기 계 공 학 과

SCHOOL OF MECHANICAL ENGINEERING

**Department Introduction**

■ History

For the past 12 years, a total of 44.5 billion won in government funds such as the College of Engineering National Support Project and the BK21 Outstanding Local University Promotion Project has been invested. Thus, we are prepared with various advanced testing materials and facilities such as the 13,200m2 mechanics hall, factory exercise center, industry-academic cooperation center, etc.

In 2001, it became the first in the nation to test ABEEK program. In 2005, students automatically receive ABEEK certification as soon as they graduate. In addition, in the national college assessment, it was chosen as the fifth best mechanical engineering school from 81 colleges.

■ Introduction

Mechanical engineering is an academic discipline that studies the principles, design, production and performance of various devices based on physical principles in order to make them practical, and it is related to all fields of engineering. Mechanical engineering is playing an important role in high-tech fields such as development of new energy resources, space and marine exploration, new materials, bionics, etc. In particular, subjects such as mechatronics, which include both mechanical and electronic technologies, computer aided design (CAD)/manufacturing (CAM) and plant automation are fields with bright prospects in the future.

In lower-level classes, students learn basic dynamics in order to train their abilities to practice principles in physics and develop unique research capacities, and in higher-level classes, students take application courses and experience actual lab work. This is divided into three programs such as Mechanical System, Mechanical Design and Advanced Engineering in order to assist students with the career plans, while students also complete courses such as foreign language, which is needed in this time of globalization.

**List of Faculty Members**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Position | Name | Last School Graduated | Degree | Major |
| Professor | Kwon, Jae Do | Yokohama National University(1988) | Ph.D. | Fracture Mechanics, Strength of Materials, Machine Design |
| Professor | Kim, Kyo Hyoung | Univ. of  Wisconsin-Madison (1983) | Ph.D. | CAD/CAM, Factory Automation, Mechatronics |
| Professor | Hawong, Jai Seok | Kanto Gakuin Univ (1990) | Ph.D. | Experimental Mechanics and New Material Technology, Fracture Mechanics, Biomechanics |
| Professor | Kim, Sang Tae | Northwestern Univ. (1984) | Ph.D. | Strength of Materials, Fracture Mechanics, New Material Technology |
| Professor | Jung, Pyung Suk | Seoul National University (1984) | Ph.D. | Thermal Engineering, Energy Conversion, Cryogenics |
| Professor | Han, Yong Oun | State Univ. of New  York, Buffalo (1988) | Ph.D. | Fluid Mechanics, Aerodynamics, Turbulence Analysis |
| Professor | Kim, Soo Youn | Seoul National University (1990) | Ph.D. | Thermal Engineering, Combustion, Energy Conversion and Transfer |
| Professor | Hwang, Pyung | Seoul National University (1989) | Ph.D. | Machine Design, Tribology, Rotor Dynamics |
| Professor | Shin, Jae Kyun | Korea Institute of Science and Technology (1985) | Ph.D. | Kinematics, Optimal Design, CAD |
| Professor | Lee, Won Kyoung | Univ. of California,  Berkeley (1988) | Ph.D. | Nonlinear Vibration |
| Professor | Chai, Young Suck | Univ. of Texas at Austin (1990) | Ph.D. | Structural Analysis, Fracture Mechanics, Composite Materials |
| Professor | Choi, Sung Ryul | Korea Institute of Science and Technology (1990) | Ph.D. | Fracture Mechanics, Elasticity, Stress Analysis |
| Professor | Kim, Yong Chul | Massachusetts Institute of  Technology (1983) | Ph.D. | Flow Induced Vibration, Nonlinear Structural Vibration |
| Professor | Song, Dong Joo | Virginia Polytechnic Institute and  State University (1986) | Ph.D. | Computational Fluid Mechanics, Heat Transfer, Aerodynamics, Fluid Machinery |
| Professor | Lee, Jae Won | Georgia Institute of Tech.  (1990) | Ph.D. | Flexible Structure Control, Robotics |
| Professor | Lee, Dong Joo | University of Massachusetts-Amherst (1987) | Ph.D. | New Material Technology, Composite Material Processing and Mechanics |
| Professor | Lim, Byoung Duk | Korea Institute of Science and Technology (1987) | Ph.D. | Noise and Vibration, Signal Processing |
| Professor | Kim, Jae Woong | Korea Institute of Science and Technology (1991) | Ph.D. | Welding Engineering, Welding Automation System |
| Professor | Kang, Dong Jin | Korea Institute of Science and Technology (1991) | Ph.D. | Computational Fluid Mechanics, Heat Transfer, Turbo Machinery Design and Efficiency Analysis |
| Professor | Chung, Mo | UCLA (1990) | Ph.D. | Heat and Mass Transfer, Two Phase Flow, Solar Energy |
| Professor | Shim, Hyun Bo | Korea Institute of Science and Technology (1990) | Ph.D. | Manufacturing, Sheet Metal Forming |
| Professor | Sah, Jong Youb | Korea Institute of Science and Technology (1989) | Ph.D. | Computational Fluid Mechanics and Convective Heat Transfer |
| Professor | Bai, Chel Ho | UCLA (1992) | Ph.D. | Heat and Mass Transfer, Thermodynamics, Two Phase Flow |
| Professor | Joo, Sang Woo | University of Michigan,  Ann Arbor(1989) | Ph.D. | Fluid Mechanics, Materials Processing, Hydrodynamic Stability, Applied Mathematics |
| Professor | Yi, Hwa Cho | Technische Universität Berlin (1993) | Ph.D. | Factory Automation, Mechatronics, Demanufacturing |
| Professor | Chung, Iisup | Purdue University (1992) | Ph.D. | Mechanics of Composite Materials. Structural Mechanics |
| Professor | Ko, Tae Jo | Pohang University of Science & Technology (1994) | Ph.D. | Machine Tools, Ultraprecision Machining, CAM, IMS |
| Professor | Chung, Byeong Mook | Korea Institute of Science and Technology (1994) | Ph.D. | Factory Automation, Intelligent Control, NC and Robot Control |
| Professor | Lee, Choon Yeol | Univ. of Texas at Austin (1993) | Ph.D. | Computational Mechanics, FEM, Nonlinear Mechanics |
| Professor | Lee, Byeong Jun | Seoul National University (1994) | Ph.D. | Combustion, Thermal Engineering |
| Professor | Park, Jung Whan | Korea Institute of Science and Technology (1995) | Ph.D. | CAD/CAM, 5-Axis NC Machining, Surface Modeling |
| Professor | Park, Sang Shin | Seoul National University (1995) | Ph.D. | Precision Measuring, Tribology, Ultra Precision Machine Tools |
| Professor | Hong, Sung Yull | Rensselaer Polytechnic Institute (1984) | Ph.D. | Nuclear Engineering, Nuclear Safety, Nuclear Physics, Nuclear Plant System |
| Assistant Professor | Kim, Jin Ho | U. C. Berkeley (2005) | Ph.D. | Electro-Mechanical Actuator & Motor, Magnetics |
| Assistant Professor | Shim, Jaesool | Washington State University (2007) | Ph.D. | Design and Modeling of Nano-Mems Fusion Technology |
| Assistant Professor | Lee, Dong-Yeon | Korea Institute of Science and Technology (2007) | Ph.D. | Nano-Mechatronics |
| Assistant Professor | Seo, Tae Won | Seoul National University (2008) | Ph.D. | Robot Design & Control |
| Full-time Instructor | Byon, Chan | Korea Institute of Science and Technology (2012) | Ph.D. | Mechanical Engineering |
| Professor | Ashutosh Sharma | State University of New York (1987) | Ph.D. | Chemical Engineering |
| Associate Professor | Shizhi Qian | University of Pennsylvania (2004) | Ph.D. | Mechanical Engineering and Applied Mecanics |
| Full-time Instructor | Michael McCateer | The Australian National University (2005) | Master | public policy |
| Full-time Instructor | Banerjee A. Narayan | Jadavpur University (2005) | Ph.D. | physics and material science |

