• Department of Advanced Materials and Chemical Engineering

1. Educational Goal

The Graduate School of Department of Advanced Materials & Chemical Engineering aims to cultivate professionals to successfully engage and contribute to the rapidly changing information-based industrial society of the 21st century. The department further aims to produce technical and vocational individuals for responding to globalization as well as to lead the local, regional and national development.

2. Educational Objectives

Master's Degree Program

① To produce professionals with knowledge and creativity to engage in the advancement of science of chemical and materials engineering

② To foster competent professionals with practical knowledge and skills on chemical and materials engineering

③ To give training for cooperative work between academics, national laboratories and private industries with the purpose to successfully engage in the wide variety of regional and national research and development activities

④ To contribute to the local & regional industrial development by engaging in various collaborative research with industries in Daejeon Industrial Complex, in cooperation with national laboratories of Daeduk Science Town

• List of Full-time Faculty

Name	Position	Degree(University)	Field of Instruction	Area of Research
Rhim, Ji Won	Professor	Ph. D. (Univ. of Waterloo)	Separation Processes Environmental Engineering	Membrane Separation Processes
Choi, Jeong-Gil	Professor	Ph. D. (Univ. of Michigan)	Chemical Reaction Engineering Catalytic Engineering	Catalytic Engineering and Secondary Cell Battery
Cheong, Seong Ihl	Professor	Ph. D. (Univ. of Maryland)	Chemical Process Control Process Design	Chemical Process Control

Kim, Geug Tae	Professor	Ph. D. (Rensselaer Polytechnic Institute)	Transport Phenomena in Materials Science and Engineering	Energy and Modeling & Simulation, Advanced Materials, Nanotechnology
Lee, Byung Chul	Professor	Ph. D. (Pennsylvania State Univ.)	Molecular Thermodynamics, Phase Equilibrium Modeling	Thermodynamics and Separation Process, Supercritical Fluid Technology
Ha, Sung Ho	Associate Professor	Ph. D. (Univ. of California. Irvine)	Biochemical Engineering	Bioprocess Engineering
Lee, Kwang-Sup	Professor	Ph. D. (Freiburg University)	Information and Electronic Material Engineering	High Performance Polymers for Electronics and Photonics Application
Lee, Jin Ho	Professor	Ph. D. (University of Utah)	Biological and Medical Material Engineering	Biomaterials and Tissue Engineering
Song, Hyun-Hoon	Professor	Ph. D. (University of Cincinnati)	Polymer Morphology	Polymer Structural Physics
Choi, Sun Woong	Professor	Ph. D. (Illinois Institute of Technology)	Biological and Medical Material Engineering	Polymer Composites and Processing
Na, Yang Ho	Associate Professor	Ph. D. (Tokyo Institute of Technology)	Biological and Medical Material Engineering	Soft Biomaterial
Kim, Tae Dong	Associate Professor	Ph. D. (University of Washington)	Information and Electronic Material Engineering	Organic Materials for Information and Electronics
Kim Myung Ho	Associate Professor	Ph. D. (Steven Institute of Technology)	Biological and Medical Material Engineering	Polymer Engineering
Oh, Ju Seok	Associate Professor	Ph. D. (Seoul National Univ.)	New polymer materials. Polymer Engineering. Rheology. Fluid Mechanics.	Rheology, Standards in Rheology, Optimization of Polymer Processing, WPC (Wood Plastic Composite)
Prem Prabhakaran	Assistant Professor	Ph. D. (Hannam Univ.)	Electronic and Photonic Materials	Molecular Interfaces for Photonics and Functional Micro-devices

• Course Description

・(과목코드) (과목명 영어) (학점)

○ Chemical Engineering

CE601 (Molecular Thermodynamics)3학점

Molecular thermodynamics, which is an essential subject in chemical engineering for analyzing chemical processes, covers topics such as the energy conversion in chemical processes, the state change (gas, liquid and solid) of a substance, phase behavior of fluid, etc. Fundamental relationships and theory of analyzing phase equilibria for a pure component and a mixture are introduced in this course.

