

## Master's Program in Service Engineering

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### ■ Master of Engineering in Service Science

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#### Program Educational Objectives

The “Program in Service Engineering” cultivates “pioneers for the future in the areas of service (mode 2 type human resources)” as highly specialized professionals who possess both advanced specialized knowledge and well-rounded human nature.

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<b>Graduate Profile</b>	The Program cultivates “pioneers for the future in the areas of service (mode 2 type human resources)” , that is, human resources who can challenge present and future social problems, then create and practice new methods and verify results scientifically in the areas of service. He or she should be capable of being active as a service development engineer or person in charge of business planning in a company, governmental person in charge of community service development, entrepreneur, etc.
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## Diploma Policy

The degree of Master of Engineering in Service Science is commenced to those who have fulfilled the requirements for the completion of the Master's programs, as set out in the Graduate School Regulations of the University of Tsukuba and related university regulations, and who are deemed to have the following competences.

	Competences	Evaluation perspectives
<b>Knowledge and Skills</b>	1. Knowledge application competence: Ability to contribute to society with advanced knowledge	① Can you apply knowledge gained through research and other activities in society? ② Can you identify new problems, even in other fields of expertise, based on broad knowledge?
	2. Management competence: Ability to appropriately address challenges from broad standpoints	① Can you take on major tasks with systematic planning? ② Can you understand and solve problems from multiple perspectives?
	3. Communication competence: Ability to accurately and clearly communicate expert knowledge	① Are you capable of efficient communication for research purposes? ② Can you discuss research or research-specific knowledge with experts from your own field and from other fields?
	4. Teamwork competence: Ability to work with a team and actively contribute to the achievement of goals	① Do you have experience cooperatively and actively working on challenges as part of a team? ② Have you helped promote projects and activities other than your own research?
	5. Internationality competence: Willingness to contribute to international society	① Are you aware of making contributions to international society and getting involved in international activities? ② Have you obtained the linguistic skills necessary for international information collection and action?
	6. Research ability: Basic knowledge and ability to set research tasks and carry out a research plan in the areas of service engineering	① Scientific analysis ability: If the skills to scientifically analyze circumstances and give them engineering solutions were gained ② Ability to challenge problems in reality: If the positive attitude, social skills and cooperativeness to challenge problems in reality were gained
	7. Specialized knowledge: Advanced specialized knowledge and command of the areas of service engineering	Ability to apply skills: If the know-how about how to use one's skills well in diverse service fields was gained
	8. Ethical view: Ethical view and ethical knowledge appropriate for highly specialized professionals in the areas of service engineering	① If researcher ethics and engineer ethics were understood and adhered by ② If human research ethics as well as formalities and/or procedures necessary for research were understood

<p><b>Guidelines for Assessing Learning Outcomes</b></p>	<p>The evaluation of learning outcomes objectively confirms and assesses the acquisition status of competences based on the degree conferral policy at each stage, according to the achievement evaluation sheet.</p> <p>It is conducted four times in total each semester. The achievement evaluation sheet provides a visual confirmation of the acquired competences.</p> <p>The achievement evaluation sheet is every time completed with achievement checks by an interview between the supervisory faculty member and the student.</p> <p>The first evaluation sees the basic leaning of the nine required subjects, the second evaluation sees how the student gains the knowledge and skills (competences) covered in Major Subjects, and the progress of his/her master’s thesis. In the third evaluation, which is made after the mid-term presentation, the evaluation includes checks as to whether the research reflects the past advice of AG faculty members, the student exchanged opinions with AG faculty members in the question-and-answer session at the mid-term presentation, and the research goes well on the whole toward the completion of the master’s thesis. The fourth evaluation entails an evaluation of the master's thesis content and competences acquired.</p> <ul style="list-style-type: none"> <li>- Service learning: For private/public industry-academia collaboration research, students are examined and evaluated at the three stages of the research plan presentation at the end of the fall semester of the first year, the mid-term presentation at the end of the spring semester of the second year, and the final examination board at the end of the fall semester of the second year.</li> </ul>
<p><b>Evaluation Criteria for Degree Theses/ Dissertations</b></p>	<p>A thesis is accepted if all of the following evaluation items are proven to be met.</p> <p>&lt;Criteria for degree thesis review&gt;</p> <ol style="list-style-type: none"> <li>1. Significance of research theme: If the theme is found to be significant to challenge present and future problems in reality in the areas of service engineering and to create and practice new service methods</li> <li>2. Understanding of preceding researches: If existing theories and researches associated with one's research theme are accurately understood and appraised. If then, the issue as to how the research could contribute to the literatures or could attain practical significance in the areas of service engineering is deeply debated.</li> <li>3. Understanding and appropriateness of research methods: If the methods (demonstration, experiment, simulation, investigation, survey and other design and data analysis, etc.) used to pursue the research theme are deeply understood and the skills to use them well in order to pursue the research theme were sufficiently gained</li> <li>4. Appropriateness of presentation and interpretation of research results: If the skill to academically present research results and the thinking ability to interpret them deductively or inductively are possessed</li> </ol>

