

# <Ph.D. in System Engineering>

## (1) Research and Educational Goals

In a society where all manner of challenges are becoming larger scale, more complex, and harder to solve, building new technological and social systems necessitates the ability to see both “the forest and the trees,” namely, the ability to take a big-picture approach to problem solving and to intricately design the target system down to the finest detail. The Keio University Graduate School of System Design and Management strives to give students with existing specialist knowledge the skills to design and manage large-scale and complex systems through education in the cross-disciplinary field of system and design management (SDM), which integrates the principles of system engineering and project management with system and design thinking. Students will learn the basics of SDM through core subjects, then deepen their specialist knowledge through major subjects targeted at each student’s interests. Additionally, they will heighten their practical skills by engaging in project and special research subjects.

## (2) Diploma Policy

### ● Educational Goals

Based on the diploma policy outlined by Keio University, this program aims to cultivate students with the ability to see both “the forest and the trees,” namely, the ability to take a big-picture approach to problem solving and to intricately design the target system down to the finest detail. To achieve this, students gain the specialist approaches, knowledge, and skills provided by system engineering by either writing academic papers in fields primarily related to the design of technological systems for evaluation by specialists, or designing their own system for evaluation by specialists, and compiling their research into a doctoral dissertation. The graduate school will confer a doctoral degree on those students who apply for degree conferral and meet the necessary requirements, with the aim to facilitate the cultivation of professionals with the qualities described in this program’s “Research and Educational Goals.”

### ● Competency Objectives

This program seeks to instill the following competencies into its students through practical learning that supports their ability to troubleshoot a wide range of problems, from advanced and complex technical issues, to hard-to-solve, complexly intertwined societal challenges.

Competency Objective (1): To obtain the specialist knowledge necessary to perceive any

subject as a system and to address a diverse array of challenges using the system engineering process, and the ability to apply that knowledge

Competency Objective (2): To obtain the ability to perceive contemporary society at the macro level by gaining a practical understanding of knowledge from a wide range of fields including the humanities, social sciences, and natural sciences, and to learn the fundamental approaches, analytical, and practical skills required to conduct research

Competency Objective (3): To obtain the ability to perform innovative, world-leading research related to system engineering and produce research papers

### **(3) Curriculum Policy**

- Curriculum Design

To develop the competencies described in the diploma policy, this program's curriculum is organized systematically from the following components: core subject, project subject, special research subjects, recommended basic subjects, and recommended advanced subjects (systems and socio-tech engineering / safe, reliable, human, symbiotic & innovation systems / political, economic and business systems). Additionally, this program aspires to offer its students the opportunity to look back on the basics of system engineering by permitting them to register for master's program courses.

- Program Delivery

To allow students to engage with both theoretical and practical perspectives under this curriculum, this program incorporates a variety of teaching methods, including classroom learning (in-person, live online, recorded online, and hybrid formats), active learning, field work, and internships.

- Evaluation and Grading Criteria

Academic achievement as it relates to the competency objectives established by the Graduate School of System Design and Management's curriculum is assessed in accordance with the university-wide assessment policy. Assessment may be conducted using direct indicators, such as the graduate school's grading system, and indirect quantitative and qualitative indicators, such as questionnaires and surveys.

- How Courses Reflect the Competency Objectives

Students will engage in research over a three-year period (standard) in fields primarily related to the design of technological systems, then present their findings in Japan and abroad to receive evaluation from external specialists while compiling their research into a doctoral dissertation. During this process, the program will provide each student with the following learning opportunities in accordance with their competency.

Competency Objective (1): To obtain a specialist knowledge of system engineering, and the ability to apply that knowledge

- The program will provide the practical knowledge and skills of system engineering through core and project subjects

Competency Objective (2): To obtain the ability to perceive contemporary society at the macro level by gaining a practical understanding of knowledge from a wide range of fields including the humanities, social sciences, and natural sciences, and to learn the fundamental approaches, analytical, and practical skills required to conduct research

- The program will provide the fundamental approaches, analytical, and practical skills required to conduct research, and knowledge from a wide range of fields including the humanities, social sciences, and natural sciences through recommended basic subjects and recommended advanced subjects (systems and socio-tech engineering / safe, reliable, human, symbiotic & innovation systems / political, economic and business systems).

Competency Objective (3): To obtain the ability to perform innovative research related to system engineering and produce research papers

- The program will develop students' ability to conduct innovative research related to system engineering and produce research papers through special research subjects.

#### **(4) Admissions Policy**

- Desired Qualities in Potential Students

1. Students with the skills needed to conduct master's-level research
2. Students who aspire to be able to design and engineer groundbreaking new technological systems that will contribute to solving the large-scale and complex problems facing contemporary society through research based on the process of system engineering
3. Students who aspire to be able to solve the varied problems facing contemporary social

systems and deliver results through research of the leadership and management strategies necessary to guide projects to success.

4. Students who possess the character, ability, and drive necessary to proactively learn through collaboration with diverse peers, and apply that learning in the real world

To cultivate individuals with qualities commensurate to the requirements of the doctoral degree, the Graduate School of System Design and Management admits people from all walks of life, including those advancing to graduate school immediately after completing their undergraduate studies, and early career and veteran professionals with work experience at organizations in both the public and private sectors.

- Student Screening Process

To ensure that a diverse body of students such as those described above are admitted to this program, the selection process will include a document screening, and an interview focused on the applicant's doctoral research plan.