**Course Description**

■ 기초공통 (Basic Major Courses)

계측공학 3 credit

(ELECTRONIC MEASUREMENT AND INSTRUMENTATION)

Fundamental knowledge of the electrical and electronic engineering is becoming a must for an engineering students in many different majors. In this respect, the objective of this class is to give an introduction of the electrical and electronic engineering fundamentals to the students majoring in the chemical engineering and technology.

마이크로컴퓨터응용 3 credit

(APPLICATION OF MICROCOMPUTER)

This course deals with some basic topics to study the principles of hardware and software microcomputer such as instrumentation, design of losic circuit, microprocessor and interface, etc.

수치해석 3 credit

(NUMERICAL ANALYSIS)

Thisclassteachesbasicnumericaltechniquesrequiredforgraduatestudentsstudyingengineeringandsciences.Itcoversmodernmethodsforlinearalgebra,nonlinearequations,approximationtheory,ODEandPDE.Thisclassisapplicationorientedandrequiresahand-onexperiencewithatleastoneprogramminglanguagesuchasC,FORTRANorBASIC.

유한요소법 3 credit

(FINITE ELEMENT METHOD)

This course consists of lectures on basic theories of Finite Element Method including truss, beam, plane stress(strain), plate(shell) and 3-D problems. It also provides instruction on how to use commercial FEM programs and applications to practical problems by term projects.

응용수학(1) 3 credit

(APPLIED MATHEMATICS Ⅰ)

Applied Mathematics I: This course deals with the mathematical theories which are helpful for the mechanical design such as the Bessel function, Fourier series, Laplace transformation, Complex theory and linear algebra.

최적화기법 3 credit

(OPTIMIZATION TECHNIQUE)

Lectures about design optimization using mathematical modeling and commercial software

통계적실험해석 3 credit

(STATISTICAL ANALYSIS OF RANDOM DATA)

Lecture on the ways to deal with dynamic and random data obtained in the mechanical engineering experiments. This mainly covers the theory of stationary and random process, a statistical analysis for experimental data, correlations between input and out signals of applied systems, error analysis and data acquisition system.

■ 전공(Major Courses)

개별연구(1) 3 credit

(INDEPENDENT STUDY (1))

개별연구(2) 3 credit

(INDEPENDENT STUDY (2))

기계공학과세미나 1 credit

(SEMINAR)

특수문제연구(1)

(SPECIAL STUDY(1))

특수문제연구(2) 3 credit

(SPECIAL STUDY(2))

특수문제연구(3) 3 credit

(SPECIAL STUDY(3))

특수문제연구(4) 3 credit

(SPECIAL STUDY(4))

■ 기계공학전공(MECHANICAL ENGINEERING MAJOR)

2상유동및열전달 3 credit

(TWO-PHASE FLOW AND HEAT TRANSFER)

Fundamentals of heat transfer including steady conduction, transient conduction, forced and free convection, thermal radiation, boiling and condensation.

BIOTHERMAL-FLUID SCIENCE 3 credit

(BIOTHERMAL-FLUID SCIENCE)

The basic thrust of this course will discuss various phenomena at biointerfaces such as potential and charge at surfaces of cells, DNA, and proteins, electrokinetic phenomena at interfaces, and interactions between surfaces, on the basis of biophysical chemistry.

