**그린에너지융합공학과**

**(Graduate Program in Green Energy Convergence Engineering)**

**Department Introduction**

Department of Green Energy Convergence Engineering (GECE) opened in the year 2013, in the context of the rapid development of the renewable energy industry both in domestic and worldwide circumstances. The main objective of Yeungnam GECE program is to foster expertise in broad areas of regenerative green energy technologies. The GECE program offers master and doctoral degree courses in two majors: (1) Green Energy; (2) Green Car, with five sub-tracks of (i) solar cells, (ii) hydrogen fuel cells, (iii) energy system designs, (iv) green car technologies, and (v) energy production and efficiency managements. As of 2013, 65 faculty members from 10 different departments (6 from engineering and 4 from science) are affiliated with the GECE program. This program is suitable for graduates from engineering, science or other relevant subjects with an interest in pursuing a successful career in research, technological development and management, and the commercialization of renewable green energy systems. The program investigates both green energy and systems technologies in order to produce scientific researchers and engineers who are competent in the R&D and engineering tasks applicable to the renewable energy and sustainable development sectors. The key learning outcomes are a global understanding of the major types of renewable energy utilizations, in-depth knowledge of the technology for solar energy, fuel cell technology, bioenergy, and smart vehicle systems, and skills in systems modeling, evaluation, and optimization. The program also provides you with opportunities to intimately interact with the industry through various collaborative R&D subjects, which will further broaden your relevant knowledge.