CE602 (Advanced Chemical Reaction Engineering) 3학점

For the students who have majored in chemical engineering, the course work of chemical reaction engineering can be used to design the reactor using the knowledge of reaction rate, materials and heat transfer, and also can be applied for petroleum industry, fermentation, fine chemical, and environmental areas. The subjects of this coursework are mainly reactor design, elementary and nonelementary reaction rate, batch reactor data analysis, and single and multiple reaction reactor design.

CE603 (Advanced Transport Phenomena) 3학점

The concepts of transport phenomena, governing equations and analogies of momentum trnasport (fluid mechanics), energy transport (heat conduction, convection, and radiation), mass transport (diffusion) are presented and discussed in details. The subject includes boundary layer theories in laminar and turbulent fields for external flows, analyses and applications in internal laminar and turbulent flows. Molecular and convection diffusions, mass transport theories in interphases, binary and multinary species diffusions are also presented. Several subjects on which much attentions are paid among the state-of-the art research topics are selected to be discussed, and for some applications, commercial computer softwares are utilized to perform a computer simulations.

CE604 (Chemical Process Control) 3학점

Advanced control theory is introduced to the students having basic knowledge about analog control theory. The difference between conventional control and advanced control will be compared through examples in which the system is hard to control. We study advanced control theory such as adaptive control, robust control, optimal control and upgrade our capability to apply our knowledge to the real process.

CE605 (Numerical Analysis in Chemical Engineering) 3학점

This course introduces numerical methods to solve mathematical problems we face in chemical engineering field. The numerical methods contain mainly how to solve nonlinear ordinary and partial differential equations numerically using finite difference method (FDM), finite element method (FEM), orthogonal collocation method, and Galerkin method.

CE606 (Advanced Catalytic Engineering) 3학점

This coursework deals with reactor design and the developments of noble metal designs using reaction rate theory, materials and heat transfer. Thus, the knowledge from this course can be applied for petrochemical and fine chemical engineering, even in environmental engineering areas. Besides, this course can give the students the knowledge of catalyst reactor design, single

and multiple reaction reactor design, catalysis.

CE607 (Process Design) 3학점

The fundamental knowledge about process design and economics for the construction of chemical plant is introduced to the students having basic understanding about unit operation of the chemical plant. This course shows students how the balanced knowledge of engineering and economics, and human relationship can be applied for the design of chemical plant. The main contents are equipment design, process design, cost estimation, interest rate calculation, depreciation, profitability, and optimum design.

CE608 (Modeling of Phase Equilibria) 3학점

This course covers fundamental thermodynamic relationships and theories of modeling phase equilibria for pure component and mixture systems. It contains calculations of vapor pressure of a pure component using a cubic equation of state and calculations of vapor-liquid and liquid-liquid equilibria of a mixture using both the equations of state and activity coefficient models.

CE609 (Advanced Separation Prosses I)3학점

This course will deal with fundamentals and applications of the membrane separation processes. The permeation mechanism (mass transfer) will be introduced about the reverse osmosis, ultrafiltration, microfiltration, gas separation, pervaporation and electrodialysis. And the membrane materials and preparation methods will be investigated in more detail. The history of membrane processes, the present status of the domestic membrane industries, and the economics comparing with other separation processes will be studied. Not only this but the other new separation processes will be introduced in this lecture.

CE610 (Solid-State Chemical Engineering) 3학점

The subjects on the structure of atoms and chemical bondings, chemistry, structures and characterizations of solid-state materials are included in the course. In particular, the structures and characterizations of semiconductor materials, impurities, diffusion in solid-state, phase diagram, phase transformations, crystal growth of inorganic materials, transport phenomena (momentum, energy and mass transport) in materials engineerings, device processings in semiconductor materials are lectured and discussed.