Eco디자인 3 credit

(Eco-design)

The widespread use of industrial products has drawn increased awareness to their environmental impacts. As a result, legislation, as well as market-driven requirements for Eco-design is emerging. The goal of eco-design is the reduction of adverse environmental impacts of a product throughout its entire life cycle.

In this lecture teach the background knowledge and methods for concept design related to eco-design. Some experts in the field will be invited to describe their practical experience.

Eco디자인세미나 3 credit

(Eco-design Seminar)

Seminars of experts in the Eco-design related field.

Goal of seminars is to recognize the global trend of environmental regulations and related product design (eco-design)

LCA 3

(LCA)

LCA(Life Cycle Assessment) is a process to evaluate the environmental burdens associated with a product system, or activity by identifying and quantitatively or qualitatively describing the energy and materials used, and wastes released to the environment, and to assess the impacts of those energy and material uses and releases to environment. The assessment includes the entire life cycle of the product or activity, encompassing extracting and processing raw materials; manufacturing; distribution; use, re-use, maintenance; recycling and final disposal; and all transportations involved. Life-Cycle Assessment in general should be looked upon as a design discipline to be applied at different level

MICROFLUIDICS 3 credit

(MICROFLUIDICS)

The course aims to provide the students with the basic principles of microfluidic technology. The first part focuses on various microfluidic components including micro-pumps, valves, mixers, and on-chip PCR. The 2ndpartfocusesonthetheoreticalframeworkofmagneto-hydrodynamicsmicrofluidics,andelectrokinetics-basedmicro/nanofluidics.Thethirdpartincludesvariousmicrofluidicapplications,andthestudentsarerequiredtowritealiteraturereviewonapplicationsofmicrofluidicsinaspecificfield.

The focus of the course will be on the physical phenomena from the continuum point of view. The mathematical complexity will be kept to a minimum. Software tools such as COMSOL will be used throughout the course. The course will be reasonably self-contained and necessary background material will be provided consistent with the students’ level of preparation.

가공형상모델링 3 credit

(GEOMETRIC MODELING FOR MACHINING)

Various topics on geometric modeling and machining are covered in the class: mathematical modeling of sculptured curve and surface, sculptured surface machining. Also covered are differential geometry, solid modeling, discrete surface processing, and geometric data exchange among CAD/CAM systems.

가스터빈 3 credit

(GAS TURBINES)

Lecture on design, theory of a gas turbine engine composed of compressors, combustor, turbine and nozzle mainly. The related thermodynamic theory and engineering applications; typically, an airplane engine and the industrial power generator are also covered.

경계층이론 3 credit

(BOUNDARY LAYER THEORY)

Boundary Layer Theory deals with an exact solution or approximated solution,laminar flow, thermal boundary layer analysis and turbulent boundary layer on a simplified or 2D incompressible flow by simplifying Navier-Stokes equation in boundary layer

고급열유체전산학 3 credit

(ADVANCED NUMERICAL ANALYSIS FOR THERMI AND FLUID DYNAMICS)

The goal of this course is to privide engineers with a specific numerical skill, especially via Finite Volume Method (FVM) and raise an ability on some problems to be encountered in research and practice. This class covers heat and mass transfer, fluid flow, chemical reaction, and other related processes. The student will learn discretization methods, convection and diffusion skims and SIMPLE and SIMPLER algorithm for fluid dynamics. In addition, students will make some practical codes for structured and unstructured mesh types.

고체역학 3 credit

(SOLID MECHANICS)

ThisCourseincludessuchfundamentaltopicsasstressesandstrains,deformationsanddisplacementsduetotheexternalloadsanditseffectsonthestructures.

Thestressesandstrainsofthematerialsunderaxiallyloaded,torsionalandbentstructuresarebasicallystudiedinthisclass.Load-carryingcapacitiesofthestructuresandtheirsafetiesaremainconcernsofthislecture.

고체역학특론 3 credit

(ADVANCED SOLID MECHANICS)

The objectives of this course are to introduce the computer as an important engineering analysis and design tool. The course will focus on solving engineering problems using various computational techniques. Emphasis will be placed on the accuracy and applicability of results from computational techniques.

고체역학특별연구 3 credit

(SELECTED TOPICS IN SOLID MECHANICS)

The objectives of this course includes the followings;1) literature survey and preparation of research environment 3) selection of topics of the thesis 4) research method 5) experiments

공학설계 3 credit

(ENGINEERING DESIGN)

This course provides a comprehensive, consistent and clear approach to systematic engineering design. The design processes like product planning, clarifying the task, conceptual design and embodiment design are explained.

The methods for team work was also included to improve the knowledge of junior

student as a mechanical engineer.

기계공작법특론 3 credit

(ADVANCED MANUFACTURING PROCESSES)

Modeling, analysis, and experimental techniques are studied for the metal cutting processes such as conventional and nontraditional machining processes.

기계설계특론 3 credit

(ADVANCED MACHINE DESIGN)

Studying about basic theory and application of CAD and machine design using kinematics, system design, optimization and design information.

기계설계특별연구 3 credit

(SELECTED TOPICS IN MECHANICAL DESIGN)

Lecturing how to survey related papers, select dissertation object and plan preliminary experiment. Based on these process, student is doing actual preliminary experiment for dissertation.

기계재료특론 3 credit

(MATERIALS FOR MACHINES)

Lectures on the material types, their structures and mechanical characteristics to provide the idea for design and manufacturing of machines, heat treatment and manufacturing processes of materials ; applications of various fabrication methods and thermal processing of metal alloys, ceramics, polymers; corrosion and degradation of materials.

