

Ph.D. Program in Humanics

Name of the degree to be conferred	Doctor of Philosophy in Medical Sciences
Educational purpose	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.
Vision of human resources development	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.

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 competencies.

Competencies	Evaluation perspectives
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.

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| 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. |
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Dissertation evaluation criteria

- 1) To pass the Qualifying Examination (QE).
- 2) To achieve the certain level in the portfolio-based achievement assessment system.
- 3) To have the English and communication skills to negotiate freely in the international community.
- 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.
- 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.
- 6) To publish research articles that are highly renowned internationally by the academic and industrial communities.
- 7) To explain what is necessary to implement research findings in society.

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.

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| Policy of curriculum organization | <ul style="list-style-type: none"> • 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. • 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. • 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. |
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| Learning methods · Processes | <p>The standard course schedule is shown below.</p> <ul style="list-style-type: none"> • Humanics Forum provides opportunities to 1st grade students to confirm the research plan for Ph.D. dissertation. • A mentor for the sub-field will be selected within 6 months after enrollment. • 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). • After the QE, the progress will be presented to the dissertation committee once or twice a year. • 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. • The dissertation will be evaluated in peer review and oral examination. |
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Evaluation of learning outcomes	• Initiation seminar and Humanics forum in the first year will help students confirm their research plans for dissertation study. • Qualifying Examination (QE) will be conducted by the end of the second year. The QE will be conducted to confirm the bidisciplinary expertise and the ability to promote research in the field of humanics. • In the fifth year, a final examination (oral examination) will be held to confirm the students' expertise and research skills in the field of humanics, as well as their ability to identify research questions.
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【System for awarding degrees】

The Qualifying Examination will be held as follows.

- QE is offered by the end of the second year to those who have earned (or expected to earn) more than 35 credits including all compulsory subjects.
- Bidisciplinary expertise in biomedical sciences and one of physical sciences/engineering/informatics, and the ability to understand the basic techniques of humanics research and the global situation in this field, and to propose a research plan for a humanics problem will be evaluated.

The examination for the Ph.D. in Medical Sciences will be conducted as follows.

- Students who have earned (or expected to earn) more than 45 credits, passed the QE and preliminary examination, and qualified the certain level of achievement in the portfolio-based assessment.
- The dissertation is evaluated in peer review and the final examination (oral examination), and those who pass these examinations will receive the Ph.D. in Medical Sciences.
- The dissertation committee will be organized by faculty members from biomedical sciences, physical sciences/engineering/informatics, and industry. Students will be evaluated on their ability to integrate bidisciplinary expertise in the field of humanics, their ability to independently identify issues that could lead to a paradigm shift, their ability to solve problems with integrity and sincere attitude and their ability to disseminate their findings to society and implement them.

Admission Policy

Desired students	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 • 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. • 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.
Selection policy	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.

Ph.D. Program in Humanics

Name of the degree to be conferred	Doctor of Philosophy in Science
Educational purpose	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.
Vision of human resources development	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.

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 competencies.

Competencies	Evaluation perspectives
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.

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| 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. |
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Dissertation evaluation criteria

- 1) To pass the Qualifying Examination (QE).
- 2) To achieve the certain level in the portfolio-based achievement assessment system.
- 3) To have the English and communication skills to negotiate freely in the international community.
- 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.
- 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.
- 6) To publish research articles that are highly renowned internationally by the academic and industrial communities.
- 7) To explain what is necessary to implement research findings in society.

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.

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| Policy of curriculum organization | <ul style="list-style-type: none"> • 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. • 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. • 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. |
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| Learning methods · Processes | <p>The standard course schedule is shown below.</p> <ul style="list-style-type: none"> • Humanics Forum provides opportunities to 1st grade students to confirm the research plan for Ph.D. dissertation. • A mentor for the sub-field will be selected within 6 months after enrollment. • 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). • After the QE, the progress will be presented to the dissertation committee once or twice a year. • 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. • The dissertation will be evaluated in peer review and oral examination. |
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Evaluation of learning outcomes	• Initiation seminar and Humanics forum in the first year will help students confirm their research plans for dissertation study. • Qualifying Examination (QE) will be conducted by the end of the second year. The QE will be conducted to confirm the bidisciplinary expertise and the ability to promote research in the field of humanics. • In the fifth year, a final examination (oral examination) will be held to confirm the students' expertise and research skills in the field of humanics, as well as their ability to identify research questions.
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【System for awarding degrees】

The Qualifying Examination will be held as follows.