CE611 (Polymer Reaction Engineering) 3학점

Polymer reaction engineering is a relatively new branch of chemical reaction engineering, dealing design, optimization and control problems in industrial polymerization processes. The objective of this course is to have students understand fundamental polymerization kinetics and apply basic reaction engineering principles to a variety of polymerization reactor problems. The main contents are kinetics of chain polymerization and step polymerization, copolymerization, mathematical modeling of polymerization processes, analysis of industrial polymerization process and control of polymerization process.

CE612 (Advanced Environmental Engineering)3학점

This course introduces how the environments affect us socially, culturally and economically. The relationship between major chemical engineering subjects and environmental subjects will be taught. Waste water treatment using physical, chemical and biological methods, air pollution treatment including carbon dioxide, NOx, and SOx will also be covered. This course covers more professional knowledge for environmental treatment approach.

CE613 (Bioreaction Engineering)3학점

This course will focus on solving bioreaction process problems. For this work, the basics of microbiology, biochemistry and molecular genetics are lectured, Then, students will study modeling and basics of optimization of bioprocess systems as well as isolation and purification, economics of bioprocess, and finally will study how to build up mathematical problems to solve bioprocess problems such as maximization of cell mass, metabolite, and recombinant protein production.

CE614 (Advanced Transport Phenomena) 3학점

The concepts of transport phenomena, governing equations and analogies of momentum trnasport (fluid mechanics), energy transport (heat conduction, convection, and radiation), mass transport (diffusion) are presented and discussed in details. The subject includes boundary layer theories in laminar and turbulent fields for external flows, analyses and applications in internal laminar and turbulent flows. Molecular and convection diffusions, mass transport theories in interphases, binary and multinary species diffusions are also presented. Several subjects on which much attentions are paid among the state-of-the art research topics are selected to be discussed, and for some applications, commercial computer softwares are utilized to perform a computer simulations.

CE615 (Fuel Cell Engineering)3학점

This course deals with electrolysis, Galvani battery, electrode reaction rate law, semiconductor electrode, and corrosion and anticorrosion. Thus, this course leads the students to obtain the fundamental knowledge of electrochemistry and apply for various chemical industries.

CE616 (Advanced Separation Processes Ⅱ) 3학점

Separation process, as a key component in chemical and petrochemical industries, is a process to purify raw materials and separate desired components from fluid mixtures by a physical or chemical method. This course focuses on the separation process which utilizes selective adsorption of a particular component from gas mixtures by adsorbents. Topics on adsorption equilibria, physical chemistry in materials surface, adsorption kinetics, pressure swing adsorption, temperature swing adsorption, chromatographic theory, and ion exchange are introduced in this course.

CE617 (Advanced Biotechnology)3학점

This course provides fundamental knowledge and principles on biochemical processes utilizing biological systems including microorganisms, animal cells and plant cells for the production of proteins, biofuels, platform chemicals and bio-derived active substances. It deals with biological basics, enzyme kinetics, immobilized enzyme system, cell growth and product formation kinetics, bioreactor operating consideration, bioreactor control, scale-up, fermentation and purification facility suited to cGMP standard for FDA license.

CE618 (Bio-separation Process)3학점

This course covers the membrane separation processes, liquid chromatography, ion exchange, and gel filtration processes to separate the products from the enzyme separation or fermentor. Also since the products in general in the fermentation inhibit the growth of micro-organisms, this course introduces which separation process would apply to minimize this inhibition effect. Not only typical separation processes but also new separation processes is covered.

CE619 (Process Modeling and Simulation) 3학점

It is very difficult to analyse the whole chemical process in a large plant since many complex mathematical equations are entangled one another. Many process simulation softwares were commercialized for the design and operation of the chemical plant. We learn and practice how to make use of a simulation software and apply to the real plant.

CE620 (Information &Telecommunication Materials Engineering) 3학점
Fundamentals of single crystal growth and technolgy for information communication applications, thin film processes, rheologies in polymer coating processes, surface tensions, spin coatings, sputtering and physical deposition processes, solid-liquid phase transformations, processings of semiconductor devices are lectured by a mean of principle-based on education.