기계재료특별연구 3 credit

(SELECTED TOPICS IN MATERIALS FOR MACHINE)

The course will mainly involve introductory Materials Science, which will include brief review of band theory of solids, basic mechanical, electric and magnetic properties of metals, insulators and semiconductors, transport phenomenon of metals and semiconductors etc. Some specific meterials used in various machines and Nanoengineering will be discussed in details. The main objective of this course is to develop the students towards the fundamental properties of materials used in machine designing and techniques. Considerable attention is given to develop the course in such a way that, after successful completion of the course, the students are expected to solve various practical problems in real situation by using physical and mathematical methods.

기구설계학 3 credit

(MECHANISM DESIGN)

Both graphical and analytical methods for the analysis of planar linkage systems, cams and gears will be covered in depth. A brief introduction to the numerical methods for some simple planar mechanisms will be given. Also topics on the kinematic synthesis will be included.

기구학특론 3 credit

(ADVANCED KINEMATICS)

Both graphical and analytical methods for the analysis of planar linkage systems, cams and gears will be covered in depth. A brief introduction to the numerical methods for some simple planar mechanisms will be given.

Also topics on the kinematic synthesis will be included.

나노공학 3 credit

(NANOTECHNOLOGY)

Nano engineering requires the top down or bottom up fabrication technology. Scale down technology such as top down is realistic in terms of current technology level. The course covers the scale down machining process for the silicon and non-silicon materials, respectively.

난류이론 3 credit

(TURBULENCE)

Lecture on turbulent phenomena and methodologies to analyze turbulent dynamics especially appeared in the fluid mechanics. This extends over the origin of turbulence, Reynolds analysis for the nonstationary fluid variables, statistical governing equations, their applications of free jets, channel flows and wakes.

내연기관특론 3 credit

(ADVANCED INTERNAL COMBUSTION ENGINES)

Advanced treatment on cycle analysis, performance, emissions, combustion, gas exchange process of internal combustion engines are provided. Design and operation conditions are included.

냉동및공기조화특론 3 credit

(ADVANCED REFRIGERATION AND AIR CONDITIONING)

This lecture is focused on special topics in the field of refrigeration and air conditioning. Professor will give various and intensive knowledge about green technologies for refrigeration and air conditioning such as heating and cooling load simulation tools, magnetic cooling, global warming problems and solutions, patent map, solar energy application for heating and cooling, geothermal energy, heat island problems and solutions, radiant floor heating, design technologies for super low energy office building and zero energy house and so on. The students will get wide view of green energy related technologies in refrigeration and air conditioning field through this course work.

대류열전달 3 credit

(CONVECTIVE HEAT TRANSFER)

General theory of convective heat transfer will be studied. Starting from rigorous derivations of conservation equations, solutions of well-known laminar flows will be studied in detail. Boundary layers and basic theory on turbulence are also systematically covered.

동역학 3 credit

(DYNAMICS)

Kinematics, Momentum formulation for system of particles, Variational formulation, Systems containing rigid bodies, Continuous systems.

디지털신호처리 3 credit

(DIGITAL SIGNAL PROCESSING)

ThecourseDigitalSignalProcessingaimsatgivingthestudentknowledgeofsomeimportantmethodsforsignalprocessingwithemphasisonsoundapplications.

Thiscoursecoversmodelling,simulationandpracticaltrainingintheareaofdigitalsignalprocessing.

Thiscourseprovidesstudentswithsolidfoundationonthetheoryandapplicationsofdigitalsignalprocessing.BothfundamentalandadvancedmathematicalandphysicalDSPconceptswillbediscussed.

로봇공학 3 credit

(ROBOTICS)

This course provides the structure and basic theory such as,forward and inverse kinematics, coordiate transform using 4 by 4 matrix,

Jacobian and Dynamics of a robot. By this course, 3 dimensional dynamics can be understood easily.

박판소성가공학 3 credit

(THEORY OF SHEET METAL WORKING)

In this course, constitutive equations of anisotropic plastic theory are investigated. Based on this, forming limit and formability are considered profoundly. With considering anisotropicity, instability theory of localized necking and diffused necking is studied. Based on the anisotropic theory, methods for theoretical analysis of hydrostatic bulging, stretching, deep drawing are introduced and their applications are also introduced. In addition, theories and applications of bending and shear of thin sheets are studied.

복사열전달 3 credit

(RADIATIVE HEAT TRANSFER)

Two types of radiation heat transfer problems are taught in this class: surface radiation and gas radiation. The concepts of blackbody and gray body are introduced and will be extended to wide rages of applications. The radiation transport equation for participating gases is explained and applied to some practical problems.

복합재료 3 credit

(MECHANICS OF COMPOSITE MATERIAL)

Students can understand the composite materials and can design some part using these new materials.

복합재료역학특론 3 credit

(ADVANCED MECHANICS OF COMPOSITE MATERIALS)

In this course, the molding method of the advanced composite materials, the advanced fracture mechanics of composite materials, the dynamic fracture mechanics of composite materials and the crack propagation theory of composite materials etc. are studied. The experimental methods on the above subjects are lectured.

불규칙진동학 3 credit

(RANDOM VIBRATIONS)

Random variables and random processes. Stationary, nonstationary, and ergodic processes.

Analysis of linear systems under stationary and nonstationary excitations.

Application to failure analysis.

비가역열역학 3 credit

(IRREVERSIBLE THERMODYNAMICS)

Irreversible phenomena related to heat transfer, mass transfer, momentum transfer, and electric charge transfer are dealt by dissociation of available energy or work potential. 2th law of thermodynamics, available and useless energies, maximum work, energy dissociation are included.

비선형진동학 3 credit

(VIBRATIONS OF NONLINEAR SYSTEM)

General theory, Stability, Conservative single-degree-of-freedom system, Damped single-degree-of-freedom system, Forced vibrations of single-degree-of-freedom system, Parametrically excited systems, Multi-degree-of-freedom systems, Continuous systems.

