

## Ph.D. Program in Humanics

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### ■ Doctor of Philosophy in Medical Sciences

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#### Program Educational Objectives

Humanics is an academic discipline that focuses on the fundamental principles of physiology and pathology of the human, generating new science and technology to achieve a healthy and comfortable life of human beings in the society. In this program, we cultivate leaders with skills in the fields of both biomedical sciences and physical sciences/engineering/informatics, as well as the capacity to integrate two or more research fields and to tackle flexibly and multifacetedly to the unpredictable future based on their bidisciplinary expertise and research skills.

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<b>Graduate Profile</b>	Students who complete this program will be outstanding leaders with the bidisciplinary expertise to incorporate the latest knowledge and technologies in biomedical sciences and physical sciences/engineering/informatics, talk with each other using the languages of both fields, conceive of new paradigms through a deep understanding of both fields, and integrate them.
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**Diploma Policy**

The degree of Doctor of Philosophy in Medical Sciences is commenced to those who have fulfilled the requirements for the completion of the Doctoral 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 creation competence: Ability to create new knowledge that can contribute to future society	① Are there any research findings that can be considered new knowledge? ② Can we expect you to create knowledge that will contribute to future society?
	2. Management competence: Ability to plan and implement measures to identify and solve challenges from a higher perspective	① Can you make and implement long-term plans for critical challenges? ② Can you identify challenges, even in other areas of expertise, and solve them from a higher perspective?
	3. Communication competence: Ability to express the true nature of academic findings positively and clearly	① Can you explain the true nature of research content and specialized knowledge clearly and logically to researchers from different areas and to people other than researchers? ② Do you proactively share your findings with researchers and experts from your field of expertise and accurately answer questions?
	4. Leadership competence: Ability to have objectives get accomplished under your leadership	① Can you set attractive and compelling goals? ② Are you capable of building systems to realize goals and accomplish objectives as the leader?
	5. Internationality competence: Possession of a high level of awareness and motivation to be internationally active and contribute to international society	① Do you have strong awareness and motivation to contribute to international society and international activities? ② Have you obtained adequate linguistic skills for international information collection and action?
	6. Bidisciplinary perspective ability	① The ability to accurately identify the essence of unpredictable humanics issues. ② The ability to propose solutions flexibly and multifacetedly based on the bidisciplinary expertise.
	7. Bidisciplinary design ability	① The ability to identify original fusion research projects in the field of humanics. ② To have the knowledge and skills to obtain excellent research results in the fields of humanics.
	8. Bidisciplinary outcome ability	① The ability to design the research plan and tackle to the humanics projects persistently with high motivation and ethical standards. ② The ability to explain the academic and social significance of the research findings and envision their commercialization.

<p><b>Guidelines for Assessing Learning Outcomes</b></p>	<p>The evaluation of learning outcomes is conducted through an achievement level assessment based on the Achievement Rubric. This assessment evaluates the acquisition status of competences according to the following stages, based on the Diploma Policy.</p> <ul style="list-style-type: none"> <li>- Based on the curriculum, academic achievements and individual student's performance serve as evidence to be evaluated by the academic advisor and course instructor.</li> <li>- The program's proprietary portfolio-based assessment method (CPx: Career Platform for Humanics) is used to track and evaluate competence attainment.</li> </ul>
<p><b>Evaluation Criteria for Degree Theses/ Dissertations</b></p>	<ol style="list-style-type: none"> <li>1) To pass the Qualifying Examination (QE).</li> <li>2) To achieve the certain level in the portfolio-based achievement assessment system.</li> <li>3) To have the English and communication skills to negotiate freely in the international community.</li> <li>4) To understand social demands in the field of medicine, and identify the research question for the dissertation that can be solved by integrating biomedical sciences and physical sciences/ engineering/informatics. They are also able to independently identify research questions that are expected to be overcome in the future based on the results of their dissertation.</li> <li>5) To have a firm will and a sincere attitude to tackle the humanics projects, and complete the research findings on their own in a dissertation.</li> <li>6) To publish research articles that are highly renowned internationally by the academic and industrial communities.</li> <li>7) To explain what is necessary to implement research findings in society.</li> </ol>

**Curriculum Policy**

The curriculum in humanics program cultivates a firm will to identify the essence of humanics research, bidisciplinary expertise in both medical sciences and physical sciences/engineering/informatics, an understanding of the basic technologies of humanics research and the global situation in this field, the ability to independently identify issues that could lead to paradigm shift, and the ability to solve these issues with sincerity and diligence.