CE621 (Advanced Electrochemistry)3학점
This coursework can be primarily used for the understanding of electroanalysis, electrolytes, electromotives of battery, structure of surface of electrodes and electrolytes, semiconductor electrodes, corrosion of metals. Therefore, throughout the course the students can get the knowledge of fundamental electroanalysis, obtain the capability of application using the knowledge in many different areas.

CE622 (Advanced Topics in Genetic Engineering)3학점
This course deals with recent industry trend and research trend in biotechnology using genetic engineering. Some lectures will be given by the invited speakers from industry to introduce the up-to-date research topics on the application of biotechnology in chemical engineering field to students.

CE623 (Green Chemical Process)3학점
Green chemistry focuses on reducing environmental risk by reducing exposure to hazardous materials. Green chemical processes involve designing chemical processes that reduce or eliminate the use of, or generation of, hazardous substances. This involves alternative solvents/reactions conditions and designing safer chemicals. This course covers lectures on green solvents or alternative clean solvents and their application to chemical processes.

CE624 (Special Topics in Chemical Engineering)3학점
This course covers special topics in research areas of chemical engineering. Research topics on the up-to-date chemical technology will be introduced to widen students' knowledge. The researchers from the inside and outside of the university will give lectures on topics such as nuclear chemical engineering, resources management and recycling, clean technology, precision analysis method, semi-conductor technology, new materials for information and biochemical technologies.

CE625 (Introduction to Membrane Separation Processes) 3학점
The fundamental principles and the application filds of the membrane separation which is using from the industries to the general homes will be introduced. The mass transfer, materilas and permeation mechanism for the reverse osmosis, ultrafiltration, microfiltration, pervaporation, gas separation, and membrane distillation will be studied. And its future and economics compared with other typical chemical engineering separation processes will be also investigated.

CE626 (Advanced Catalyst Engineering)3학점
This course is used to design the reactor using catalytic reaction rate, mass and heat transfer concept. It is also stating the concept of catalysis, catalytic reactor design for a single and

multiple reactions. These kinds of knowledge are to be used for petroleum industries, environmental industries.

CE627 (Diffusion in Polymers)3학점

We are frequently faced the diffusion ih membrane separation, controlled release, new material development and application, and transport phenomena ares. This lecture deals the fundamental diffusion problems which is necessary in those fields. The transport of solutes inside the membranes, the free volume theory, and solution-diffusion model in amorphous polymers will be investigated in detail.

CE628 (Adsorption Engineering)3학점

Adsorption process is one of the important separation processes which are widely applicable in th fields of energy and environmental industries as well as conventional chemical and petrochemical industries. This course focuses on the separation process which utilizes selective adsorption of a particular component from gas mixtures by adsorbents. Topics on adsorption equilibria, physical chemistry in materials surface, adsorption kinetics, PSA (pressure swing adsorption), TSA (temperature swing adsorption), chromatographic theory, and ion exchange are introduced in this course.

CE629 (Advanced Chemical Reaction Engineering)3학점

This course is needed to design the reaction apparatus using reaction rate laws, mass and heat transfer concepts. Also this deals with the concept of reactor, steady and unsteady state reaction rate law, enzyme reaction rate, solid catalytic reaction, chemical reaction engineering in semi-conductor process.

CE630 (Advanced Materials for Life Science)3학점

The course of Advanced Materials for Life Science provides recent trends on biotechnology industries including pharmaceuticals, food, environments and enzymes and biomaterials which biotechnology industries deals with.

CE631 (Seminars in Chemical Engineering)3학점

In this course, students independently studies research topics of their interest in their research field of chemical engineering, and give presentations of new theory, method of research, research trend, and future prospect about their research topics. The objective of this course is to improve students' ability toward their researches such as method of research approach, preparation of their presentation materials, improvement of their presentation skill, and improvement of research paper writing skill. The research seminars will be given by the invited speakers from the outside of the university to introduce the up-to-date research topics in chemical engineering field to students.

