

SYLLABUS

Classification	Selective	Course No.	7503	Cr. Hrs.	4	Instructor 이재영
Course Title	Korean	환경 화학				
	English	Environmental Chemistry				
Course Outline Fundamental and advanced environmental chemistry is studied including, reaction kinetics, thermodynamics, equilibrium chemistry, acid-base chemistry, oxidation and reduction, and electrochemistry related to natural and environmental processes.						
Prerequisite		No required				
Textbook and References		Zumdahl, Chemistry, 4th, Houghton Mifflin.				
Weekly Course Schedule						
Calendar	Description					*Remarks
1st week	Types of Chemical Reactions and Solution Stoichiometry					
2nd week	Gases					
3rd week	Thermochemistry					
4th week	Bonding : General Concepts					
5th week	Covalent Bonding : Orbitals & 1st Exam.					
6th week	Liquids and Solids					
7th week	Properties of Solution					
8th week	Chemical Kinetics					
9th week	Chemical Equilibrium					
10th week	Acids and Bases & 2nd Exam					
11th week	Applications of Aqueous Equilibria					
12th week	Spontaneity, Entropy, and Free energy					
13th week	Electrochemistry					
14th week	Transition Metals and Coordination Chemistry					
15th week	Organic Chemistry					
16th week	Final Exam					

Instructor

이재영



Dept. Chair

조재원



Course Noticement

Classification	Core	Course No.	7504	Cr. Hrs.	3	Instructor	김준하
Course Title	Korean	환경이동현상					
	English	Environmental Transport Phenomena					
Course Outline 환경이동현상은 환경공학과 전공필수 3과목 중 한 과목으로, 수학, 물질전달, 유체역학, 대기역학을 강의하게 됩니다. 학기가 끝난 후, 본 과목에 대한 Q.E.시험이 있으니 신입생의 경우에는 숙지하기 바랍니다(QE시험: 전공필수 3과목 중 수강한 두 과목을 반드시 응시하여야 함).							
Prerequisite		없음, not required					
Textbook and References		1) Math.: Differential Equations (4th ed.), by D.G. Zill & M.R. Cullen, 2) Transport Phenomena: Diffusion, mass transfer in fluid system, E.L. Cussler, Cambridge 3) Fluid Mechanics: Fluid Mechanics, Streeter et al., McGraw-Hill. 4) 'Air Pollution Meteorology and Dispersion' by S. P, Arya 'Chemical Fate and Transport in the Environment' by H. Hemond & J. Fechner-Lev					
Weekly Course Schedule							
Calendar	Description					Remarks	
1st week	Ordinary Differential Equations						
2nd week	Partial Differential Equations: Fourier Series						
3rd week	Partial Differential Equations: Laplace Transform						
4th week	Partial Differential Equations: Separation Var.						
5th week	Principles of mass transfer						
6th week	Diffusion equations and diffusion processes						
7th week	Mass transfer coefficients and overall mass transfer coefficients						
8th week	Dispersion and reactions with mass transfer						
9th week	Conservation principles						
10th week	Reynolds Transport Theorem						
11th week	Mass and Momentum						
12th week	Heat transport						
13th week	Atmospheric Structure and Stability						
14th week	Atmospheric Dynamics and Transport						
15th week	Wet and Dry Deposition						
16th week	Atmospheric Radiation						