<p><b>Curriculum Design Framework</b></p>	<ul style="list-style-type: none"> <li>- In the Common Subjects, we cultivate strong motivation, sincere attitude, rigid ethics, and international communication skills to become leaders in the world through courses including the study of research ethics, entrepreneurship education, internships, and overseas laboratory rotation.</li> <li>- In the Basic Specialized Subjects, students learn basic and clinical medicine, as well as physical sciences, engineering, and informatics, through lectures and practical courses that combine e-learning and problem-based learning (PBL), and cultivate the bidisciplinary expertise required for humanics study.</li> <li>- In the Humanics Specialized Subjects, students choose mentors from both biomedical sciences and physical sciences/engineering/informatics and acquire specialized knowledge and skills through the double-mentoring system based on collaboration among mentors.</li> </ul>
<p><b>Teaching and Learning Methods</b></p>	<p>The standard course schedule is shown below.</p> <ul style="list-style-type: none"> <li>- Humanics Forum provides opportunities to 1st grade students to confirm the research plan for Ph.D. dissertation.</li> <li>- A mentor for the sub-field will be selected within 6 months after enrollment.</li> <li>- By the end of the second year, students must earn more than 35 credits from compulsory and elective subjects and pass the Qualifying Examination (QE).</li> <li>- After the QE, the progress will be presented to the dissertation committee once or twice a year.</li> <li>- Students, who passed the QE and earned more than 45 credits from compulsory and elective subjects, must pass the preliminary dissertation examination to qualify the dissertation examination requirements.</li> <li>- The dissertation will be evaluated in peer review and oral examination.</li> </ul>

**Admission Policy**

<p><b>Desired Student Profile</b></p>	<p>We are looking for students who have a strong will to contribute to the future of human beings through the discovery and resolution of issues that could be a paradigm shift in the field of humanics, and who meet one of the following criteria</p> <ul style="list-style-type: none"> <li>- Students have basic knowledge and skills in biomedical sciences or clinical medicine, as well as a strong interest in interdisciplinary research in physical sciences/engineering/informatics.</li> <li>- Students have basic knowledge and skills in one of the fields of physical sciences, engineering, or informatics, as well as a strong interest in interdisciplinary research in the field of biomedical sciences or clinical medicine.</li> </ul>
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<b>Student Selection Process</b>	The humanics program integrates the knowledge and skills of biomedical sciences, and physical sciences/engineering/informatics to lead a paradigm-shift for overcoming the life and health problems facing human beings. Taking advantage of the characteristics of this program, we will evaluate the applicants on the selection criteria based on expertise in the fields of biomedical sciences and physical sciences/engineering/informatics, advanced creativity, internationality, and the ability to explain to non-specialist researchers. Applicants need to submit a research proposal in English that integrates the fields of biomedical sciences and physical sciences/engineering/informatics, and the research proposal will be evaluated through the oral examination by faculty members from different fields of expertise.
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### Learning Support Framework

<b>Academic Support</b>	<ul style="list-style-type: none"> <li>- Support interdisciplinary learning by acquiring knowledge and skills through introductory courses and foundational practical training outside student's original academic field.</li> <li>- In the common subject “Scientific Writing and Publishing”, instruct students on the knowledge and skills necessary for paper writing.</li> <li>- Utilize portfolio-based assessment to enable students to review their learning progress and clarify challenges to encourage self-reflection.</li> </ul>
<b>Opportunities for Peer Interaction</b>	<ul style="list-style-type: none"> <li>- The common subject “Humanics Forum” provides opportunities for interaction among new students and with upperclassmen.</li> <li>- A student group will take the lead in planning and hosting the Humanics Symposium, providing opportunities for exchange and collaboration through the planning and operation process.</li> </ul>
<b>Opportunities for Student-Faculty Interaction</b>	<ul style="list-style-type: none"> <li>- In addition to the main mentor, students will meet with QE examiners for research progress meetings (held every six months) to provide opportunities to receive guidance on their doctoral dissertation research.</li> <li>- With the introduction of double-mentor system and reverse-mentor system, we support interdisciplinary learning and research by promoting collaboration among faculty with a student in its center.</li> </ul>