**List of Faculty Members**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Position | Name | Last School Graduated | Degree | Major |
| Assist. Prof. | Seo, Tae Won | Seoul Nat’l Univ | Ph.D. | Mechanical Engineering |
| Assist. Prof. | Lee, Dong Yeon | KAIST | Ph.D. | Mechanical Engineering |
| Assist. Prof. | Shim, Jae Sool | Washington State Univ | Ph.D. | Mechanical Engineering |
| Prof. | Lee, Choon Yeol | Univ of Texas, Austin | Ph.D. | Mechanical Engineering |
| Prof. | Lee, Byeong Jun | Seoul Nat’l Univ | Ph.D. | Mechanical Engineering |
| Prof. | Ko, Tae Jo | POSTECH | Ph.D. | Mechanical Engineering |
| Prof. | Han, Yong Oun | SUNY, Buffalo | Ph.D. | Mechanical Engineering |
| Assist. Prof. | Kim, Jin Ho | Univ of California, Berkeley | Ph.D. | Mechanical Engineering |
| Prof. | Bai, Cheol Ho | Univ of California,  Los Angeles | Ph.D. | Mechanical Engineering |
| Prof. | Kim, Kyoo Ho | Univ of Tokyo | Ph.D. | Materials Science & Engineering |
| Assoc. Prof. | Kim, Hyun Tae | KAIST | Ph.D. | Materials Science & Engineering |
| Assoc. Prof. | Kim, Hae Kyoung | Illinois Inst Tech | Ph.D. | Materials Science & Engineering |
| Prof. | Lee, Jae Hyung | Ohio State Univ | Ph.D. | Materials Science & Engineering |
| Prof. | Han, Young Hwan | Univ of Nevada, Reno | Ph.D. | Materials Science & Engineering |
| Assist. Prof. | Ko, Young Gun | POSTECH | Ph.D. | Materials Science & Engineering |
| Assoc. Prof. | Ahn, Jong Heon | Univ of Utah | Ph.D. | Materials Science & Engineering |
| Prof. | Cho, Kye Hyun | Pennsylvania State Univ | Ph.D. | Materials Science & Engineering |
| Prof. | Baek, Eung Ryul | POSTECH | Ph.D. | Materials Science & Engineering |
| Prof. | Han, Kwan Hee | KAIST | Ph.D. | Materials Science & Engineering |
| Assist. Prof. | Park, Si Hyun | Seoul Nat’l Univ | Ph.D. | Electronic Engineering |
| Assist. Prof. | Park, Il Kyu | GIST | Ph.D. | Electronic Engineering |
| Assist. Prof. | Jung, Sung Yoon | KAIST | Ph.D. | Electronic Engineering |
| Assist. Prof. | Kim, Sung Ho | KAIST | Ph.D. | Electronic Engineering |
| Prof. | Ahn, Byoung Chul | Oregon State Univ | Ph.D. | Computer Engineering |
| Prof. | Cho, Haeng Rae | KAIST | Ph.D. | Computer Engineering |
| Prof. | Lee, Ki Dong | Seoul Nat’l Univ | Ph.D. | Computer Engineering |
| Prof. | Kim, Chong gun | Univ of Electro-Communications | Ph.D. | Computer Engineering |
| Assist. Prof. | Jason J. Jung | Inha Univ | Ph.D. | Computer Engineering |
| Prof. | Park, Chang Hyeon | Seoul Nat’l Univ | Ph.D. | Computer Engineering |
| Prof. | Kim, Wook Hyun | Univ of Tsukuba | Ph.D. | Computer Engineering |
| Prof. | Kim, Young Tak | KAIST | Ph.D. | Information and Communication Engineering |
| Assist. Prof. | Choi, Gyu Sang | Pennsylvania State Univ | Ph.D. | Information and Communication Engineering |
| Prof. | Ryu, Si Ok | Univ of Toledo | Ph.D. | Chemical Engineering |
| Prof. | Park, Chin Ho | Univ of Florida | Ph.D. | Chemical Engineering |
| Assoc. Prof. | Kim, Woo Kyoung | Univ of Florida | Ph.D. | Chemical Engineering |
| Prof. | Jung, Jae Hak | POSTECH | Ph.D. | Chemical Engineering |
| Assoc. Prof. | Jeon, Chan Wook | POSTECH | Ph.D. | Chemical Engineering |
| Assoc. Prof. | Kim, Jae Hong | Kyoto Inst Tech | Ph.D. | Chemical Engineering |
| Assoc. Prof. | Lee, Seung Woo | POSTECH | Ph.D. | Chemical Engineering |
| Assist. Prof. | Ahn, Kwang Soon | GIST | Ph.D. | Chemical Engineering |
| Prof. | Kwak, Chong Hoon | KAIST | Ph.D. | Physics |
| Assist. Prof. | Gwag Jin Seog | Pusan Nat’l Univ | Ph.D. | Physics |
| Prof. | Kwon, Jin Hyuk | KAIST | Ph.D. | Physics |
| Assoc. Prof. | Kim, Ki Hyeon | Myongji Univ | Ph.D. | Physics |
| Prof. | Kim, Dong Ho | Univ of Minnesota | Ph.D. | Physics |
| Assist. Prof. | Kim Jong Su | Yeungnam Univ | Ph.D. | Physics |
| Prof. | Kim, Eng Chan | Yonsei Univ | Ph.D. | Physics |
| Prof. | Bae, In Ho | Dongguk Univ | Ph.D. | Physics |
| Prof. | Yi, Jong Hoon | KAIST | Ph.D. | Physics |
| Assoc. Prof. | Joh Young Gull | Univ of California, Riverside | Ph.D. | Physics |
| Prof. | Choi, Myoung Seon | KAIST | Ph.D. | Physics |
| Assoc. Prof. | Kang Mi Sook | Kyoto Univ | Ph.D. | Chemistry |
| Prof. | Kim, Seog K. | New York Univ | Ph.D. | Chemistry |
| Assoc. Prof. | Kim, Young Il | Ohio State Univ | Ph.D. | Chemistry |
| Prof. | Ra, Choon Sup | Ohio State Univ | Ph.D. | Chemistry |
| Prof. | Nahm, Kee Pyung | Michigan State Univ | Ph.D. | Chemistry |
| Prof. | Park, Jung Hag | Univ of Minnesota | Ph.D. | Chemistry |
| Assist. Prof. | Sohn, Young Ku | Univ of British Columbia | Ph.D. | Chemistry |
| Assist. Prof. | Cho, Dae Won | Pusan Nat’l Univ | Ph.D. | Chemistry |
| Prof. | Cho, Tae Sub | Yeungnam Univ | Ph.D. | Chemistry |
| Assoc. Prof. | Kang, Sang Gu | Iowa State Univ | Ph.D. | Biotechnology |
| Prof. | Choi, In Ho | Univ of Florida | Ph.D. | Biotechnology |
| Assoc. Prof. | Cho, Kyung Hyun | Kyungpook Nat’l Univ | Ph.D. | Biotechnology |
| Prof. | Khang, Yong Ho | Texas Inst Tech | Ph.D. | Biotechnology |
| Prof. | Lee, Jea Young | New Mexico Univ | Ph.D. | Statistics |

**Academic programs**

Majors: Green Energy, Green Car

Degrees: Philosophy of Doctor (Ph.D.), Master of Science (M.S.)