비파괴시험법 3 credit

(NONDESTRUCTIVE TESTING METHOD)

The objectives of this course are to introduce the fundamentals and applications of nondestructive testing method to investigate the internal condition of various materials, products and machines without any influence.

생체역학 3 credit

(BIOMECHANICS)

This course is designed to understand human performance in terms of mechanical, anatomical and neurophysiological standpoint.

선형진동학 3 credit

(VIBRATIONS OF LINEAR SYSTEMS)

An introduction to the theory of mechanical vibrations including topics of harmonic motion, free and forced vibrations, influences of damping, resonance, transient excitation. Normal modes of multi-degree-of-freedom and continuous systems.

소성가공공정설계 3 credit

(DESIGN OF METAL FORMING PROCESSES)

Based on the basic theories considered in the plastic working class, manufacturing methods such as rolling, forging, extrusion, drawing, bulging, stretching, deep drawing are classified, analyzed and designed with considering cost, precision, functionality, productivity of each method. In order to design those manufacturing process independently or comprehensively, understanding general concept of plastic working is required. In this course, manufacturing machinery such as mechanical press, hammer, machine, and roller are classified and introduced. In addition, general characteristics of suitable machinery for optimal design are studied according to the relevant manufacturing method.

소성역학 3 credit

(THEORY OF PLASTICITY)

In this course, basis of plasticity theory: metal yielding condition, plastic deformation theory, stress-strain relation, hardening, dislocation line, creep problems, are studied.

소음공학 3 credit

(NOISE CONTROL ENGINEERING)

Students will learn following topics;

- propagation of sound wave : generation, reflection, diffraction and transmission

- architectural acoustics, reverberation,

- sources of sound and their charactreistics,

- measurement of sound, spatial and temporal analysis of sound.

- waveguides and filters, passive noise control devices, and noise barriers

- sound radiation from a vibrating surface, transmission through solid walls.

- fundamentals of active noise control

- human perceptions to the sound and sound quality

- case studies in automotive noise control

시스템규명법 3 credit

(SYSTEM IDENTIFICATION)

System Identification is the process of developing or improving a mathematical representation of a physical system using experimental data. This course provide a common theoretical basis to understand the techniques developed under different disciplines. Matlab software is used for building accurate, simplified models of complex systems from noisy-series data.

신뢰성공학 3 credit

(RELIABILITY ENGINEERING)

Concepts of reliability engineering, basic probability and statistics, life expectancy, variance and reliability, failure rate distribution and its estimation, reliability estimation of distribution, reliability verification method, safety factor for infinite life, accelerated test, system reliability.

신소재공학 3 credit

(NEW MATERIALS FOR MACHINES)

Introduce the newly developed engineering materials and lecture on the mechanical properties, characteristics and applicable areas in mechanical engineering field among the selected new materials. Especially, the structures, properties and processing techniques of polymer and ceramic materials will be covered in detail, and the future developing trend and possible applications of new materials will be discussed. Also, a characteristic and application of composites will be taught.

압축성유체역학 3 credit

(COMPRESSIBLE FLUID DYNAMICS)

Fundamental concepts and governing equations of compressible fluids are the main subjects of the course. Also shock waves, supersonic nozzle design, one-dimensional unsteady flow and two dimensional steady flows, Prandtl-Meyer theory, effect of viscous flow, boundary layer are major topics of the course. Not only analytical theory but also computational method by using CFD tools are introduced.

에너지변환공학

(ENERGY CONVERSION ENGINEERING)

Energy conversion systems and various useful energies including new and renewable energies are treated. Solar energy conversions are included.

연소공학 3 credit

(COMBUSTION ENGINEERING)

Combustion applies to power production, jet and rocket propulsion, safety, pollution control and material processing. This course provides the fundamental concepts of reacting flow, the characteristics of flame and the view point of practical heat generating systems as a combustion engineer. Major subjects dealing in the course are combustion and thermo-chemistry, mass transfer, chemical kinetics, chemical mechanism, reacting system, laminar premixed flame, laminar diffusion flame, droplet burning, turbulent flow and turbulent flame.

연속체역학 3 credit

(CONTINUUM MECHANICS)

Introduction to the concept of continuum, vector and tensor, kinematics of deformation, stress and strain, compatibility, the constitutive equations for the idealized fluid and elastic solids, the equations of mass conservation and energy, and the Navier-Stokes equation.

열계통해석 3 credit

(THERMAL SYSTEM ANALYSIS)

Performance analysis and design of energy conversion systems which convert heat to power or convert power to heat are provided. Energy management and energy economics are included.

열공학특별연구 3 credit

(SELECTED TOPICS IN THERMAL ENGINEERING)

Special topics selected in thermal engineering are dealt and discussed. Review of research trend by literature surveys, technical writing, experimental planning, data processings are included.

열교환기특론 3 credit

(ADVANCED HEAT EXCHANGER THEORY)

The performance analysis and design theory is studeid in this class. The knowledge of heat transfer and Fluid dynamics is applied for heat exchanger design. The spedific design method is introduced and numerical method could be used.

열및물질전달 3 credit

(HEAT AND MASS TRANSFER)

Lettingstudentsunderstandfundamentalsrelatedtoheatandmasstransfer,sothattheyacquireanalyticalabilityforsystemsandprocessesinvolvingheatand/ormasstransfer.

열역학특론 3 credit

(ADVANCED THERMODYNAMICS)

Lectures on the concepts of equilibrium and temperature, definition of work and heat and energy; first law and second law of thermodynamics, entropy and application of second law, principle and introductions of energy conversion cycles.