<p><b>Evaluation Criteria for Degree Theses/ Dissertations</b></p>	<p>5. Research overall: If the research is capable of doing advocacy that could be contributable to the areas of service engineering or if the research successfully has developed a significant debate toward future research trends as results of an overview of steps 1 to 4 above and the objective evaluation of strengths and weaknesses of the research</p> <p>6. Format of thesis: If the appropriate level as an academic paper is reached in terms of the appropriateness of sentence expressions, the presentation and citation of graphics and literatures and the creation of literature list in the thesis</p> <p>&lt;Criteria for final exam&gt;</p> <p>1. <b>【Research ability】</b> If the basic knowledge and ability to set research tasks and carry out a research plan in the areas of service engineering were gained</p> <p>2. <b>【Specialized knowledge】</b> If the advanced specialized knowledge and command of the areas of service engineering were gained</p> <p>3. <b>【Ethical view】</b> If the ethical view and ethical knowledge appropriate for highly specialized professionals in the areas of service engineering were gained</p> <p>&lt;Level standards required for the degree thesis, review board members, review method and review items, etc.&gt;</p> <p>A master's thesis review board must be organized with one chief reviewer and two or more sub-reviewers who are applicable faculty members of the Degree Programs in Systems and Information Engineering of the Graduate School.</p> <p>The chief reviewer opens a master's thesis review board, and the board reviews the thesis in accordance with the criteria for degree thesis review to judge the acceptance of the thesis.</p> <p>The thesis passes if approved to be on a master's thesis level in all of the above evaluation items 1 to 6 with the final (oral) exam included in the judgment.</p>
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**Curriculum Policy**

The curriculum is organized to provide students with specialized knowledge and research ability as to service engineering (Science of Effectiveness (quantitative analysis skill to identify services required by customers and the society), Science of Efficiency (skill to improve efficiency for an organization to secure a reasonable profit), Art of Integration (integrated skill to overcome the trade-offs arising between the said effectiveness and efficiency)) as well as a wide range of basic knowledge and ethical view in the areas of engineering, so that the Program cultivates highly specialized professionals who can identify and solve problems from a wide perspective extending over multiple areas in science and technology.

The Program in Service Engineering is designed to develop human resources who can challenge present and future social problems, then create and practice new methods and verify results scientifically in the areas of service. To attain this purpose, the Program vigorously drives forward education and research in cooperation with private/public industry and academia such as by actively having faculty members who are engaged at work in companies or national/municipal organizations. Thus, the Program builds itself up as a trinity characterized by the three aspects: the curriculum contributes to the communities as well, research findings are accumulated, and good students result under these environments.