**Course Description**

■ 기초공통(Basic Major Courses)

Green by IT 3 credits

This course presents IT-based energy management system that can reduce energy consumption in traditional industry using IT service and communication technology. Specifically, it introduces IT-based energy saving technologies in BEMS (Building Energy Management System), optimization of supply chain, smart grid, carbon estimation and management system, and intelligent transportation system.

고체전자재료 3 credits

(Solid State Electronic Materials)

This course is aimed to deliver universal views of the composition-structure-property relationships in the solid state materials that are potentially applicable in modern electronic devices. Particularly the materials of unique transport, magnetic, and optical behaviors will be covered.

바이오에너지특론 3 credits

(Special Topics on Bioenergy)

This course introduces important topics for renewable energy made available from materials derived from biological sources. Major topics in this course are biomass engineering, genetic engineering, crop engineering, agriculture, and bio-refinery technologies for producing bioethanol, biodiesel and biogas. The social, economic, scientific and technical fields associated with using biological sources for energy will be discussed.

수치해석특론 3 credits

(Advanced Numerical Analysis)

This course covers broad problems of number analysis in engineering and deals with number representation, precision, linear and nonlinear simultaneous equations, interpolation, function root, differential and integration equation, approximation theory, eigen value and eigen vector problems.

신재생에너지특론 3 credits

(Advanced Topics in New Renewable Energy)

This course covers the fundamental information concerning new and renewable energy technology, including the introduction of new and renewable energy, resources of energy and its supply & demand, fossil fuel and its environmental effect, solar thermal system, hotovoltaics, fuel cell, battery, IGCC and C1 chemistry. The objectives are as follows: (1) Explore the current energy resources and environmental effects. (2) Introduce the new and renewable energy including solar cells and their operation principle.

양자역학 3 credits

(Quamtum Mechanics)

In this course, we will learn the basic postulates and techniques of non-relativistic quantum mechanics. The term non-relativistic quantum mechanics refers primarily to interactions of particles with potentials only. The course will cover review of wave functions and the Schrodinger Equation, Hilbert space, the WKB approximation; central forces and angular momentum, scattering, and electron spin.

응용수학특론 3 credits

(Advanced Applied Engineering Mathematics)

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.

임베디드시스템특론 3 credits

(Advanced Topics in Embedded System)

This course spans all areas in embedded systems, including hardware to software. In this course, we will deal with the recent research issues in embedded systems. In addition, we will focus on one area in recent trends and design an embedded system

재료과학특론 3 credits

(Advanced Materials Science for Engineers)

Advanced treatment of structure-property relations, covering mechanical-, electrical-, magnetic-, thermal-, and optical-properties; designing or engineering of materials to meet the predetermined set of properties.

확률모형과 응용 3 credits

(Probability Models and its Applications)

This is a basic course which deals definitions and concepts of Probablity will be introduced. Random variables, transformations, Normal distribution, Poisson distribution are also dealt with in some details. Expecations such as mean and variance of a random variable will be calculated. For large sample behavior limit distribution is studied and discussed.

■ 그린에너지 전공 (Green Energy Major)

광에너지화학 3 credits

(Photoenergy Chemistry)

Compounds containing a variety of chromophore absorb photoenergy to promote compounds to excited state. Contrary to conventional ground state of compounds, these high energy excited state of compounds undergo various kinds of photochemical and photophysical pathways via interaction with light (i.e., electron transfer, energy transfer, fluorescence, phosphorescence, chemical reaction, etc). This class will provide basic knowledge about photochemical/photophysical properties and will explore mechanistric aspect in chemical point of view. And Photo-related electronic materials and biomaterials will be discussed.

광전기화학에너지소재특론 3 credits

(Advanced Photoelectrochemical Energy Materials)

Fundermentals on the electrochemistry and photoelectrochemistry will be understood and be discussed with respect to the electrode materials. In addition, the introduction and materials' requirements in the divese electrochemical and photoelectrochemical cells such as the supercapacitors, the batteries, the fuel cells, the dye-sensitized solar cells, the quantum dot-sensitized solar cells, the water-splitting cells, etc. will be understood and discussed.

광전자공학 3 credits

(Optical Electronics)

This course covers theory and application of core optical devices for photoelectric system such as light pipe, optical fiber, optical modulator, light receiver element, LED, and laser diode and so on.

그린에너지특론1 3 credits

(Special Topics in Green Energy 1)

Aiming at comprehensive knowledge of sustainable and renewable energies (solar light, solar heat, wind, geothermal heat, etc.), contemporary topics will be selected as the course content. Background theories will be covered in-depth, together with the case studies of practical applications.