열유체계측법 3 credit

(MEASUREMENTS IN THERMAL AND FLUID SYSTEMS)

It is important that engineers be able to perform successful experiments, and it is equally important that they know or be able to estimate the accuracy of their measurements. This course deals with rather broad range of instruments and experimental measurements techniques for the thermal and fluidic engineers. It introduces statistical data analysis and concept of experimental uncertainty. It provides principles of several techniques and devices to measure the pressure, temperature, velocity and transport properties and to visualize the flow fields.

열전달특론 3 credit

(ADVANCED HEAT TRANSFER)

In this class, the students will learn the advanced subjects in heat transfer. Topics include analytical methods for conduction, convection and radiation and basic concept of heat transfer with phase change. Boiling and condensation heat transfer and two-phase flow will be also briefly touched.

영어의사소통기술 3 credit

(TECHNICAL COMMUNICATION IN ENGLISH)

The first half of the semester will be spent for communications related to job search, application, and interview, including writing an attractive resume, application letters, follow-up letters, and e-mail correspondences. During the second half students will learn technical writing applications, such as memorandums, formal and informal reports, proposals, and oral reports.

용접공학특론 3 credit

(ADVANCED WELDING PROCESSES)

The principles and characteristics of various welding processes as well as the economics and the effects of practical factors are studied. And the reasons of defect and flaw generation which are related with the stability of welded structures are investigated in the point of process and metallurgical aspects.

용접구조물해석 3 credit

(welded structure analysis)

The analysis of thermal flow and the temperature distribution of weldment are studied by using the models of various welding processes. And then the prediction of weld metal structures, residual stresses, and weld distortions are investigated. In addition, the test methods for the weldability of various metals are introduced.

원자력공학특론 3 credit

(NUCLEAR POWER PLANT ENGINEERING)

The goal of this course is to provide engineers the basic theory of nuclear engineering and principle of nuclear power plant. This class covers introduction of nuclear engineering, atomic physics, nuclear reactor theory, nuclear power plant system, radiation and health physis. This course will cover the overall spectrum of nuclear engineering.

윈도우즈프로그래밍 3 credit

(WINDOWS PROGRAMMING)

In the windows system, .NET platform is the the underlying framework of programming. This course deals with the .NET platform architecture and system programming technologies. Major topics include visual studio .NET, the architecture of .NET framework, CLR, CLS, COM, and C#.

유동의안정성 3 credit

(STABILITY OF FLOW MOTIONS)

Stability of Flow Motions deals linear stability theory, non-linear stability theory for a stability analysis of flow, instability due to heat, stability on centrifugal and shear flow

유체공학특별연구 3 credit

(SELECTED TOPICS IN FLUID ENGINEERING)

Withcomprehensionsofrotoraerodynamicsofhelicopter,flightdynamicsofrotarywingvehicle,aeroacoustics,principlesofpropellerdesign,powergenerationofwindmillandthierapplicationtoengineeringwillbeaimed.

유체기계특론 3 credit

(ADVANCED FLUID MACHINERY)

This course provides a comprehensive introduction to the operation principle, performance and design concepts of fluid machinery. By focusing on the preliminary design and selection of equipment to meet a set of performance specifications-including size, noise, and cost limitations, a basic but thorough understanding of the subject is requested. Students are exposed to a realistic array of conflicting requirements and real-world industrial applications, while providing a solid background for more advanced study. Coverage of both gas and hydraulic fluid machinery and emphasis on industrial issues and equipment makes this course ideal for mechanical engineering students.

유체역학특론 3 credit

(ADVANCED FLUID DYNAMICS)

This course will teaches the theory of momentum, shear stress, and its application. This course teaches not only laminar flow but also tuburent flow. With Reynolds transform continum, Navier-Stokes equation, Bernoulli principal, potential flow theory we will discuss three dimentional fluid dynamics and thermal flow theory. From Newtonian flow to nass flow equipment analysis, students shoud learn the theories and prectices.

윤활공학 3 credit

(LUBRICATION ENGINEERING)

Studying about general facts of lubrication, especially of hydrostatic and hydrodynamic lubrication theory with pressure distribution, load carrying capacity, friction and power loss.

음향학 3 credit

(ACOUSTICS)

The purpose of this course is to understand the fundamental principles underlying the generation, transmission, and reception of acoustic waves. The following topics are dealt in detail: the fundamental concepts of vibration, transverse waves on a string, longitudinal vibrations of a bar, vibrations of membranes and plates, the acoustic wave equation and simple solution in fluids, transmission phenomena in plane boundaries, absorption and attenuation of sound in fluids, radiation and reception of acoustic waves, wave-guides and resonators, and so on. They are largely related to the fields of acoustic sensors, medical diagnosis, underwater detection and nondestructive inspection.

응용광학특론 3 credit

(ADVANCED APPLIED OPTICS)

The purpose of this subject is to consider general optics for measurement and to figure out important properties regarding measurement technologies such as light interference, diffraction, magnetic characteristics.

응용수학(2) 3 credit

(APPLIED MATHEMATICS Ⅱ)

Applied Mathematics II: This course deals with the mathematical theories which are helpful for the mechanical design such as partial differential equations, the approximate solution for the differential equations, mathematical physics and so on.

인공시각 3 credit

(MACHINE VISION)

1. Image Acqusition (Camera, BMP or Raw file)

2. Image Processing(Segmentation, Edge detection, Object contouring)

3. Image Classifying and Recognition

인공지능제어 3 credit

(ARTIFICIAL INTELLIGENCE CONTROL)

1. Fuzzy Theory & Control

2. Neural network & Back-propagation Theory

3. Expert system

자동제어특론 3 credit

(ADVANCED AUTOMATIC CONTROL)

The aim of the this course is to provide opportunity to study the basic of feedback control systems. This course deals with modeling of dynamic system, signal flow graph, state equation, characteristics and performances of the feedback control system, simple stability analysis of linear system using Routh-Hurwitz method, root-locus techniques, frequency response techniques, stability of frequency domain and design of feedback control system. And design controller using modern control theories - design of the linear quadratic optimal control in state space, pole placement control, robust control - will be introduced.

