
Prerequisite		Graduate standing (Any level of graduate student may attend the course)					
Textbook and References		Text : Goodman, Introduction to Fourier Optics, McGraw-Hill					
		Referencess :					
		-R.G.Wilson, Fourier Series and Optical Transform Techniques in Contemporary Optics, John Wiley & Sons					
		-B.Bradley, Signal Processing using Optics, Oxford Univ. Press					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Groundwork						
2nd week	Groundwork						
3rd week	Fourier Transformation						
4th week	Fourier Transformation						
5th week	Linear Systems						
6th week	Linear Systems						
7th week	Linear Filters						
8th week	Phasor Representation of Monochromatic Waves					Midterm Exam	
9th week	Diffraction						
10th week	Lenses						
11th week	Coherent Image Formation						
12th week	Coherent Image Formation						
13th week	Incoherent Image Formation						
14th week	Incoherent Image Formation						
15th week	Holography and Wavefront Reconstruction						
16th week	Final Exam						

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

Instructor    Dug Young Kim  
Dept. Chair   JongWon Kim



# SYLLABUS

Classification	Selective	Course No.	11693	Cr. Hrs.	3	Instructor	Woontack Woo
Course Title	Korean	인간과 컴퓨터간 상호작용					
	English	Human Computer Interaction (HCI)					
<u>Course Outline</u> This course will cover three main issues in HCI: (i) comfortable 3D interface, (ii) intelligent emotonal agent, and (iii) natural interaction in virtual environment. Basically, we will study the fundamental theories and algorithms on the above issues, and will survey the recent advances in the related areas.							
Prerequisite		Interest in human-computer interaction and virtual reality					
Textbook and References		N/A					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Introduction to HCI						
2nd week	3D photography I: geometry and digitization						
3rd week	3D photography II: multiview camera calibration						Preliminary proposal and team assembly
4th week	3D interface I: vision-based interface						
5th week	Proposal presentation						
6th week	3D interface II: nonvision-based interface						
7th week	Intelligent agents I: emotional intelligence						
8th week	Intelligent agents II: gesture analysis						
9th week	Virtual environment I: geometry-based rendering						
10th week	Interim project presentation						
11th week	Virtual environment II: image-based rendering						
12th week	Natural interaction in virtual environment						
13th week	Artificial life in virtual environment						
14th week	Tangible bits and visualization						
15th week	Final project presentation						
16th week	Ubiquitous/Wearable computing						

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

Instructor    Woontack Woo  
Dept. Chair   JongWon Kim





<b>Textbook and References</b>	<ol style="list-style-type: none"> <li>1. Todd K. Moon, and Wynn C. Stirling (1999). <i>Mathematical Methods and Algorithms for Signal Processing</i>. Prentice Hall, NJ.</li> <li>2. Sage, A.P., and Melsa, J.L. (1971). <i>Estimation Theory with Applications to Communications and Control</i>. McGraw-Hill, NY.</li> <li>3. Poor, H.V. (1988). <i>An Introduction to Signal Detection and Estimation</i>. Springer-Verlag, NY.</li> <li>4. Van Trees, H.L. (1968). <i>Detection, Estimation and Modulation Theory</i>. Part I. John Wiley&amp;Sons, Inc., NY.</li> <li>5. Scharf L.L. (1991). <i>Statistical Signal Processing. Detection, Estimation, and Time Series Analysis</i>. Addison-Wesley Publishing Company, NY.</li> </ol>
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<b>Weekly Course Schedule</b>		
<b>Calendar</b>	<b>Description</b>	<b>Remarks</b>
<b>1<sup>st</sup> week</b>	Linear estimation. Cramer-Rao lower bound.	
<b>2<sup>nd</sup> week</b>	Adaptive estimation. Lainiotis-Kalman estimator. Riccati equations	
<b>3<sup>rd</sup> week</b>	Wiener filter: causal and noncausal	
<b>4<sup>th</sup> week</b>	Stochastic approximation	
<b>5<sup>th</sup> week</b>	Signal modeling	
<b>6<sup>th</sup> week</b>	Levinson-Durbin recursion	
<b>7<sup>th</sup> week</b>	Zero and threshold crossing	
<b>8<sup>th</sup> week</b>	Basic equations of nonlinear filtering. Kushner's equation.	
<b>9<sup>th</sup> week</b>	Practical approximations to optimal nonlinear filters: normal approximation filter, parametrization of conditional density	
<b>10<sup>th</sup> week</b>	Extended Kalman filter. Filter accuracy and applications	
<b>11<sup>th</sup> week</b>	Statistical linearization	
<b>12<sup>th</sup> week</b>	Discrete nonlinear estimation. Limit memory filters.	
<b>13<sup>th</sup> week</b>	Data fusion and multisensor estimation fusion	
<b>14<sup>th</sup> week</b>	Detection of continuous waveforms	
<b>15<sup>th</sup> week</b>	Detection of signals with unknown parameters	
<b>16<sup>th</sup> week</b>	Fisher's discriminant functions and classification with several classes	

