Description of Courses

▣ Graduate Program

GT500 Introduction to Green Transportation Systems 3:0:3

This course is mainly to enhance understanding on the transportation and vehicle technology, and the future green transport vehicle technology. We study the overview of sustainable transportation technology including road and railways, aviation, ship, walking and cycling, freight, and ports and airports etc. In addition, the current status and future about the green transport technology, sustainable potential and risk analysis, and policy and its measures will be discussed.

GT501 Modeling and Control of Electric Propulsion Systems 3:3:4

This course is designed to introduce students to the state-of-the-art Electrified Powertrain technologies based on modeling, dynamics, and controls approach. The course focuses on the system-level design and control problems of hybrid electric vehicles. We will introduce the basic concepts, terminology, and solve engineering problems of hybrid vehicles using system dynamics & controls approaches.

GT502 Intelligent Transportation System) 3:3:4

This course introduces methodologies and concepts for the analysis and design of intelligent transportation system; and discusses state-of-art information and communication technologies (ICT) that are readily applicable to real-world transportation problems.

GT505 Computational Analysis and Design for Electric Vehicles 3:3:4

This course covers fundamental principles of computational analysis and design for the systematic and efficient development of emerging electric transportation systems. This course also provides case studies which involve multidisciplinary analysis such as structural analysis, thermal analysis, and electromagnetic analysis in order to help students to understand the course.

GT506 Fundamentals of Vehicular Electric Systems 3:0:3

This course introduces the basic concept and operational principle of electronic circuits, electromagnetics and semiconductors and applications to motor, sensor, communication system, and wireless charging systems are explained based on the fundamentals to enhance the design ability for converging vehicle and transportation technology.

GT507 Transportation Infrastructure systems 3:0:3

This course provides understanding on transportation-related infrastructures, and deals with planning of infrastructure systems, geometric and structural design, and evaluation of the systems. It covers facilities issues including railway systems, roadway design,

pavement management systems, harbor and airport design, and expands to sustainability issues.

GT508 Navigation and Sensing Systems 3:0:3

This course introduces GNSS (Global Navigation Satellite Systems), radar, and image processing technologies for vehicular navigation systems. Study subjects include the principles and signal analysis of the next generation GNSS, principles and signal processing techniques for radar, and the principles and image processing techniques for vision navigation.

GT520 Electric Powertrain Engineering 3:0:3

This course covers the vehicular technology of electric powertrain for the public transportation such as the bus and railways etc., which includes the environmental impact, electric and hybrid-electric, wireless in-motion charging vehicular technology and their systems, and fuel cell technology, in addition to the current IC-engine technology. It will also cover the core technology of the electric vehicle system, such as the energy storage system, the electric propulsion system and the incorporation of the smart grid technology with the electric vehicle as a major future transportation system.

GT531 Battery System Modeling and Control 3:0:3

This course introduces the principles and applications of battery modeling, control and diagnostic methodologies, with emphasis on battery electric and hybrid electric vehicle applications. In particular, various types of battery models such as equivalent circuit models and electrochemistry-based models are discussed, and these models are utilized to predict battery states and conditions such as state-of-charge (SOC) and state-of-health (SOH).

GT560 The Principles and Applications of the Calman Filter 3:0:3

The aim of this course is to provide a thorough introduction to the Kalman filter technique that is an essential tool for state estimation and optimal control. In addition, this course covers the applications of the Kalman filter for linear and nonlinear systems such as extended Kalman filter, unscented Kalman filter, robust Kalman filter, multi-model Kalman filter, and particle filter.

GT611 Introduction to Transportation Economics 3:0:3

The course aims to develop a critical economic perspective to transportation issues and problems, and to explore a set of quantitative methods that are valuable to transportation system analysis and evaluation. To this end, various economic concepts (econometrics and micro/macro-economics) will be explored to evaluate transportation systems and policy. Real-world cases will be reviewed and discussed to understand how these economic approaches are applicable to transportation systems.

GT640 Green Railway System Engineering 3:0:3

This course provides the fundamental principles of railroad engineering and introduces emerging green railroad technologies such as high-speed rail, MAGLEV, and wireless TRAM. This course also provides each student a chance of conducting in-depth research on the specific topics related with railroad engineering.

GT642 Wireless Power Transfer System 3:0:3

This course introduces the basic concept and principle of wireless power transfer system which are being developed in electric vehicle and electric railway system. Also, the analysis of equivalent circuit, system design methodology, maximization of efficiency and transfer power, and magnetic field shielding technology for human body protection from the magnetic field is explained.

GT643 Wireless Link Analysis 3:0:3

This course is for provision of comprehensive knowledge on wireless link between railway train and infrastructure, both of which are indispensible for implementation of intelligent railway transportation systems. Lectures are focused on basic theoric field, magnetic field, electromagnetic field, and applications of the theories.

GT814 Special Topics on Intelligent Transportation Systems 3:0:3

This course introduces various researches and technologies related to the intelligent transportation system as one of the core elements of the future transportation systems. Main topics include traffic analysis and modeling techniques for overall transportation operation and planning field, and traffic prediction techniques. The specific contents of the course will be notified before the offering.

GT829 Special Topics in Green Logistics 3:0:3

This course is designed to review, evaluate and apply methods currently used in the field of logistics in order to design and analyze futuristic, green logistics system. The course aims to teach approaches to defining environmental issues in existing logistics systems and selecting the sustainable solution(s) to address the issues posed.

GT833 Special Topics on Electric Power Systems 3:0:3

This course is an advanced course to introduce theories and applications of the electric propulsion systems as one of the core elements of the future transportation systems. Main topics of the course include wireless electric power transfer system, battery system, and hybrid electric vehicles. The specific contents of the course will be notified before the offering.

GT843 Special Topics on Green Railway Vehicle Technology 3:0:3

This course is reserved for the selected special topics in the field of green railway vehicle technology upon need-basis.

GT859 Special Topics in Green Ocean Transportation 3:0:3

This course covers the basic methodologies for design and assessment for offshore crane systems as green maritime transportation system. In addition, it includes detailed case-studies such as Mobile Harbor and offshore wind farm installation system to review the methodologies covered in the lectures.

GT869 Special Topics on Unmanned Autonomous Systems 3:0:3

This course introduces state-of-the-art technologies and research trends in unmanned autonomous systems as one of the core elements of the future transportation systems. Main topics of the course include the principles of the self-driving systems, various sensor systems and sensor fusion techniques for smart vehicles, and the advanced driver assistance system. The specific contents of the course will be notified before the offering.

GT960 MS Thesis

This is an independent research work supervised by the advisor(s), toward the Master's thesis.

GT966 MS Green Transportation Seminar 1:0:1

This course provides general understanding on green transportation for master student The seminar topics include current technologies, policies and issues on green transportation.

GT980 Ph.D. Thesis

This is an independent research work supervised by the advisor(s), toward the Ph.D's thesis.

GT986 Ph.D. Green Transportation Seminar 1:0:1

This course provides general understanding on green transportation systems for doctoral student The seminar topics include current technologies, policies and issues on green transportation.