재료강도학 3 credit

(MECHANICAL BEHAVIOR OF MATERIALS)

This course covers the following subjects: analysis of stress and strain, dislocation dynamics, plastic deformation of crystalline solids, deformation of viscous materials, basic equation of continuos mechanics, approximate stree analysis, residual stress, fracture mode of ductile and brittle fracture, degradation assessment and life prediction due to fatigue and creep, case study etc.

저탄소에너지시스템 3 credit

(LOW-CARBON ENERGYSYSTEM)

Carbon-based energy system today has two decisive disadvantages, accelerated depletion of natural energy resources and threatening influences to the global environment. Law-carbon energy system is known as a principal measure to reduce greenhouse gas emissions and thus to stabilize global warming in an appropriate level and to make our future socio-economic system sustainable.

This lecture is to handle new energy conversion technologies which enable to reduce carbon dioxide emission, highly efficient energy technologies and renewable energy system. Renewable energies based on non-depletive natural cycle are solar, wind, hydro, marine and geothermal energy and thus known as an essential new energy system for the future which make our energy system decentralized, non-pollutive and sustainable.

전산기응용제작 3 credit

(COMPUTER AIDED MANUFACTURING)

GeneralunderstandingofCAD/CAM,sculpturedsurfacemachining,RPandVE

전산기제어 3 credit

(DIGITAL CONTROL)

PracticesimulationofvariousengineeringproblemsbyMATLABprogram.Basics,numericalsimulation,controllerdesign,plotting,etc.aregoingtobestudiedforeachclass.Fundamentalalgorithmsandtheoriesarealsogoingtobeintroducedbriefly.

Thislectureis3-creditgraduateclassbasedonMATLABpractice.StudentsaregoingtopracticeonespecifictopicbyMATLABforeachclass.

전산기지원설계 3 credit

(COMPUTER AIDED DESIGN)

Various computer application methodologies in product design are introduced. The computational geometry concerning computer graphics in engineering design is the main topic.

전산역학 3 credit

(COMPUTATIONAL MECHANICS)

Computational Mechanics deals with an advanced theory for such computational analysis as Finite Element method, Finite Difference method and Boundary Element method. In addition, it provides actual programming techniques for a variety of examples on solid mechanics and fracture mechanics.

전산유체역학 3 credit

(COMPUTATIONAL FLUID DYNAMICS)

Lectures on fundamental information and practice by using CFD based software about thermal and fluid system

전열공학특별연구 3 credit

(SELECTED TOPICS IN HEAT TRANSFER ENGINEERING)

The focus of these subject lies on the application of heat and mass transfer. Individual students are required to perform application oriented term projects in the fields of power engineering, heat exchanger design and refrigeration system among many possible topics.

절삭가공특론 3 credit

(ADVANCED METAL CUTTING PROCESSES)

Intheadvancedcutting,thecuttingmechanism,cuttingforce,cuttingtoolaswellastoolwear,andsurfaceintegrityincludingsurfaceroughnessarecoverd.Recently,nonconventionalcuttingsuchasabrasivecuttingbecomesattractive,thoseverycomplicatedprocessesshouldalsobetreatedintheclass.Someprocessesmightincludetheexperimetallaboratary.

점탄성론 3 credit

(THEORY OF VISCOELASTICITY)

This subject deals with the behavior of the viscoelastic materials with respect to time and temperature.

제작및자동화특별연구(1) 3 credit

(SELECTED TOPICS IN MANUFACTURING & AUTOMATIONⅠ)

In this course, brand new technologies for mechanical manufacturing and automated production are introduced. In addition, theoretical background and applications of the regarding technologies are investigated.

제작및자동화특별연구(2) 3 credit

(SELECTED TOPICS IN MANUFACTURING & AUTOMATIONⅡ)

In this course, brand new experimental technologies regarding mechanical manufacturing and automated production, which has been introduced by recent technical publications, are taught.

조립공학 3 credit

(ASSEMBLY ENGINEERING)

Lecture consisted definition and types of assembly, assembly processes, and consideration of the product design for efficient assembly. Assembly planning and simulations are also included in the lecture.

진동및제어특별연구(1) 3 credit

(SELECTED TOPICS IN VIBRATION & CONTROL Ⅰ)

This course presents the advanced research topics on vibration and control with emphasis of analytical tools and compuational approaches. Topics include vibration control of lumped and distributed system; fundamentals of beam theory; extensional, torsional, and °exural vibrations of beams; vibraton of a flexible manipulator. Students will learn fundamental vibration control tools for modeling and analyzing mechanical systems with Matlab and Simulink.

진동및제어특별연구(2) 3 credit

(SELECTED TOPICS IN VIBRATION & CONTROLⅡ)

This course presents the advanced research topics on vibration and control with emphasis of analytical tools and compuational approaches. Topics include bond graph modelling of dynamics system; Modeling multidomain engineering systems at a level of detail suitable for design and control system implementation. Network representation, state-space models; multiport energy storage and dissipation, Lagrangian and Hamiltonian forms; Control-relevant properties

Students will learn fundamental vibration control tools for modeling and analyzing mechanical systems with Matlab and Simulink.

창의적통합공학실험 3 credit

(CREATIVE ENGINEERING PROJECT)

Students will focus on practical solving of real engineering problems, each engineering project is organized and posted by the professor. As a team, students whose specific majors are not identical will propose several alternatives to solve the problems, followed by implementing and verifying their solutions with the help of advisory professors. It includes 40 hours of field practice on the shop floor.