Instructor

Shin Vladimir

V.Shin

Dept. Chair

Wang, Se-Myung



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	15403	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Kangwook Kim
<b>Course Title</b>	<b>Korean</b>	안테나 공학					
	<b>English</b>	Antenna Engineering					
<b>Course Outline</b> Operation mechanisms of basic antenna types, e.g., linear antennas, aperture antennas, and printed antennas, and their applications. Numerical modeling technique is introduced for antenna design.							
<b>Prerequisite</b>		None					
<b>Textbook and References</b>		[1] C. A. Balanis, Antenna Theory: Analysis and Design, John Wiley & Sons, Inc. [2] G. Smith, "An Introduction to Classical Electromagnetic Radiation," Cambridge Univ. Press.					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Maxwell's equations						
<b>2nd week</b>	Electromagnetic planewaves						
<b>3rd week</b>	Electromagnetic analogues of some optical principles						
<b>4th week</b>	Radiation from charge and current						
<b>5th week</b>	Dipole radiation						
<b>6th week</b>	Radiation from wire antennas						
<b>7th week</b>	Introduction to antenna arrays						
<b>8th week</b>	Midterm exam						
<b>9th week</b>	Log periodic arrays and Uda-Yagi arrays						
<b>10th week</b>	Self and mutual impedances						
<b>11th week</b>	Matching techniques						
<b>12th week</b>	Horn antennas						
<b>13th week</b>	Reflector antennas						
<b>14th week</b>	Patch antennas						
<b>15th week</b>	Numerical models						
<b>16th week</b>	Final exam						

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

Instructor Kim, Kangwook  
 Dept. Chair Wang, Se-Myung



# SYLLABUS

<b>Classification</b>	Elective	<b>Course No.</b>	15404	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Ko, Kwang Hee
<b>Course Title</b>	<b>Korean</b>	고급기하 모델링 및 그래픽스를 위한 물리기반 모델링					
	<b>English</b>	Advanced Topics in Geometric and Physics-based Modeling for Graphics					
<b>Course Outline</b> The goal of this course is to cover advanced topics in geometric modeling and physics-based modeling for computer graphics. First, mathematics for geometric modeling is introduced and various robustness issues in geometric modeling are discussed. The second part of the course deals with modeling and simulation of natural phenomena using physics-based modeling techniques, including oceans, landscapes, clouds, snows, plants, cloths, smoke, fires, etc.							
<b>Prerequisite</b>		Computer Programming (C and C++), CAD/CAM, Computer Graphics, Numerical Methods, Calculus, Physics					
<b>Textbook and References</b>		Lecture notes and reference papers					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>Remarks</b>
<b>1st week</b>	Differential Geometry I						
<b>2nd week</b>	Differential Geometry II						
<b>3rd week</b>	Arithmetic Systems I						
<b>4th week</b>	Arithmetic Systems II						
<b>5th week</b>	Robustness in Numerical Computation I						
<b>6th week</b>	Robustness in Numerical Computation II						
<b>7th week</b>	Robustness in Geometric Modeling I						
<b>8th week</b>	Robustness in Geometric Modeling II						
<b>9th week</b>	Robustness in Geometric Modeling III						
<b>10th week</b>	Physics-based Modeling: Introduction						
<b>11th week</b>	Modeling of Oceans and Landscapes						
<b>12th week</b>	Modeling of Clouds and Snows						
<b>13th week</b>	Modeling of Plants and Cloths						
<b>14th week</b>	Modeling of Fracture and Smoke						
<b>15th week</b>	Modeling of Explosion and Fire						
<b>16th week</b>	Modeling of Water and Smoothed Particle Hydrodynamics						