○ Advanced Materials

AM601 (Polymer Synthesis) 3학점

The course of Polymer Synthesis provides fundamental knowledge and principles of polymer structure and properties; polymerization mechanism, characterization and evaluation of polymers, molecular weight, polymer solutions, morphology, etc. It also covers detail techniques to synthesize vinyl polymers, polyethers, polysulfides, polyesters, polyamides, phenolic polymers, heterocyclic polymers, and inorganic polymers by step-polymerization and ring-opening

polymerization.

AM602 (Polymer Properties) 3학점

The course of Polymer Properties provides fundamental knowledge and principles of chemical, physical, thermal, and mechanical properties of polymers related to dilute solution thermodynamics, phase separation behavior and diffusion, and amorphous state and crystalline states as well as liquid crystalline state, rubber elasticity, viscoelasticity and rheology, polymer surfaces and interfaces.

AM603 (Functional Polymers) 3학점

The course of Advanced Functional Polymers provides recent advances in functional polymers for various applications in smart devices, which requires the attendant to possess some prior knowledge of polymer science and engineering, such as conductors, light emitting diodes, nonlinear optics, photovoltaics, filed effect transistors, and so on.

AM604 (Organic Synthesis) 3학점

The course of Organic Synthesis provides more details for chemical structures, properties and reaction mechanisms of carbon-based compounds and derivatives. It covers conjugated and non-conjugated structures, hydrogen bonds, stereochemistry, photochemical reactions, electrochemical reactions, and nucleophilic and electrophilic substitution reactions.

AM605 (Photoresponsive Polymers) 3학점

AM606 (Polymer Characterization) 3학점

The course of Polymer Characterization provides lectures and experiments for the characterization and analysis of various polymers by gel permeation chromatography, thermal analysis (DSC, DTA, TGA, and TMA), ultracentrifuge, viscometry, X-ray, and so on.

AM607 (Polymer Spectroscopy) 3학점

The course of Polymer Spectroscopy provides the principles of various spectroscopies associated with the electromagnetic spectrum, from gamma rays to radio waves to verify chemical structure, composition, configuration, and conformation of various functional polymers. Special emphasis is placed on UV/vis, Raman, NMR, FT-IR, and PL spectroscopies.

AM608 (Polymer Structure &Morphology) 3학점

The course of Polymer Morphology provides wide range of structural arrangement of the polymers from molecular level to macroscopic structure. The course provides basic understanding of polymer structure-property relations and ability to predict basic properties of new polymers, The course mainly covers molecular weight and its distribution, conformation of polymer chains, crystallization, lamellar and spherulitic structure of polymer crystals, liquid crystallinity and its phase transitions, thermodynamics of copolymer and polymer blends, inonomers, etc. The course also covers structural characteristics and properties upon processing and deformation.

AM609 (X-ray Diffraction) 3학점

The course of X-ray Diffraction provides fundamental understaind of basic X-ray diffraction and its application to polymer structure determination. The course covers the basic properties of X-ray, instrumentation, concept of reciprocal lattice, Fourier analysis and the diffraction, basics of small angle X-ray scattering and its practical applications.

AM610 (Polymer Rheology) 3학점

Fundamental of rheology. Basic transport phenomena. Polymer melt and constitutive equations. Rheological characterization of polymeric fluids. Relationship between the rheological properties and molecular parameters of polymeric materials. Molecular viscoelastic theories of polymer and flow of molten polymers through circular and slit dies. Experimental methods of determination of rheological properties of polymer melts, solutions, elastomers. Structure-flow behavior relationships, viscoelastic fluid theory, application to extrusion, fiber, film processing molding. Structure development in processing.