### Approaches to Assuring and Enhancing Educational Quality

- Evaluation of student learning outcomes and regular surveys for current students and graduates, are analyzed at the Faculty Meeting and the Curriculum Committee to verify the validity of the curriculum and the appropriateness of the instruction.

## Ph.D. Program in Humanics

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### ■ Doctor of Philosophy in Science

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#### Program Educational Objectives

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<b>Graduate Profile</b>	Students who complete this program will be outstanding leaders with the bidisciplinary expertise to incorporate the latest knowledge and technologies in biomedical sciences and physical sciences/engineering/informatics, talk with each other using the languages of both fields, conceive of new paradigms through a deep understanding of both fields, and integrate them.
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**Diploma Policy**

The degree of Doctor of Philosophy in Science is commenced to those who have fulfilled the requirements for the completion of the Doctoral 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 creation competence: Ability to create new knowledge that can contribute to future society	① Are there any research findings that can be considered new knowledge? ② Can we expect you to create knowledge that will contribute to future society?
	2. Management competence: Ability to plan and implement measures to identify and solve challenges from a higher perspective	① Can you make and implement long-term plans for critical challenges? ② Can you identify challenges, even in other areas of expertise, and solve them from a higher perspective?
	3. Communication competence: Ability to express the true nature of academic findings positively and clearly	① Can you explain the true nature of research content and specialized knowledge clearly and logically to researchers from different areas and to people other than researchers? ② Do you proactively share your findings with researchers and experts from your field of expertise and accurately answer questions?
	4. Leadership competence: Ability to have objectives get accomplished under your leadership	① Can you set attractive and compelling goals? ② Are you capable of building systems to realize goals and accomplish objectives as the leader?
	5. Internationality competence: Possession of a high level of awareness and motivation to be internationally active and contribute to international society	① Do you have strong awareness and motivation to contribute to international society and international activities? ② Have you obtained adequate linguistic skills for international information collection and action?
	6. Bidisciplinary perspective ability	① The ability to accurately identify the essence of unpredictable humanics issues. ② The ability to propose solutions flexibly and multifacetedly based on the bidisciplinary expertise.
	7. Bidisciplinary design ability	① The ability to identify original fusion research projects in the field of humanics. ② To have the knowledge and skills to obtain excellent research results in the fields of humanics.
	8. Bidisciplinary outcome ability	① The ability to design the research plan and tackle to the humanics projects persistently with high motivation and ethical standards. ② The ability to explain the academic and social significance of the research findings and envision their commercialization.

<p><b>Guidelines for Assessing Learning Outcomes</b></p>	<p>The evaluation of learning outcomes is conducted through an achievement level assessment based on the Achievement Rubric. This assessment evaluates the acquisition status of competences according to the following stages, based on the Diploma Policy.</p> <ul style="list-style-type: none"> <li>- Based on the curriculum, academic achievements and individual student's performance serve as evidence to be evaluated by the academic advisor and course instructor.</li> <li>- The program's proprietary portfolio-based assessment method (CPx: Career Platform for Humanics) is used to track and evaluate competence attainment.</li> </ul>
<p><b>Evaluation Criteria for Degree Theses/ Dissertations</b></p>	<ol style="list-style-type: none"> <li>1) To pass the Qualifying Examination (QE).</li> <li>2) To achieve the certain level in the portfolio-based achievement assessment system.</li> <li>3) To have the English and communication skills to negotiate freely in the international community.</li> <li>4) To understand social demands in the field of medicine, and identify the research question for the dissertation that can be solved by integrating sciences and biomedical sciences. They are also able to independently identify research questions that are expected to be overcome in the future based on the results of their dissertation.</li> <li>5) To have a firm will and a sincere attitude to tackle the humanics projects, and complete the research findings on their own in a dissertation.</li> <li>6) To publish research articles that are highly renowned internationally by the academic and industrial communities.</li> <li>7) To explain what is necessary to implement research findings in society.</li> </ol>

**Curriculum Policy**

The curriculum in humanics program cultivates a firm will to identify the essence of humanics research, bidisciplinary expertise in both sciences and biomedical sciences, an understanding of the basic technologies of humanics research and the global situation in this field, the ability to independently identify issues that could lead to paradigm shift, and the ability to solve these issues with sincerity and diligence.