그린에너지특론2 3 credits

(Special Topics in Green Energy 2)

Aiming at comprehensive knowledge of sustainable and renewable energies (solar light, solar heat, wind, geothermal heat, etc.), contemporary topics will be selected as the course content. Background theories will be covered in-depth, together with the case studies of practical applications.

그린에너지특론3 3 credits

(Special Topics in Green Energy 3)

Aiming at comprehensive knowledge of sustainable and renewable energies (solar light, solar heat, wind, geothermal heat, etc.), contemporary topics will be selected as the course content. Background theories will be covered in-depth, together with the case studies of practical applications.

단백질공학특론 3 credits

(Advanced Protein Engineering)

Protein architecture, structural biology of proteins, and introduction to bioinformatics to sequences, and is intended to focus on protein function including integration and regulation based on biochemical background. Students will learn about the logic of life as about its chemistry, which are sequence, structure, and function, those are involved in incidence of human disease, cancer, heart, brain disease.

무기재료화학 3 credits

(Inorganic Material Chemistry)

Electronic structure and bonding with emphasis on transition metal and organometallic compounds. Chemical applications of group theory, ligand field, and molecular orbital theory. Coordination chemistry and organometallic chemistry: structure, reactions, kinetics, and mechanism. Topics in advanced inorganic chemistry including spectroscopic methods, group theory, and bio-inorganic chemistry.

무기태양전지소재특론 3 credits

(Inorganic Photovoltaic Materials)

Solar cells, which are one of promising future generation renewable energy sources, employs various materials. In particular, this course will cover the operational principles of crystalline Si and compound semiconductor thin film solar cells, and thus will help engineers understand what is required to achieve the low-cost, high-efficient inorganic solar cells.

물리화학특성측정론 3 credits

(Methodology of Physicochemical Properties)

In this course, the theoretical background of various physicochemical properties of materials will be explored. Furthermore, various spectroscopic techniques, used for elucidating the properties will be discussed. To successfully finish this course, it is necessary for students to complete physical chemistry course as a prerequisite.

반도체물리 3 credits

(Semiconductor Physics)

The purpose of semiconductor physics is to provide a basis for understanding the characteristics, operation, and limitations of semiconductor. This course begins with the introductory physics, moves on to the semiconductor material physics, and then covers the physics of semiconductor. The contents are the crystal structure of semiconductor material, the quantum theory of solids, the semiconductor in equilibrium, carrier transport phenomena, nonequilibrium excess carriers and the p-n junction.

생물반응공학특론 3 credits

(Advanced Bioreaction Engineering)

Kinetic studies of microbial bioprocess are required for the production of bioactive materials such as antibiotics or recombinant proteins. Simple method of biosimulation with mathematical models of enzyme kinetics and microbial fermentations will be introduced. This course will make students understand biological reactions of enzymes and microbes quantitatively by use of Excel-VBA programming.

수소연료전지시스템설계 3 credits

(System Design of Hydrogen Fuel Cell)

This course covers the fuel cell system, which includes unit cell, MBOP, and EBOP. The targeted fuel cell system wull be designed.

수소연료전지심화특론 3 credits

(Advanced Hydrogen-Fuel Cell)

This course includes of definition, principle, technical issues and applications of fuel cell and fuel cell systems.

수소연료전지재료 3 credits

(Materials for Hydrogen Fuel Cell)

In this course, the materials for fuel cell such as electrolyte, electrode, interconnector, will be discussed and the new design will be proposed.

수소연료전지평가 3 credits

(Evaluation of Hydrogen Fuel Cell)

This course covers the methods and equipment for evaluation of materials and unit cells.

에너지재료특론 3 credits

(Advanced Energy Materials)

Topics in fuel cell; the ideal structures and functions of electrolytes and electrodes in fuel cells; fabrication and evaluation methods in unit cell, stack, and system.

연소공학 3 credits

(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.

열및통계역학 3 credits

(Thermodynamics and Statistical Mechanics)

This course consists of thermodynamics and statistical mechanics parts. The Thermodynamics part is devoted to a comprehension of analysis and description of thermal phenomena using basic concepts of thermodynamics. The main subjects are as follows: thermodynamic systems and temperature, equation of state, laws of thermodynamics, heat and mechanical work, entropy, thermodynamic potential, phase transition, low temperature physics. The Statistical Mechanics part is designed to introduce some concepts of statistical mechanics and their applications to system containing many particles. The main subjects are as follows : molecular kinetics, transport phenomena, partition and distribution functions of Maxwell-Boltzmann, Fermi-Dirac, Bose-Einstein statistics, quantum statistics and its applications to various physical phenomena.