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

**Instructor**  
**Dept. Chair**

**Ko, Kwang Hee**  
**Wang, Semyoung**





# SYLLABUS

Classification	Optional	Course No.	15421	Cr. Hrs.	3:0:3	Instructor	Yang, Sung
Course Title	Korean	Microfluidics for BioMEMS/BioNEMS applications					
	English	BioMEMS/BioNEMS 응용을 위한 미세유체역학					
<u>Course Outline</u> Microfluidics is the study of flow phenomena at small length scales with characteristic channel dimensions typically less than the diameter of a human hair. Small length scale effects become important as surface forces such as viscous drag and surface tension govern flow behavior rather than body forces (inertia) as seen in macroscale fluid mechanics. Miniaturization of fluid handling systems also allows the development of micro Total Analysis Systems ( $\mu$ TAS) or so called "lab on a chip" which combines biological sample preparation, separation and analysis in a single device. Topics explored in this class include: Basic Concepts in Microfluidics, Governing equations for Microfluidics/Basic Flow solutions, Hydraulic Resistance and Compliance, Diffusion, Time-dependent Flow, Capillary Effects, Electrohydrodynamics, Electroosmosis, Dielectrophoresis, Magnetophoresis, Thermal Transfer, Two-phase Flow, Optofluidics, Nanofluidics. As a final step of this class, students will conduct their own term projects related with the material covered in the class.							
Prerequisite		Engineering Mathematics (Preferred), Fundamentals of Fluid Mechanics (Preferred), General Biology (preferred)					
Textbook and References		<u>Text and Reference Books</u> 1. "Theoretical Microfluidics," Henrik Bruus, Oxford University Press, 2008. 2. "Transport Phenomena in Biological Systems", George A. Truskey, Fan Yuan, and David F. Katz, Pearson Prentice Hall Bioengineering, 2004. 3. "Transport Phenomena," Revised 2 <sup>nd</sup> edition, R. Byron Bird, Warren E. Steward, Edwin N. Lightfoot, John Wiley & Sons, Inc., 2007. 4. "Fluid Mechanics," 4 <sup>th</sup> edition, Pijush K. Kundu, Ira M. Cohen, Academic Press, 2007. <u>Grading</u> Attendance (10%), Mid Term Exam (20%), Final Exam (20%), Term Project (40%), ETC (10%)					
Weekly Course Schedule							
Calendar	Description						Remarks
1st week	Basic Concepts in Microfluidics						
2nd week	Governing equations for Microfluidics/Basic Flow solutions						
3rd week	Hydraulic Resistance and Compliance						
4th week	Diffusion						
5th week	Time-dependent Flow						
6th week	Capillary Effects						
7th week	Mid-term Exam						
8th week	Electrohydrodynamics						
9th week	Electroosmosis						
10th week	Dielectrophoresis						
11th week	Magnetophoresis						
12th week	Thermal Transfer						
13th week	Two-phase Flow						
14th week	Optofluidics						
15th week	Nanofluidics						
16th week	Term Paper Presentation/ Final Exam						

\* The above lecture schedule is tentative and might be changed depending on lecture status

Instructor

Yang, Sung

Dept. Chair

Wang, Se Myung



# SYLLABUS

<b>Classification</b>	Selective	<b>Course No.</b>	15603	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Wang, Se Myung
<b>Course Title</b>	<b>Korean</b>	고급진동학					
	<b>English</b>	Advanced Vibration					
<b><u>Course Outline</u></b>							
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.							
<b>Prerequisite</b>		1)Ordinary Differential Equations,      2)Fundamentals of Vibrations, 3)Laplace Transformation,                      4)Fourier’s Transformation, 5)Matrix Linear AlgebraEngineering Mechanics, Dynamics					
<b>Textbook and References</b>		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 Structural Systems, E.J. Haug, K.K. Choi, and V. Komkov, Academic Press, 1986. 5) Methods of Engineering Mathematics, E.J.Haug and K.K.Choi,Prentice Hall, 1993.					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>*Remarks</b>
<b>1st week</b>	Review(Linear Algebra, Laplace Transformation)						
<b>2nd week</b>	"						
<b>3rd week</b>	Single DOF						
<b>4th week</b>	"						
<b>5th week</b>	Multiple DOF						
<b>6th week</b>	"						
<b>7th week</b>	Properties of Vibrating Systems						
<b>8th week</b>	Lagrange’s Equation						
<b>9th week</b>	Mid Term Exam						
<b>10th week</b>	Vibration of Continuous Systems						
<b>11th week</b>	"						
<b>12th week</b>	Introduction to FEM						
<b>13th week</b>	Mode-Summation Procedures for Contiguous Sys.						
<b>14th week</b>	Classical Methods						
<b>15th week</b>	Design Sensitivity Analysis of Vibrating Systems						
<b>16th week</b>	Final Exam						