Instructor 김 준 하
Dept. Chair 조 재 원



SYLLABUS

Classification	Required	Course No.	7505	Cr. Hrs.	3	Instructor 장인섭
Course Title	Korean	환경미생물학				
	English	Environmental Microbiology				
Course Outline Attempted to limit the topics covered to those that we consider essential to the quantitative expression and mechanistic understanding of the microbial activities that occur in natural environments or processed engineered for the purpose of exerting useful control over the natural environment. Approach is more process-Oriented than species-Oriented						
Prerequisite		None				
Textbook and References		1. Microbiology for Environmental Scientists and Engineers-Gaudy & Gaudy, McGraw Hill 2. The Microbial World-Stanier, Ingraham, Wheelis & painter, Prentics Hall 3. Microbiology : An Introduction - Tortora, Funker \$ Case, Benjamin/cummings Publishing Co.				
Weekly Course Schedule						
Calendar	Description					*Remarks
1st week	Introduction					
2nd week	The life-support system					
3rd week	Chemical Composition of cells & The nature of Organic matter					
4th week	The Microorganisms					
5th week	Nutrition and Growth Conditions					
6th week	Quantitative Description of Growth					
7th week	Energy generation and Utilization in Biological System					
8th week	Metabolic Classification of Microorganisms					
9th week	The Central Pathways of Metabolism					
10th week	Aerobic Metabolism					
11th week	Aerobic Metabolism					
12th week	Anaerobic Metabolism					
13th week	Anaerobic Metabolism					
14th week	Anaerobic Metabolism					
15th week	Respose to change in the Environment					
16th week	Final Exam					

Instructor

장인섭



Dept. Chair

조재원



SYLLABUS

Classification	전공선택	Course No.	7624	Cr. Hrs.	3	Instructor	Jaeweon Cho
Course Title	Korean	지속가능 수처리					
	English	Sustainable Water Treatment					
<u>Course Outline</u> : 지구의 생태를 고려한 지속가능한 수처리공정 가능기술을 다룬다. This course encompasses potential water treatment technologies which consider global and local sustainability.							
Prerequisite							
Textbook and References							
Weekly Course Schedule							
Calendar	Description						Lecturers
1st week	Introduction to Environmental Ecology						
2nd week	Ecological Sustainability						
3rd week	Motivation of Water treatment and reuse						
4th week	Water Treatment Theory						
5th week	Separation theory						
6th week	Reactors						
7th week	Coagulation						
8th week	Sedimentation and filtration						
9th week	Membrane Process						
10th week	Disinfection						
11th week	Wastewater reuse I						
12th week	Wastewater reuse II						
13th week	Natural system for water treatment						
14th week	Wetland Application for wastewater treatment						
15th week	Wetland Application						
16th week	Eco System						
17th week	Final Exam						

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

Coordinator
Dept. Chair


조재원
조재원



SYLLABUS

Classification	Elective	Course No.	7630	Cr. Hrs.	3	Instructor	SD Kim
Course Title	Korean	환경독성학					
	English	Environmental Toxicology					
<u>Course Outline</u> Principles of toxicology with a focus on environmental and industrial chemicals. Topics include fate and effects of chemicals in organisms and the environment, aquatic toxicology, endocrine disruptors, bioassays and whole effluent toxicity test.							
Prerequisite		NO					
Textbook and References		1. Introduction to Environmental Toxicology - Landis and Yu 2. Environmental Toxicology and Chemistry - Crosby and Donald 3. Toxicology: Principles and Applications - Niesink, Vries and Hollinger 4. Basic Environmental Toxicology - Cockerham and Shane					
Weekly Course Schedule							
Calendar	Description					*Remarks	
1st week	Introduction to Environmental Toxicology						
2nd week	Toxicokinetics						
3rd week	Chemodynamics						
4th week	Environmental Fate						
5th week	Experimental Design and Statistics						
6th week	Aquatic Toxicology						
7th week	Toxicity Tests						
8th week	Review and Mid-term Exam						
9th week	Whole Effluent Toxicity Test (WET)						
10th week	Analytical Approaches to Chemical Speciation						
11th week	Factors Affecting Toxicity						
12th week	QSAR						
13th week	Biomonitoring						
14th week	Current Issues (I): Bioavailability						
15th week	Current Issues (II): EDCs						
16th week	Review and Final Exam						

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

Instructor Sang Don Kim
 Dept. Chair 



Course Noticement

Classification	Selective	Course No.	7631	Cr. Hrs.	3	Instructor	허호길 Hor-Gil Hur
Course Title	Korean	분자생물공학					
	English	Molecular Biotechnology					

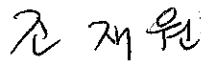
Course Outline.

Introduction of molecular biotechnology for applied and environmental microbiology.