열역학특론 3 credits

(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.

유기태양전지소재특론 3 credits

(Organic Solar Cell)

A photovoltaic (PV) cell is a type of semiconductor diode that converts visible light into [direct current](http://en.wikipedia.org/wiki/Direct_current) (DC) electricity. Organic PV cell is a type of [polymer solar cell](http://en.wikipedia.org/wiki/Polymer_solar_cell) that uses [organic electronics](http://en.wikipedia.org/wiki/Organic_electronics), a branch of electronics that deals with conductive organic polymers or small organic molecules, for light absorption and charge transport to produce [electricity](http://en.wikipedia.org/wiki/Electricity) from [sunlight](http://en.wikipedia.org/wiki/Sunlight) by the [photovoltaic effect](http://en.wikipedia.org/wiki/Photovoltaic_effect). This course covers small organic materials and organic polymers and conducting polymers in PV cell. Particularly the electron transport and materilas behaviors will be covered

유무기하이브리드재료 3 credits

(Advanced Organic-Inorganic Hybrid Materials)

Applications of organic-inorganic hybrid materials in the field of energy, bio, micro-electronics; the synergy of organic-inorganic hybrid effects; the functions of organic-inorganic hybrid materials; design and fabrication via various processing methods, such as sol-gel, assembling, self assembling, etc.

유전자공학특론 3 credits

(Advanced Genetic Engineering)

This course will teach the various basic laboratory techniques relating modern biotechnology including the isolation and purification of nucleic acids, restriction analysis, gene cloning, PCR amplification, cDNA synthesis, DNA sequencing and gene expresssion, and further protein analysis, which are widely used in biotechnology research field.

유체역학특론 3 credits

(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.

이상유동 및 열전달 3 credits

(Two-Phase Flow and Heat Transfer)

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

전산유체역학 3 credits

(Computational Fluid Dynamics)

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

태양전지공학 3 credits

(Photovoltaic Engineering)

Photovoltaic(PV) industry is growing very rapidly and becoming more important due to its role in addressing the global energy and environment issues such as global warming and depletion of petroleum resources. Photovoltaic devices are made from various materials using different processes and equipments, and their efficiency and economy are improving every moment. Development of photovoltaics is thus very fast. The grid parity is expected to be reached soon by photovoltaics, and the current issue is about what kind of PV is going to be commercialized in economy of scale to reach the grid parity. In this sense, this lecture will cover the technological backgrounds of various kinds of solar cells and also cover the industry structure. The topics will be treated from the engineering perspective.

태양전지성능평가특론 3 credits

(Advanced Solar Cell Analysis)

The fundamentals of p-n diode and its operation will be studied. The method to extract short-circuit current density, open-circuit voltage, fill factor, series resistance, shunt resistance, and ideality factor from current-voltage measurement of solar cells being mass-produced, will be studied. The students will have ability to correlate the solar cell performance parameters with its fabrication process and device structure.

통계자료분석 3 credits

(Statistical Data Analysis)

This is a real applied course of statistical graduate level which includes data analysis, discussion of data, hypothesis test, analysis of variance, and others. We will perform a project related with multiple regression, glm procedures, ancova, and manova etc.

통계적방법론 3 credits

(Theory of Statistics Methods)

This is a basic graduate course which deals concepts of statistical models, descriptive statistics, random variable, concepts in statistical inference, estimation and hypotheses testing, and practice. Summarizing data, the distribution of the sample mean and the estimation of the population mean in large samples, Type-I and Type-II errors, hypothesis testing for the population mean and proportion in large samples, small-sample inference for the mean and variance in normal populations, two-sample comparisons, and categorical data are discussed.

통계품질관리와 6시그마 3 credits

(Statistical Quality Control and 6 Sigma)

This is a principal applied statistical course for high quality management.

We talk about methods of quality modeling, process quality, Inferences about process quality, statistical process control, control charts, and EWMA chart etc. Furthermore, we discuss about 6 sigma with DIMIC(define, measure, analysis, improve and control) process.

■ 그린카 전공 (Green Car Major)

계측공학 3 credits

(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.

그린카특론1 3 credits

(Special Topics in Green Car 1)

Aiming at the comprehensive knowledge of the intelligent automotive-based energy technologies, contemporary topics will be selected as the course content. Background theories will be covered in-depth, together with the case studies of practical applications.