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

Instructor      Wang, Se-Myung



Dept. Chair      Wang, Se-Myung



## SYLLABUS

<b>Classification</b>	Selective	<b>Course No.</b>	15616	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Jeong, Sungho
<b>Course Title</b>	<b>Korean</b>	레이저가공 및 원리					
	<b>English</b>	Laser Processing and Principles					
<b><u>Course Outline</u></b>							
Fundamental processes of laser-matter interaction during laser processing of solids including the conversion of light energy into heat, phase transform into liquid or vapor, and plasma generation above the irradiated surface are to be analyzed and formulated theoretically. Mathematical modeling and methods of numerical analysis of the thermophysical processes induced in the solid are introduced.							
<b><u>Prerequisite</u></b>							
Laser Engineering(15613) is recommended							
<b>Textbook and References</b>		“Laser-beam interactions with materials :physical principles and applications”, Martin von Allmen, Andreas Blatter., Springer, 1995 Laser Processing and Chemistry, Dieter Bauerle, Springer, 2000					

<b>Weekly Course Schedule</b>		
<b>Calendar</b>	<b>Description</b>	<b>Remarks</b>
<b>1<sup>st</sup> week</b>	Introduction	
<b>2<sup>nd</sup> week</b>	Fundamental optical properties	
<b>3<sup>rd</sup> week</b>	Laser energy absorption and heating	
<b>4<sup>th</sup> week</b>	Thermal modeling for temperature distribution	
<b>5<sup>th</sup> week</b>	Finite difference method for numerical analysis	
<b>6<sup>th</sup> week</b>	Laser-induced melting and evaporation	
<b>7<sup>th</sup> week</b>	Numerical methods for phase change problems	
<b>8<sup>th</sup> week</b>	Mid-term exam	
<b>9<sup>th</sup> week</b>	Laser ablation	
<b>10<sup>th</sup> week</b>	Plasma formation and interaction with laser beam	
<b>11<sup>th</sup> week</b>	Nonequilibrium processes	
<b>12<sup>th</sup> week</b>	Photochemical etching with laser beam	
<b>13<sup>th</sup> week</b>	Photochemical deposition with laser beam	
<b>14<sup>th</sup> week</b>	Ultrafast laser processing	
<b>15<sup>th</sup> week</b>	Experimental techniques	
<b>16<sup>th</sup> week</b>	Final exam	

Instructor Jeong, Sungho

Dept. Chair Wang, Se-Myung



## SYLLABUS

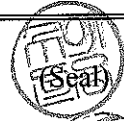
<b>Classification</b>		<b>Course No.</b>	15617	<b>Cr. Hrs.</b>	3	<b>Instructor</b>	Lee, Yong-Gu
<b>Course Title</b>	<b>Korean</b>	소프트웨어 엔지니어링					
	<b>English</b>	Software Engineering					
<b>Course Outline</b> The methodology for developing successful industry strength application software including: requirement analysis, design, prototype development, implementation, testing, evolution will be covered. MS-Visual Studio 2008 Team Suite/Team Foundation Server will be used for course term project.							
<b>Prerequisite</b>	Basic understanding of computer programming <b>Important:</b> You <u>should not have taken Software Engineering course previously as an undergraduate or equivalent</u> . If you did, you are recommended not to take this course as there will be many overlaps.						
<b>Textbook and References</b>	Professional Visual Studio 2005 Team System, Jean-Luc David et al, Wiley Publishing, 2006 Professional Team Foundation Server, Jean-Luc David et al, Wiley Publishing Inc 2007 Software Engineering (8 <sup>th</sup> edition), Ian Sommerville, Addison-Wesley, 2007						