Prerequisite	
Textbook and References	Molecular Biotechnology

Weekly Course Schedule

Calendar	Description	Remarks
1st week	Introduction/Molecular Biotechnology Revolution	
2nd week	Molecular Biotechnology Biological Systems	
3rd week	DNA, RNA, and Protein Synthesis	
4th week	Recombinant DNA Technology	
5th week	Chemical Synthesis, Sequencing, and Amplification of DNA	
6th week	Manipulation of Gene Expression in Prokaryotes	
7th week	Recombinant Protein Production in Eukaryotic Cells	
8th week	Directed Mutagenesis and Protein Engineering	
9th week	Molecular Diagnostics	
10th week	Microbial Production of Therapeutic Agents	
11th week	Vaccines	
12th week	Synthesis of Chemical Products by Recombinant Microorganisms	
13th week	Bioremediation and Biomass Utilization	
14th week	Plant Growth-Promoting Bacteria	
15th week	Microbial Insecticides	
16th week	Large-Scale Production of Proteins from Recombinant Microorganisms	

Instructor Hor-Gil Hur
Dept. Chair 



SYLLABUS

Classification	선택	Course No.	07654	Cr. Hrs.	3	Instructor	Detlef Mueller
Course Title	Korean	환경기상학					
	English	Environmental Meteorology					
Course Outline : This course will present measurement instruments and methodologies that are used for studying air pollution, clouds, and meteorological parameters. The course will provide a basic introduction to meteorology, and the fundamental physical principles that stand behind the various measurement techniques.							
Prerequisite							
Textbook and References		K. Grefen/J. Löbel: Environmental Meteorology, Springer, 2007. Journal publications					
Weekly Course Schedule							
Calendar	Description					Lecturers	
1st week	Introduction: clouds, air pollution, and meteorology					Detlef Mueller	
2nd week	Meteorology: basic concepts					Detlef Mueller	
3rd week	Meteorology of the tropics and mid-latitudes					Detlef Mueller	
4th week	Meteorology of the polar regions and micrometeorology					Detlef Mueller	
5th week	Instruments for measurements of meteorological parameters					Detlef Mueller	
6th week	Instruments: physical principles					Detlef Mueller	
7th week	Mid-term 1					Detlef Mueller	
8th week	Air pollution					Detlef Mueller	
9th week	Instruments for air pollution monitoring					Detlef Mueller	
10th week	Instruments: physical principles 1					Detlef Mueller	

<i>11th week</i>	Instruments: physical principles 2	Detlef Mueller
<i>12th week</i>	Mid-term 2	Detlef Mueller
<i>13th week</i>	Clouds: introduction	Detlef Mueller
<i>14th week</i>	Clouds and air pollution and climate	Detlef Mueller
<i>15th week</i>	Instruments for measurements of cloud parameters	Detlef Mueller
<i>16th week</i>	Instruments: physical principles	Detlef Mueller
<i>17th week</i>	Clouds and air pollution: optical phenomena in the atmosphere (OPTIONAL)	1 학기 / spring break

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

Coordinator

Detlef Mueller

Dept. Chair

조재원



SYLLABUS

Classification	Selective	Course No.	7657	Cr. Hrs.	3	Instructor	Young J. Kim
Course Title	Korean	대기오염물리 I					
	English	Atmospheric Physics of Air Pollution I					
<u>Course Outline</u> : The major objective of this course is to understand physical characteristics of air pollution phenomena							
Prerequisite		NO					
Textbook and References							
Weekly Course Schedule							
Calendar	Description						Lecturers
1st week	Introduction						
2nd week	Blackbody radiation. Main laws						
3rd week	Composition and structure of the atmosphere Basic properties of radiatively active species						
4th week	Gaseous absorption/emission						
5th week	Absorption by atmospheric gases in IR, visible and UV						
6th week	Terrestrial infrared radiative processes. Part 1: Fundamentals of thermal IR radiative transfer Line-by-line						
7th week	Terrestrial infrared radiative processes. Part 2: K-distribution approximations						
8th week	Scattering. Part 1						
9th week	Scattering. Part 2						
10th week	Principles of multiple scattering in the atmosphere						
11th week	Clouds and radiative heating/ The Earth Radiation Budget (ERB)						
12th week	Molecular Spectroscopy / Doppler and Lorentz broadening						
13th week	Environmental Spectroscopy						
14th week	Atmospheric Dynamics						
15th week	Radiation & Climate						
16th week	Final Exam						
17th week							1학기 spring break