<p><b>Curriculum Design Framework</b></p>	<ul style="list-style-type: none"> <li>- In the Common Subjects, we cultivate strong motivation, sincere attitude, rigid ethics, and international communication skills to become leaders in the world through courses including the study of research ethics, entrepreneurship education, internships, and overseas laboratory rotation.</li> <li>- In the Basic Specialized Subjects, students learn basic and clinical medicine, as well as sciences, through lectures and practical courses that combine e-learning and problem-based learning (PBL), and cultivate the bidisciplinary expertise required for humanics study.</li> <li>- In the Humanics Specialized Subjects, students choose mentors from both sciences and biomedical sciences and acquire specialized knowledge and skills through the double-mentoring system based on collaboration among mentors.</li> </ul>
<p><b>Teaching and Learning Methods</b></p>	<p>The standard course schedule is shown below.</p> <ul style="list-style-type: none"> <li>- Humanics Forum provides opportunities to 1st grade students to confirm the research plan for Ph.D. dissertation.</li> <li>- A mentor for the sub-field will be selected within 6 months after enrollment.</li> <li>- By the end of the second year, students must earn more than 35 credits from compulsory and elective subjects and pass the Qualifying Examination (QE).</li> <li>- After the QE, the progress will be presented to the dissertation committee once or twice a year.</li> <li>- Students, who passed the QE and earned more than 45 credits from compulsory and elective subjects, must pass the preliminary dissertation examination to qualify the dissertation examination requirements.</li> <li>- The dissertation will be evaluated in peer review and oral examination.</li> </ul>

**Admission Policy**

<p><b>Desired Student Profile</b></p>	<p>We are looking for students who have a strong will to contribute to the future of human beings through the discovery and resolution of issues that could be a paradigm shift in the field of humanics, and who meet one of the following criteria</p> <ul style="list-style-type: none"> <li>- Students have basic knowledge and skills in biomedical sciences or clinical medicine, as well as a strong interest in interdisciplinary research in physical sciences/engineering/informatics.</li> <li>- Students have basic knowledge and skills in one of the fields of physical sciences, engineering, or informatics, as well as a strong interest in interdisciplinary research in the field of biomedical sciences or clinical medicine.</li> </ul>
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<b>Student Selection Process</b>	The humanics program integrates the knowledge and skills of biomedical sciences, and physical sciences/engineering/informatics to lead a paradigm-shift for overcoming the life and health problems facing human beings. Taking advantage of the characteristics of this program, we will evaluate the applicants on the selection criteria based on expertise in the fields of biomedical sciences and physical sciences/engineering/informatics, advanced creativity, internationality, and the ability to explain to non-specialist researchers. Applicants need to submit a research proposal in English that integrates the fields of biomedical sciences and physical sciences/engineering/informatics, and the research proposal will be evaluated through the oral examination by faculty members from different fields of expertise.
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### Learning Support Framework

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### Approaches to Assuring and Enhancing Educational Quality

- Evaluation of student learning outcomes and regular surveys for current students and graduates, are analyzed at the Faculty Meeting and the Curriculum Committee to verify the validity of the curriculum and the appropriateness of the instruction.

## Ph.D. Program in Humanics

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### ■ Doctor of Philosophy in Engineering

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#### Program Educational Objectives

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<b>Graduate Profile</b>	Students who complete this program will be outstanding leaders with the bidisciplinary expertise to incorporate the latest knowledge and technologies in biomedical sciences and physical sciences/engineering/informatics, talk with each other using the languages of both fields, conceive of new paradigms through a deep understanding of both fields, and integrate them.
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**Diploma Policy**

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**Curriculum Policy**

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