초정밀공작기계3 credit

(ULTRAPRECISION MACHINE TOOLS)

This course covers the concept and types of errors, the principle of homogeneous transformation matrix, sensor technology, error estimation and compensation, and the design of ultra-precision parts for the machine tools or three axis coordinate machine

최적설계특론 3 credit

(ADVANCED OPTIMAL DESIGN)

This lecture aims to study robust optimal design based on Taguchi methodology. The quality of product is optimized by using experimental or simulation data. The lecture is proceeded by theoretical studies and individual research project.

최적제어공학 3 credit

(OPTIMAL CONTROL ENGINEERING)

Thislectureaimstostudyfundamentalsoflinearsystemtheoryandcontrol.Basicsystemmodeling,state-spaceequations,linearalgebra,isgoingtobestudiedinthefirsthalf.Inthesecondhalf,controllability,observability,andcontrollerdesignmethodsaregoingtobestudied.

컴퓨터통합생산 3 credit

(COMPUTER INTEGRATED MANUFACTURING)

The class covers practical topics on computer integrated manufacturing that utilizes various computer-aided technologies such as CAD, CAM, FA(factory automation), PPC(production planning & control). The relevant technologies and application examples in industry are introduced and discussed.

탄성론 3 credit

(THEORY OF ELASTICITY)

Thecourseincludessuchfundamentaltopicsasstresses,strains,Hooke'slawandbasicapproachesoftwo-dimensionalelasticity.

Definitionsandrelatedtopicsofstressesandstrainsarestudiedinthisclass.TheirrelationshipswhicharecalledHooke'slawarealsostudied.Airyfunctionsin two-dimensionalelasticityareformulatedandareapplied.Loadcarryingcapacitiesofthestructureandtheirsafetiesaremainconcernofthiscourse.

탄소관리 3 credit

(CARBON MANAGEMENT)

Carbon-based energy system today has two decisive disadvantages, accelerated depletion of energy resources and threatening influences to the global environment. Law-carbon energy system is known as basic alternative method to stabilize global warming in an appropriate level, to prolong resource limit and to make our economic-social system sustainable. Carbon management is aimed to reduce input of carbon-based energy into the industrial and service processes, to develop renewable energy and to use Clean Development Mechanism (CDM) and Emissions Trading (ET) introduced by UNFCCC. This study course covers law-carbon energy technologies and systems and its use in the Flexible Mechanism provided by Kyoto Protocol. The students also are to learn to generate Certified Emission Reduction (CER) and its trading through some practical training projects.

트라이볼로지 3 credit

(TRIBOLOGY)

The Tribology course is based on the study about the phenomena between two surfaces that have relative motions. This course includes friction, wear, lubrication, lubricants and bearings. For the half of the course, the theory of lubrication, specially called Reynolds' equation, is discussed under the fluid film lubrication. During the last half of the course, several kinds of wear mechanism, such as abrasive, corrosion, fretting etc, are lectured.

특수및미세가공 3 credit

(NONTRADITIONAL 3 creditAND MICRO MACHINING)

In contrast to conventional machining process, nontraditional machining process uses various types of energy source. The representative energy source is mechanical, chemical, electro-chemical, and electro-thermal. The machine tools using the above energy source are studied.

파괴역학 3 credit

(FRACTURE MECHANICS)

This course covers the following subjects: elasto-plastic stress analysis around crack tips, concept and determination of fracture mechnics variables: stress intensity factor and energy relaease rates, fracture mode of ductile and brittle fracture, degradation assessment and lfatigue ife prediction, concept and experimental analysis of fracture toughness, case study etc.

파괴역학특론 3 credit

(ADVANCED FRACTURE MECHANICS)

Fracture parameters such as stress intensity factor, anergy release rate, and elastoplastic stresses around crack tip are studied with analytic and experimental approaches. Also the methods to determine fracture toughness, and to evaluate the fracture parameters are investigated.

판및셸진동론3 credit

(VIBRATIONS OF PLATES AND SHELLS)

The objectives of this course are to introduce continuum mechanics and analysis methods on membranes and shells.

평판및쉘이론 3 credit

(THEORY OF PLATE AND SHELL)

The purpose of this course is to understand theories of panels and shells, and to apply those theories to dome, pressure vessel, tank and tubing to foster problem-solving skills. For this purpose, shell governing equations and relevant analyzing methods are introduced In addition, the physical meaning of the results are investigated to foster applications skills. Based on the panel bending theory, bending of circular, rectangular panels, and their numerical analysis are taught. Subsequently, film stress and bending stress of shells are considered. Finally, the learned panel and shell theories are applied to pipe, tank, pressure vessel, etc.

풍력공학특론 3 credit

(WIND ENERGY CONVERSION SYSTEM)

Course seeks mainly to understand theory, design and application of wind turbine, including wind characteristics and resources, classification of wind turbune, rotor aerodynamics and structural design, electric energy conversion, turbine noise, wind turbine control and energy transportation system.

피로강도론 3 credit

(FATIGUE FRACTURE AND STRENGTH)

The objectives of this course includes the followings; 1) fundamentals of fatigue and fatigue fracture 2) elasticity and crack propagation 3) micro crack propagation 4) fracture mechanism 5) factors of fatigue fracture 6) evaluation of fatigue life 7) fatigue safe design method

회전체기계설계 3 credit

(ROTATIONAL MACHINE DESIGN)

Study of dynamic analysis, real problem solving and new research trend of rotating machine.

회전체동역학 3 credit

(ROTOR DYNAMICS)

This course deals the rotordynamics which is a applied mechanics concerned with the behavior and diagnosis of rotating structures. single axis.