<b>Weekly Course Schedule</b>		
<b>Calendar</b>	<b>Description</b>	<b>Remarks</b>
<b>1<sup>st</sup> week</b>	Software processes	
<b>2<sup>nd</sup> week</b>	Project management - Team foundation architecture	
<b>3<sup>rd</sup> week</b>	- Working with VM from Host PC - Users and groups permissions setting - Project management tools	
<b>4<sup>th</sup> week</b>	- Team reporting Configuration management - Team foundation version control - Team build	
<b>5<sup>th</sup> week</b>	Software requirements - UML-Use Cases - UML-Sequence Diagrams	
<b>6<sup>th</sup> week</b>	Object-Oriented Design - UML-Class Diagram	
<b>7<sup>th</sup> week</b>	- Class diagramming with Visual Studio	Term project proposal
<b>8<sup>th</sup> week</b>	Mid exam	
<b>9<sup>th</sup> week</b>	Verification and validation - Application verifier	
<b>10<sup>th</sup> week</b>	- Refactoring and Code Snippets	
<b>11<sup>th</sup> week</b>	- Profiling and performance	
<b>12<sup>th</sup> week</b>	Software testing - Test case management - Unit testing	Term project progress report

Yong-Gu Lee, 08-07-22

<b>13<sup>th</sup> week</b>	- Manual testing - Generic testing	
<b>14<sup>th</sup> week</b>	Rational rose for visual studio	
<b>15<sup>th</sup> week</b>	Final exam	
<b>16<sup>th</sup> week</b>	Term project presentation	

Instructor Lee, Yong-Gu



Dept. Chair

Wang, Se-Myung



# SYLLABUS

<b>Classification</b>	Selective	<b>Course No.</b>	15620	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Park, Kyi Hwan
<b>Course Title</b>	<b>Korean</b>	센서 및 액츄에이터					
	<b>English</b>	Sensor & Actuator					
<b><u>Course Outline</u></b> This course covers principles of different transducer and integration with actuator. The main topics are : theory of transducers, actuators and measurement methods of mechanical, electrical, optical quantities. The principle and design of sensor systems like laser, radiometer, mm-wave radar is also covered.							
<b>Prerequisite</b>		None					
<b>Textbook and References</b>		Handout Mechatronics by D.A. Bradley, Chapman & Hall					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>*Remarks</b>	
<b>1st week</b>	Transducer Fundamentals						
<b>2nd week</b>	Solid-mechanical sensor & measurement						
<b>3rd week</b>	"						
<b>4th week</b>	Fluid-mechanical sensor & measurement						
<b>5th week</b>	"						
<b>6th week</b>	Electrical and magnetic sensor						
<b>7th week</b>	Optical sensor & measurement						
<b>8th week</b>	Thermal sensor						
<b>9th week</b>	Interference and noise						
<b>10th week</b>	Actuator & driver						
<b>11th week</b>	Linear system						
<b>12th week</b>	Rotational drives						
<b>13th week</b>	Motion converters						
<b>14th week</b>	Systems & design						
<b>15th week</b>	"						
<b>16th week</b>	Final Exam						

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

**Instructor**    Park, Kyi Hwan



**Dept. Chair**    Wang, Se-Myung



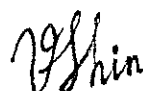
## SYLLABUS

<b>Classification</b>		<b>Course No.</b>	15628	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Shin Vladimir
<b>Course Title</b>	<b>Korean</b>						
	<b>English</b>	<b>Statistical Analysis of Dynamic Systems</b>					
<b><u>Course Outline</u></b>							
<p>The course is designed for MS engineering students and postgraduates of universities. It may be also useful for engineers in the field of communication, control theory, and applied mechanics studying the dynamic systems subjected to random disturbances (noise input).</p> <p><i>Many illustrative examples</i> have been interspersed throughout the course to assist in effective presentation of the theoretical materials. This course still requires an engineering background in mathematics.</p> <p>The course is organized in three parts.</p> <p><i>In the first part</i> the foundation of random processes is studied. The finite-dimensional distributions, their expectations, auto- and cross-correlations, and moments of higher order are studied. Special attention is paid to the approximate representation of finite-dimensional distributions based on orthogonal expansions. Definition of a <i>white noise</i> and of its derivative are given. The mean square convergence, linear operations on random functions such as differentiation, integration, and integration of linear differential equations containing random functions are studied. The stationary random functions and spectral theory are studied.</p> <p><i>In the second part</i> application of random functions to linear dynamic systems is presented. First the methods of transformation of system equations into stochastic equations are studied. Two methods are considered: the method of direct replacing of an additive bandwidth random noise by a white noise, and the more general method of shaping filters. Equations for the expectation and the covariance of state vector are derived. The solution of the equations and explicit formulae for distribution of the state vector are obtained. These equations and formulas allow statistical research of arbitrary linear systems with random input. We point out relationships between statistical analysis problem of dynamic systems and both their reliability and stability. We present numerical integration of stochastic equations algorithms and simulation algorithms based on Monte-Carlo method.</p> <p><i>In the third part</i> methods for studying nonlinear systems are presented. The construction of nonlinear theory in the course is based on the Fokker-Plank equation (FPE). The solutions of FPE are considered. The method of statistical linearization is established. The fluctuations of a systems with one and more degree of freedom are studied.</p>							
<b>Prerequisite</b>	Basic MS courses of «Linear and Matrix Algebra», and «Probability Theory»						