- QE is offered by the end of the second year to those who have earned (or expected to earn) more than 35 credits including all compulsory subjects.
- Bidisciplinary expertise in sciences and biomedical sciences, and the ability to understand the basic techniques of humanics research and the global situation in this field, and to propose a research plan for a humanics problem will be evaluated.

The examination for the Ph.D. in Science will be conducted as follows.

- Students who have earned (or expected to earn) more than 45 credits, passed the QE and preliminary examination, and qualified the certain level of achievement in the portfolio-based assessment.
- The dissertation is evaluated in peer review and the final examination (oral examination), and those who pass these examinations will receive the Ph.D. in Science.
- The dissertation committee will be organized by faculty members from biomedical sciences, physical sciences/engineering/informatics, and industry. Students will be evaluated on their ability to integrate bidisciplinary expertise in the field of humanics, their ability to independently identify issues that could lead to a paradigm shift, their ability to solve problems with integrity and sincere attitude and their ability to disseminate their findings to society and implement them.

Admission Policy

Desired students	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 • 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. • 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.
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Selection policy	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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Ph.D. Program in Humanics

Name of the degree to be conferred	Doctor of Philosophy in Engineering
Educational purpose	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.
Vision of human resources development	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.

Diploma Policy

The degree of Doctor of Philosophy in Engineering 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 competencies.

Competencies	Evaluation perspectives
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.

Dissertation evaluation criteria

- 1) To pass the Qualifying Examination (QE).
- 2) To achieve the certain level in the portfolio-based achievement assessment system.
- 3) To have the English and communication skills to negotiate freely in the international community.
- 4) To understand social demands in the field of medicine, and identify the research question for the dissertation that can be solved by integrating engineering/informatics 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.
- 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.
- 6) To publish research articles that are highly renowned internationally by the academic and industrial communities.
- 7) To explain what is necessary to implement research findings in society.

Curriculum Policy

The curriculum in humanics program cultivates a firm will to identify the essence of humanics research, bidisciplinary expertise in both engineering/informatics 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.

Policy of curriculum organization	• 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. • In the Basic Specialized Subjects, students learn basic and clinical medicine, as well as engineering/informatics, through lectures and practical courses that combine e-learning and problem-based learning (PBL), and cultivate the bidisciplinary expertise required for humanics study. • In the Humanics Specialized Subjects, students choose mentors from both engineering/informatics and biomedical sciences and acquire specialized knowledge and skills through the double-mentoring system based on collaboration among mentors.
Learning methods • Processes	The standard course schedule is shown below. • Humanics Forum provides opportunities to 1st grade students to confirm the research plan for Ph.D. dissertation. • A mentor for the sub-field will be selected within 6 months after enrollment. • 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). • After the QE, the progress will be presented to the dissertation committee once or twice a year. • 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. • The dissertation will be evaluated in peer review and oral examination.

Evaluation of learning outcomes	• Initiation seminar and Humanics forum in the first year will help students confirm their research plans for dissertation study. • Qualifying Examination (QE) will be conducted by the end of the second year. The QE will be conducted to confirm the bidisciplinary expertise and the ability to promote research in the field of humanics. • In the fifth year, a final examination (oral examination) will be held to confirm the students' expertise and research skills in the field of humanics, as well as their ability to identify research questions.
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【System for awarding degrees】

The Qualifying Examination will be held as follows.

- QE is offered by the end of the second year to those who have earned (or expected to earn) more than 35 credits including all compulsory subjects.
- Bidisciplinary expertise in engineering/informatics and biomedical sciences, and the ability to understand the basic techniques of humanics research and the global situation in this field, and to propose a research plan for a humanics problem will be evaluated.

The examination for the Ph.D. in Engineering will be conducted as follows.

- Students who have earned (or expected to earn) more than 45 credits, passed the QE and preliminary examination, and qualified the certain level of achievement in the portfolio-based assessment.
- The dissertation is evaluated in peer review and the final examination (oral examination), and those who pass these examinations will receive the Ph.D. in Engineering.
- The dissertation committee will be organized by faculty members from biomedical sciences, physical sciences/engineering/informatics, and industry. Students will be evaluated on their ability to integrate bidisciplinary expertise in the field of humanics, their ability to independently identify issues that could lead to a paradigm shift, their ability to solve problems with integrity and sincere attitude and their ability to disseminate their findings to society and implement them.

Admission Policy

Desired students	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 • 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. • 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.
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Selection policy	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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