그린카특론2 3 credits

(Special Topics in Green Car 2)

Aiming at the comprehensive knowledge of the intelligent automotive-based energy technologies, contemporary topics will be selected as the course content. Background theories will be covered in-depth, together with the case studies of practical applications.

그린카특론3 3 credits

(Special Topics in Green Car 3)

Aiming at the comprehensive knowledge of the intelligent automotive-based energy technologies, contemporary topics will be selected as the course content. Background theories will be covered in-depth, together with the case studies of practical applications.

기계재료특론 3 credits

(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.

기구설계학 3 credits

(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.

마이크로컴퓨터 응용 3 credits

(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.

복합재료 3 credits

(Mechanics of Composite Material)

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

선형진동학 3 credits

(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.

센서시스템특론 3 credits

(Special Topics for Sensor System)

Current electric devices are composed digital circuits and the sensor is input device to receive physical value into digital value. Actual physical system is analog, but digital information is required for electric devices. This course covers sensor devices to measure physical values and intelligent sensor system to measure, and process data from real environment.

신소재 3 credits

(Advanced Materials and Processing)

Topics in advanced materials, especially in emerging materials and their properties, synthesis and processing technologies.

유한요소법 3 credits

(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.

응용전기화학특론 3 credits

(Applied Electrochemistry)

Principles of electrochemical devices for new energy, such as high density storage batteries, fuel, cell, etc; materials for electrochemical devices; electrode reaction and its kinetics; mechanism of electrochemical reactions.

임베디드시스템응용 3 credits

(Applied Embedded System)

This course studies the systematic design methodologies for an embedded system consisting of both hardware components and software components. We also verify and practice the design methodologies with a simple real embedded system. It also covers the optimized system implementation with efficient partitioning of a system into software components and hardware components.

자동제어특론 3 credits

(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.

지능형자동차공학특강 3 credits

(Advanced Intelligent Automotive Engineering)

This course presents research issues for intelligent automotives, such as their architectures, unmanned vehicle, vision algorithms for recognition of driving environment, microprocessor design for automotive control, infotainment services, and communication technology for intelligent automotives.

지능형차량용비전특론 3 credits

(Advanced Machine Vision for Intelligent Vehicle)

Machine vision is the core-technology of sensor signal processing for smart, intelligent, and safe car. Object and human recognition with machine vision is useful technology to protect drivers and pedestrians. This course introduces geometric analysis, feature-based detection and recognition method for the intelligent cars. In addition, this course deals with the state-of-the art machine vision technologies using infrared cameras for day and night operation.

차량용 Green ICT 특론 3 credits

(Special Topics in Green ICT for Automotive Applications)

The convergence of ICT and transportation infrastructure is widely emerged thanks to the technical enhancement of wired/wireless communications. In addition, the convergence trend tries to follow the purpose of green-it innovation. As a consequence, there are lots of emerging R&D activities in the field of communication skills for the development of green ITS and vehicular smart grid systems. In this lecture, we review the technical concept and basic technical issues of communication skills in designing green ITS and vehicular smart grid systems.

차량용SW플랫폼 3 credits

(SW Platform for Vehicles)

This course first introduces requirements of real-time operating systems (RTOS) for automotive control and then describes the current state-of-the-art RTOSs for automotive control. It also presents standardized SW platform such as AUTOSAR and tools for development of control SWs and reliability testing.

차량통신특론 3 credits

(Advanced Topics in Vehicle Communication)

Vehicle communication technology which is the combination of vehicle and wireless communication as the vehicle-IT convergence technology gives big impact on industry, by creating service markets including telematics, vehicle safety check and ITS. The vehicle communication technology consists of network within vehicle, vehicle-to-vehicle communication, and vehicle and infrastructure communication. In this course, we will deal with basic concepts of vehicle communication and service, and recent research and standard trends.

최적화기법 3 credits

(Optimization Technique)

Lectures about design optimization using mathematical modeling and commercial software.

회전기계설계 3 credits

(Rotational Machine Design)

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

■ 연구학점 (Research Credits)

석사연구1 3 credits

(Master Independent Study 1)

석사연구2 3 credits

(Master Independent Study 2)

석사연구3 3 credits

(Master Independent Study 3)

박사연구1 3 credits

(Doctoral Independent Study 1)

박사연구2 3 credits

(Doctoral Independent Study 2)

박사연구3 3 credits

(Doctoral Independent Study 3)

박사연구4 3 credits

(Doctoral Independent Study 4)