<b>Textbook and References</b>	<p>(1) Wong, E. (1983). <i>Introduction to Random Processes</i>. Springer-Verlag, NY.</p> <p>(2) Peyton Z. Peebles (2001). <i>Probability, Random Variables, and Random Signals Principles</i>. McGraw-Hill, Inc.</p> <p>(3) Soong, T.T. (1973). <i>Random Differential Equations in Science and Engineering</i>. Academic Press, NY.</p> <p>(4) Pugachev, V.S. and Sinitsyn, I.N. (1987). <i>Stochastic Differential Systems</i>. John Wiley &amp; Sons Ltd.</p>
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<b>Weekly Course Schedule</b>		
<b>Calendar</b>	<b>Description</b>	<b>Remarks</b>
<b>1<sup>st</sup> week</b>	Introduction to the course. The random process (r.p) concept. Correlation functions. Finite-dimensional distributions. Moments of a r.p.	Examples
<b>2<sup>nd</sup> week</b>	Gaussian and Poisson random processes. Orthogonal expansions of finite-dimensional densities of r.p. White noise. Integrals containing white noise. Derivatives of a white noise.	Examples
<b>3<sup>rd</sup> week</b>	Stationary r.p. Characteristics of stationary r.p. Spectral theory of stationary r.p. Linear operations on stationary r.p.	Examples
<b>4<sup>th</sup> week</b>	Introduction to statistical analysis of dynamic systems. Analysis of linear stochastic systems.	Examples
<b>5<sup>th</sup> week</b>	Analysis of linear stochastic systems (continue).	Examples
<b>6<sup>th</sup> week</b>	Analysis of linear stochastic systems with nonwhite noise	Examples
<b>7<sup>th</sup> week</b>	Nonlinear stochastic systems. Fokker-Plank equation. Probability of achievement of boundary.	Examples
<b>8<sup>th</sup> week</b>	Exact solutions of Fokker-Plank equation. Noise-free systems with random initial value.	Examples
<b>9<sup>th</sup> week</b>	Moments and cumulants of the state vector. Equations for moments and cumulants.	Examples
<b>10<sup>th</sup> week</b>	Normal approximation method	Examples
<b>11<sup>th</sup> week</b>	Statistical linearization method and its generalizations	Examples
<b>12<sup>th</sup> week</b>	Parametrization of distributions. Method of moments.	Examples
<b>13<sup>th</sup> week</b>	Reliability of stochastic systems. Evaluation of probability of reliability.	Examples
<b>14<sup>th</sup> week</b>	Stochastic stability of dynamic systems	Examples
<b>15<sup>th</sup> week</b>	Simulation of dynamic systems with random noises.	Examples
<b>16<sup>th</sup> week</b>	Numerical solution of stochastic differential equations. Monte-Carlo method.	Examples

Instructor: Shin Vladimir



Dept. Chair:

