Description of Courses

▣ Master's and Doctoral Programs

CBE571 Energy Engineering 3:0:3(4)

This course is designed to foster overall understanding of alternative energy development and application technologies of coal energy as research topics of the energy field.

CBE771 Advanced Electrochemical Engineering 3:0:3(4)

Students will understand basic principles of electrochemistry including thermodynamic, electrochemical reaction, charge transport, and mass transport, and based on this understanding, students will further investigate the design and analysis technologies for various electrochemical systems including sensors, fuel cells, secondary batteries, and capacitors. (Prerequisite: CBE371)

CH464 Electroanalytical Chemistry 3:0:3(3)

This course introduces basic concepts of electroanalytical chemistry, such as electrochemical thermodynamics and kinetics, and is designed to foster understanding of various electrochemical analytical experimental designs and latest research in the field.

CH471 Introduction to Polymer Chemistry 3:0:3(3)

This course aims to foster basic knowledge of polymer chemistry by introducing the structure and properties of polymer as macromolecule with high molecular weight, while also touching on ways to synthesize them and their thermodynamic behaviors.

CS550 Software Engineering 3:0:3(4)

This course covers fundamental concepts required to develop highly reliable software in a cost-effective manner. Topics for discussion include the life cycle model, techniques for each developmental stage, automation tools, project management techniques, software development environment, degree of reliability and resource utilization model, and software metrics.

CS564 Data Science Methodology 3:0:3(6)

In this course, students will learn about various methodologies to analyze, interpret and visualize large amounts of data by carrying out an actual project to acquire hands-on experience.

CS570 Artificial Intelligence and Machine Learning 3:0:3(6)

This course offers an overview of machine learning based on understanding of classical artificial intelligence algorithms, and probability and statistics.

EE772 Electronic Circuits for Green Energy 3:0:3

This course will introduce high-efficiency circuit technologies for energy production systems, as well as fundamental concepts and design techniques of IC circuit for power management designed to minimize power usage.

EE791 Power Conversion Circuits and Systems 3:0:3

This course covers the practical design and analysis of various DC/DC converters in the power conversion system while also examining high-frequency transformer, inductor, magnetic amplifier, snubber, and feedback stabilization to give students deep insight into power conversion system. (Prerequisites: EE391, EE594)

GT501 Electric Propulsion System Engineering 3:3:4

This course introduces electric power systems as well as their associated modeling, control and design methods based on dynamics and control theories. In particular, multidisciplinary understanding of basic concepts and the operation principle surrounding electric power systems, including machine driving system, motors and batteries, will be fostered to further investigate engineering issues of latest electric power systems and related research in this field.

GT506 Fundamentals of Vehicular Electric Systems 3:0:3

This course introduces the basic concepts and the operation principle of basic electronic circuits, electromagnetics and semiconductors. Building on this knowledge, applications to motor, sensor, communication system, and wireless charging systems are explained based on the fundamentals to enhance the convergence design ability for vehicles and transportation technology.

GT531 Battery System Modeling and Control 3:0:3

In this course, students will learn about how to monitor, predict and control battery states based on modeling and control theories to investigate batteries as a core component of any electric power system. The course will also define design issues that may arise from battery application to electric and hybrid vehicles, and explore methodologies and theories to resolve such issues. To that end, a multidisciplinary approach covering electricity, chemistry, and mechanics is employed to predict the operation principle of batteries.

ME634 Functional Materials and Structures 3:0:3

In this course, students will understand fundamental properties and working mechanism of various functional materials used in the mechanical engineering fields and study how to apply them to engineering-based applied devices and structures. Students will further investigate soft actuators/sensors, smart materials, bio-inspired materials and functional nano-carbons as functional materials, and will examine methodologies for theoretical modeling and experimental performance evaluation.

ME800 Special Topics in Mechanical Engineering 3:0:3(6)

This lecture covers theories and applications selected from the field of mechanical engineering on an as-needed basis. Specific topics to be discussed are selected and announced before opening the course.

MS617 Solid State Electrochemistry 3:0:3(3)

This course focuses on fundamental concepts and technologies of solid-state chemistry, defect chemistry and electrochemistry, and based on this knowledge, will discuss working mechanisms of solid-state electrochemical devices including fuel cells and batteries as well as major research issues. From this, students will acquire basic knowledge in crystallography, thermodynamics, kinetics, solid-state ionics, and electrochemical reactions/methods, as well as applied fields such as solid oxide fuel cells and metal-air batteries.

MS626 Physical Properties of Energy Materials 3:0:3

This course nurtures knowledge in key physical phenomena involving structures, electric/optical properties, and quantum-mechanical phenomena in elementary materials applied in energy storage and conversion devices. Building on this systematic understanding of physical properties, the course also proposes various approaches to enhancing energy storage capacities and conversion efficiency.