<p><b>Curriculum Design Framework</b></p>	<p>Major Subjects and Foundation Subjects for Major are organized in Degree Programs' Common Courses and in Program subjects.</p> <p>Students gain (generic knowledge and ability) through Graduate General Education Courses, Inter-disciplinary Foundation Courses, and Foundation Subjects for Major. Particularly, the following knowledge and abilities are expected to be gained through Program subjects:</p> <p>Through “Consumer Psychology” , “Regional Data Analysis” , “Big Data Analytics” and such other required subjects involving group work (matrix type course work, 9 subjects/18 credits) and “Facilitation Training Program in Service Engineering” , “Internship (Master's Program in Service Engineering)” , etc., students gain the Competence of knowledge application, Management competence, Communication competence, Teamwork competence, and Competence in Internationality.</p> <p>(Specialized knowledge and abilities) are gained as follows:</p> <ul style="list-style-type: none"> <li>- To gain the basic skills to scientifically analyze circumstances and give them engineering solutions, students learn through matrix type course work in addition to Graduate General Education Courses and Inter-disciplinary Foundation Courses. The research ability is gained through “Special Seminar in Service Engineering I and II” and “Special Research Work in Service Engineering I and II” (Service learning = Private/public industry-academia collaboration research).</li> <li>- With elective subjects, students gain specialized knowledge as to the methodology and know-how about how to use the basic skills well.</li> <li>- Students gain ethical view through “Facilitation Training Program in Service Engineering” , “Internship (Master's Program in Service Engineering)” and service learning = Private/public industry-academia collaboration research.</li> </ul>
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<p><b>Teaching and Learning Methods</b></p>	<ul style="list-style-type: none"> <li>- Around the spring semester of the first year, students take nine required subjects (2 credits × 9 subjects) that cover the three services, which are real service (human to human), community service (organization to community) and virtual service (organization to humans through IT), and the three skills, which are Science of Effectiveness (quantitative analysis skill to identify services required by customers and the society), Science of Efficiency (skill to improve efficiency for an organization to secure a reasonable profit), and Art of Integration (integrated skill to overcome the trade-offs arising between the said effectiveness and efficiency).</li> <li>- After the fall semester of the first year, students take subjects covering the specialized knowledge about each of the three services and those covering the specialized knowledge about each of the four skills which additionally include hypothetical verification and service progression (skill to implement solutions and verify results scientifically).</li> <li>- After fall semester C of the first year, during which the above learning has almost completed, students get predominantly involved in practical research activities through private/public industry-academia collaboration research and take 8 credits of Major Subjects related to the writing of a thesis.</li> </ul>
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**Admission Policy**

<p><b>Desired Student Profile</b></p>	<p>We seek candidates who possess engineering fundamental abilities (mathematical or logical thinking abilities) and the basic knowledge about one of the three areas of assets/resources design (finance/optimization), spatial/environmental design (urban planning) and organizational/behavioral design (behavioral science).</p>
<p><b>Student Selection Process</b></p>	<ul style="list-style-type: none"> <li>- To accept outstanding and diverse human resources inside and outside Tsukuba, candidates are solicited through multiple entrance exam means including recommendation entrance exam, general entrance exam and special entrance exam for adults at different timings and different numbers of students admitted.</li> <li>- Irrespective of the type of entrance exam, an oral exam is mandatorily required.</li> <li>- To prove foreign language proficiency, candidates are required to submit the score sheet of English language test (e.g. TOEIC, TOEFL).</li> <li>- In the recommendation entrance exam, the potential students to be selected out must excel academically, especially in the abilities necessary for the research in the areas of service engineering.</li> <li>- In the general entrance exam, the potential students to be selected out must possess certain fundamental abilities and research abilities.</li> <li>- The special entrance exam for adults evaluates the achievements and experiences as an adult member of society in addition to fundamental abilities and research abilities.</li> </ul>

**Learning Support Framework**

<b>Academic Support</b>	Achievements are evaluated using an achievement evaluation sheet. Students use the sheet to document their progress in acquiring the necessary competences, which they confirm with their supervisors. "Special Seminar in Service Engineering II" , as well as "Special Research Work in Service Engineering I and II" encourage students to manage their research progress and improve their presentation skills.
<b>Opportunities for Peer Interaction</b>	Opportunities for student interaction are promoted through "Consumer Psychology" , "Regional Data Analysis" , "Big Data Analytics" and such other required subjects, which implements active learning through group work, and interdisciplinary research activities utilizing research units.
<b>Opportunities for Student-Faculty Interaction</b>	Opportunities for interaction between students and faculty members are promoted through the seminars involving multiple faculty members using sub-advisors and research units, as well as supporting a seminar for multiple faculty members and graduate students as part of degree programs. Meetings for graduate students and faculty members holds every year as opportunities for interaction.

**Approaches to Assuring and Enhancing Educational Quality**

- The degree program leader and the curriculum committee analyze and review the assessment results of learning outcomes, striving for the continuous improvement of educational quality.
- The academic management committee continuously reviews and enhances educational activities, ensures the quality of education through initiatives such as workshops, and strengthens the system for achieving the objectives of the degree program.
- External evaluations— such as direct feedback from participants at the Service Engineering Symposium and questionnaire surveys regarding students' research presentations and educational content—are conducted to confirm whether the education being offered aligns with the qualities and competences expected of graduates of the Service Engineering degree program.