AM611 (Advanced Polymeric Materials) 3학점

Advanced Polymer Materials is aimed to enhance student's capability of selecting materials and their utilization. The course divides the materials into commodity and engineering plastics based on their strucutre, properities and application. The course, then, covers synthesis, structure, processing and various properties including thermal, chemical, electric, optical and mechanical properties of polymer materials. The course also provides the fundamental basis for the product design based on the properties of selected commodity and engineering plastics.

AM612 (Advanced Polymer Composites) 3학점

Analysis and modeling of fiber-reinforced composites: continuous fiber-reinforced lamina, discontinuous fiber-reinforced lamina, laminating theories, failure theories, and environmentally induced stresses in laminates. Materials selection in polymer composites design. Composite design and fabrication techniques. Mechanical and processing behaviors, failure criterion and testing. Advanced thermoplastic composites and safety issues with composite materials.

AM613 (Advanced Polymer Processing) 3학점

Analysis and modeling of fiber-reinforced composites: continuous fiber-reinforced lamina, discontinuous fiber-reinforced lamina, laminating theories, failure theories, and environmentally induced stresses in laminates. Materials selection in polymer composites design. Composite design and fabrication techniques. Mechanical and processing behaviors, failure criterion and testing. Advanced thermoplastic composites and safety issues with composite materials.

AM614 (Biomedical Polymers) 3학점

The course of Biomedical Polymers provides fundamental knowledge of the structure and physiological properties of biocomponents in the living body, structure and properties of natural and synthetic biocompatible polymers. It will also include current research development of artificial organs, drug delivery systems, and biotechnology applications.

AM615 (Polymer Surfaces) 3학점

The course of Polymer Surfaces provides fundamental knowledge and principles of surface and interfacial structures of various polymers and their composites. It will cover chemical and physical adsorptions, their mechanisms, surface (interfacial) tension and energies, electrical properties, and their characterizations and analyses.

AM616 (Polymers for Drug Delivery) 3학점

The course of Polymers for Drug Delivery provides basic concepts and applications of drug delivery systems. It will cover basic theories of phase transition phenomena of polymers, physical properties, toxicity, biological and physiological informations, and their current R & D trends.

AM617 (Tissue Engineering) 3학점

The course of Tissue Engineering provides basic concepts and relationships between biomaterials and living tissues and their applications to tissue engineering. It will include types and characteristics of biomaterials used for tissue engineering, tissue reactions, tissue regenerations, and their clinical applications.

AM618 (Soft Matter) 3학점

Soft matter is a generic name for materials such as polymers, liquid crystals, colloids, emulsions and biological materials. Among the places where its presence is ubiquitous is in the food, cosmetic, electronics and chemical industries and its absence would make modern life unthinkable. The course of Soft Matter provides basic concepts of soft matter and relationships between structures and functions and external stimuli-responsive properties. It will include experiment and theoretical investigation of the structure and dynamics of mesoscopic systems for some soft matters..

AM619 (Advanced Optoelectronic Polymers) 3학점

The course of Advanced Optoelectronic Polymers provides advanced materials and devices for optoelectronic applications utilized with fusion technologies. It will cover conducting polymers, light-emitting polymers, photorefractive polymers, nonlinear optical polymers, and photovoltaic polymers as well as their devices.

AM620 (Advanced Polymer Synthesis) 3학점

The course of Advanced Polymer Synthesis provides fundamental knowledge and principles of polymer structure and properties; polymerization mechanism, characterization and evaluation of polymers, molecular weight, polymer solutions, morphology, etc. It also covers detail techniques to synthesize vinyl polymers, polyethers, polysulfides, polyesters, polyamides, phenolic polymers, heterocyclic polymers, and inorganic polymers by step-polymerization and ring-opening polymerization.

AM621 (Special Topics on Polymer Synthesis) 3학점

The course of Special Topics on Polymer Synthesis provides principles and applications of novel functional polymers synthesized by advanced techniques such as group transfer polymerization, atom transfer radical polymerization (ATRP), metathesis and so on.