Wang, Se-Myung





# SYLLABUS

교과구분	선택	교과번호	15650	강의:실험:학점	3:0:3	담당 교수	Lee, Sun Kyu
교과목명	국 문	나노정밀공학					
	영 문	Nano-precision Engineering					
강의내용							
Recent technologies for nano positioning and nano machining are introduced.							
<div><div>• Nano positioning</div><div>• Micro/nano mechano-processing</div><div>• Nano/pico measurment</div><div>• High speed AFM control</div><div>• Surface characteristics</div></div>							
선수과목관계(Prerequisite)				Engineering Mechanics			
교재 및 참고문헌	Proc. Int. Conference on Positioning Technology Precision Machine Design, Alexander H.Slocum,Prentice-Hall Accuracy of Machine Tool, D.N. Reshetov, V.T Portman,ASME press, 1998 Scanning Tunneling Microscopy and spectroscopy, D.A.Bonnel, VCH						
Lecture Plan							
구 분	Contents					remarks	
1 <sup>st</sup>	Nanopositioning Technology						
2 <sup>nd</sup>	Nano Feed Mechanism, Control						
3 <sup>rd</sup>	Contact guide and bearing						
4 <sup>th</sup>	Noncontact guide design						
5 <sup>th</sup>	Machining Accuracy(I)						
6 <sup>th</sup>	Machining Accuracy(II)						
7 <sup>th</sup>	Micro/nano grinding						
8 <sup>th</sup>	Micro/Nano Surface topography						
9 <sup>th</sup>	Surface tension						
10 <sup>th</sup>	Surface characteristics						
11 <sup>th</sup>	Optical measurement						
12 <sup>th</sup>	Advanced Laser Interferometer						
13 <sup>th</sup>	Advanced AFM for Biomatrial						
14 <sup>th</sup>	Micro assembly						
15 <sup>th</sup>	SPM issues						
16 <sup>th</sup>	Final Exam, Presentation						

Instructor    Lee, Sun Kyu

Dept. Chair    Wang, Se-Myung



# SYLLABUS

Classification		Course No.	15670	Cr. Hrs.	3	Instructor	Yong Hoon Kim
Course Title	Korean	초고주파 밀리미터파 공학-1: 수동회로					
	English	Microwave & mm-Wave Engineering I: passive circuits					
<u>Course Outline</u> 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 week	Microwave Transmission System						
2nd week	Signal Transmission on Line						
3rd week	Transmission Line Structures and Properties						
4th week	Microwave Integrated Circuits (MICs)						
5th week	Microstrip Design at Lower Frequencies						
6th week	Microstrip Design at Lower Frequencies						
7th week	Microstrip Design at High Frequencies						
8th week	Microstrip Design at High Frequencies						
9th week	CPW Lines and Fundamentals						
10th week	Circuit Elements of CPW Lines						
11th week	Discontinuities in Microstrip and Strip Lines						
12th week	Parallel-coupled Lines and Directional Couplers						
13th week	Filters in MICs						
14th week	Experiment of Parallel Coupled Lines						experiment
15th week	Experiment of Passive MICs						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

<i>Classification</i>	Elective	<i>Course No.</i>	15674	<i>Cr. Hrs.</i>	3:0:3	<i>Instructor</i>	Ahn, Hyo-Sung
<i>Course Title</i>	<i>Korean</i>	지능제어이론					
	<i>English</i>	Intelligent Control Theory					

## Course Outline

In this course we study intelligent control systems. Intelligent control is a control system that makes use of conventional control methodologies to solve lower level control problems. Intelligent control attempts to build upon and enhance the conventional control methodologies to solve new challenging control problems (from report of the Task Force on Intelligent Control, IEEE control systems society). There is no common definition for intelligent control; however it is widely accepted that intelligent control includes neural network, fuzzy logic, computational intelligence, evolutionary algorithms, and learning. In this course, we study core ideas of these intelligent control methodologies, and apply these theories to actual mobile robotics applications in a control perspective.

<i>Prerequisite</i>	Undergraduate-level Control Courses (Required), Graduate-level linear systems (Preferred)
<i>Textbook and References</i>	<p><i>TextBook</i></p> <ol style="list-style-type: none"> <li>1. "Computational intelligence Principles, Techniques and Appl.", Amit Konar, Springer, 2005</li> <li>2. "Neural networks: A classroom approach", Satish Kumar, McGraw Hill, 2005</li> <li>3. "Introduction to Fuzzy Logic using MATLAB", S. N. Sivanandam, S. Sumathi, and S. N. Deepa, Springer, 2006</li> </ol> <p><i>Grading</i></p> <p>Weekly Homework Assignment (20%), Midterm Exam (20%), Final Exam (20%), Project 1 (10%), Project 2 (10%), Project 3 (20%)</p>

## Weekly Course Schedule

<i>Calendar</i>	<i>Description</i>	<i>Remarks</i>
1st week	Introduction: Definitions, motivations, challenges in control systems	
2nd week	Neural networks: Supervised learning	
3rd week	Neural networks: Supervised learning	Submission Due of Project Proposal
4th week	Neural networks: Un-supervised learning	
5th week	Neural networks: Self-organizing	
6th week	Reinforcement learning	
7th week	1-st project presentations & mid-exam	
8th week	Fuzzy sets & relations	
9th week	Membership functions & Fuzzy control systems	
10th week	Fuzzy control applications	
11th week	2-nd project presentations	
12th week	Evolutionary computation	
13th week	Evolutionary computation	
14th week	Computational intelligence in mobile robotics	
15th week	Learning control	
16th week	Final project presentations & final exam	