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

Coordinator
Dept. Chair

김 영 준
전 재 원



SYLLABUS

Classification	선택	Course No.	7681	Cr. Hrs.	3	Instructor	송철한
Course Title	Korean	대기오염 I					
	English	Atmospheric Pollution Chemistry and Physics					
Course Outline : The objective of this course is to study fundamentals of air pollution chemistry and physics. Based on the theoretical knowledge, this course will also explore various air pollution phenomena such as stratospheric ozone depletion, acid precipitation, urban ozone and PM2.5 problems, and global warming.							
Prerequisite		Transport phenomena : Thermodynamics					
Textbook and References		Textbook : Atmospheric Chemistry and Physics:from Air Pollution to Cimate Change (by John H. Seinfeld & Spyros N. Pandis) References : i) Fundamentals of Atmospheric Modeling (by Mark Z. Jacobson); ii) Atmospheric Chemistry and Global Change (by Guy P. Brasseur, John J. Prlando, and Geoffrey S. Tyndall); and iii) Air Pollution ; Its Origin and Control (by Kenneth Wark, Cecil Warner, and Wayne T. Davis)					
Weekly Course Schedule							
Calendar	Description					Lecturers	
1st week	Instroduction of air pollution						
2nd week	Air quality standars & particle size distribution						
3rd week	Air pollutant emissions and controls						
4th week	Atmospheric thermodynamics (Meteorology)						
5th week	Conservation of mass and momentum in atmospheric system						
6th week	Plume dispersion and Chemistry I						
7th week	Plume dispersion and Chemistry II						
8th week	Mid-term exam						
9th week	Atmospheric gas-phase chemistry I : Chemical kinetics						
10th week	Atmospheric gas-phase chemistry II : Stratospheric chemistry (O3 depletion)						
11th week	Atmospheric gas-phase chemistryIII : Tropospheric Chemistry (O3-NOy-HOy chemistry)						
12th week	Atmospheric gas-phase chemistry IV : Tropospheric Chemistry (NMHC & Isoprene chemistry)						
13th week	Atmospheric aerosol & cloud chemistry						
14th week	Visibility Impairment						
15th week	Climate change						
16th week	Final exam						

Coordinator 송 철 한

Dept. Chair 조 재 원



Course Noticement

Classification	Elective	Course No.	7690	Cr. Hrs.	3	Instructor	박기홍 Kihong Park
Course Title	Korean	환경공학 특론 II (대기 에어로졸의 물리적/화학적 특성연구)					
	English	Special topic II : Physical and chemical properties of atmospheric aerosols					

Course Outline

Particles in the ambient atmosphere affect radiation balance (directive climate forcing), cloud formation (indirect climate forcing), visibility impairments, and human healths. Physical and chemical properties of atmospheric aerosols are essential to better understand aerosol sources and formation mechanisms, and to investigate effects of aerosols on climate change and human health.

Prerequisite	에어로졸입자공학 1 (Aerosol Particle Engineering 1)
Textbook and References	Recently published articles

Weekly Course Schedule

Calendar	Description	Remarks
1st week	Introduction	
2nd week	A overview of atmospheric aerosols	
3rd week	Aerosol effects on climate change	
4th week	Adverse health effects of aerosols	
5th week	Physical properties of aerosols	
6th week	Chemical properties of aerosols	
7th week	Measurement techniques	
8th week	Nucleation	
9th week	Particle growth	
10th week	Secondary Organic Aerosol formation	
11th week	Black Carbon aerosols	
12th week	Inorganic aerosols	
13th week	Metal aerosols	
14th week	Transport behaviors of aerosols	
15th week	Aerosol generation	
16th week	Summary and Conclusions	

Instructor Kihong Park
Dept. Chair 조재원