AM622 (Glassy Polymers) 3학점

The course of Glassy Polymers provides a structural arrangement of microscopic and macroscopic states of the glassy polymers by optical microscope, scanning electron microscope, transmission electron microscope, atomic force microscope, and X-ray. It will also cover their thermal and mechanical properties by various techniques.

AM623 (Hybrid Nano-materials) 3학점

The course of Hybrid Nano-materials provides fundamental knowledge of the hybrid materials composed of electro/optical polymeric materials and biomaterials. It will also include current R & D trends and applications of hybrid nano-materials. This course will be team-teached by the specialists of industry, academy, and research institute.

AM624 (Bio-materials & Biotechnology) 3학점

The course of Bio-materials & Biotechnology provides fundamental knowledge and principles of the biomaterials and biotechnology, and the introduction of their R & D trends. It will include

current research development of proteins, saccharides, amino acids, growth factors produced by micro-organisms. The course will also cover the structure and physiological properties of natural and synthetic biocompatible polymers.

AM625 (Advanced Polymer Properties) 3학점

The course of Advanced Polymer Properties provides fundamental knowledge and principles of chemical, physical, thermal, and mechanical properties of polymers related to dilute solution thermodynamics, phase separation behavior and diffusion, and amorphous state and crystalline states as well as liquid crystalline state, rubber elasticity, viscoelasticity and rheology, polymer surfaces and interfaces.

AM626 (Special Topics on Polymer Properties) 3학점

The course of Special Topics on Polymer Synthesis provides principles and applications of novel functional polymers synthesized by advanced techniques such as group transfer polymerization, atom transfer radical polymerization (ATRP), metathesis and so on.

AM627 (Biodegradable Polymers) 3학점

The course of Biodegradable Polymers provides basic concepts of natural and synthetic polymers, and their degradation mechanism in the body, changes in physical properties and biocompatibilityaccording to their degradation. It will also include applications of biodegradable polymers in artificial organs, drug delivery systems, and tissue engineering.

AM628 (Advanced Biomedical Polymers) 3학점

The course of Advanced Biomedical Polymers provides fundamental knowledge of the structure and physiological properties of biocomponents in the living body, structure and properties of natural and synthetic biocompatible polymers. It will also include current research development of artificial organs, drug delivery systems, and biotechnology applications.

AM629 (Polymer Mechanics) 3학점

Study of mechanics of deformable bodies, including three-dimensional stress and strain tensors and their transformations. Equations of compatibility, continuity and equilibrium. Elastic constants. Failure criteria including fracture, yield and instability. Deflection relations for complex loading and shapes. Indeterminate problems. Strength theories and design equations, fatigue, and fracture. Design applications and numerical methods.

AM630 (Polymer Rheology) 3학점

Fundamental of rheology. Basic transport phenomena. Polymer melt and constitutive equations. Rheological characterization of polymeric fluids. Relationship between the rheological properties and molecular parameters of polymeric materials. Molecular viscoelastic theories of polymer and flow of molten polymers through circular and slit dies. Experimental methods of determination of rheological properties of polymer melts, solutions, elastomers. Structure-flow behavior relationships, viscoelastic fluid theory, application to extrusion, fiber, film processing molding. Structure development in processing.

AM631 (Seminar on Polymer Synthesis) 3학점

AM632 (Seminar on Polymer Properties) 3학점

The course of Seminar on Polymer Synthesis provides various topics related to principles of polymer synthesis and applications of functional polymers. Each student should presents literature reviews for his/her topics related recent trends of polymer synthesis.

○**Research Course**

(Research for the Master's Degree Ⅰ)0학점

This course is for students attending in the third semester in the master's degree program. Students are guided for their thesis research.

(Research for the Master's Degree Ⅱ)0학점

Students who already took the course of research for the master's degree Ⅰ can take this course. Students are guided for their thesis research.

(Research for the Doctoral Degree Ⅰ)0학점

(Research for the Doctoral Degree Ⅱ)0학점

(Research for the Doctoral Degree Ⅲ)0학점