*Instructor*

Ahn, Hyo-Sung

*Dept. Chair*

Wang, Se Myung



# SYLLABUS

<b>Classification</b>	Selective	<b>Course No.</b>	15678	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Choi, Tae Son
<b>Course Title</b>	<b>Korean</b>	로봇 비전					
	<b>English</b>	Robot Vision					
<b>Course Outline</b> The Principles of the Machine/Robot Vision are introduced. It covers image formation, pattern classification, motion, and optical effect for object recognition. Also, the design technology of the Robot Vision System with optical device is studied.							
<b>Prerequisite</b>		One of Digital Signal Processing Image Processing Professor's permission					
<b>Textbook and References</b>		1. Robot Vision, B.K.P. Horn, MIT Press 2. Computer Vision, Dana Ballard and Christopher Brown, Prentice Hall					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>					<b>*Remarks</b>	
<b>1st week</b>	Image Formation & Image Sensing						
<b>2nd week</b>	Binary Images : Geometrical Properties						
<b>3rd week</b>	Binary Images : Topological Properties						
<b>4th week</b>	Regions & Image Segmentation						
<b>5th week</b>	Image Processing : Continuous Images						
<b>6th week</b>	Image Processing : Discrete Images						
<b>7th week</b>	Edges & Edge Finding						
<b>8th week</b>	Lightness & Color						
<b>9th week</b>	Reflectance Map : Photometric Stereo						
<b>10th week</b>	Reflectance : Shape from Shading						
<b>11th week</b>	Motion Field & Optical Flow						
<b>12th week</b>	Photogrammetry & Stereo						
<b>13th week</b>	Pattern Classification						
<b>14th week</b>	Polyhedral Objects						
<b>15th week</b>	Extended Gaussian Images						
<b>16th week</b>	Passive Navigation & Structure from Motion						

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

**Instructor**      Choi, Tae Son  
**Dept. Chair**    Wang, Se-Myung



# SYLLABUS

<b>Classification</b>	Selective	<b>Course No.</b>	15692	<b>Cr. Hrs.</b>	3:0:3	<b>Instructor</b>	Lee,Kwan Heng
<b>Course Title</b>	<b>Korean</b>	고급 CAD/CAM					
	<b>English</b>	Advanced CAD/CAM					
<b><u>Course Outline</u></b> Fundamentals of CAD/CAM. Main topics include CAD/CAM hardware and software, computer graphics, CAD/CAM data exchange, and mathematical representations of curves, surfaces, and solids. CAD/CAM integration and computer-aided process planning are also covered.							
<b>Prerequisite</b>		None					
<b>Textbook and References</b>		Text : Ibrahim Zeid, CAD/CAM Theory & Practice, McGraw-Hill, 1991. Reference : David Rogers and J. Alan Adams, Mathematical Elements for computer graphics, 2 <sup>nd</sup> edition, McGrawHill Publishing Co., 1990.					
<b>Weekly Course Schedule</b>							
<b>Calendar</b>	<b>Description</b>						<b>*Remarks</b>
<b>1st week</b>	Introduction						
<b>2nd week</b>	CAD/CAM Hardware						
<b>3rd week</b>	CAD/CAM Software						
<b>4th week</b>	Types and Mathematical Representation of Curves						
<b>5th week</b>	Types and Mathematical Representation of Curves						
<b>6th week</b>	Types and Mathematical Representation of Surfaces						
<b>7th week</b>	Types and Mathematical Representation of Surfaces						
<b>8th week</b>	Types and Mathematical Representation of Solids						Mid Term Exam
<b>9th week</b>	Types and Mathematical Representation of Solids						
<b>10th week</b>	CAD/CAM Data Exchange						
<b>11th week</b>	Two dimensional transformations						
<b>12th week</b>	Three dimensional transformations						
<b>13th week</b>	Graphic Manipulations and Editings						
<b>14th week</b>	Mechanical Assembly						
<b>15th week</b>	Mechanical Tolerancing						
<b>16th week</b>	CAD/CAM Integration						Final Exam

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

Instructor     Lee, Kwan Heng (Seal)

Dept. Chair     Wang, Se-Myung (Seal)

