Graduate Major in Mechanical Engineering

【Master's Degree Program】

1. Outline

This major aims at fostering human resources who possess systematic expertise constituting basic academic principles of mechanical engineering, have creative abilities to resolve problems from a societal viewpoint using these academic principles, and can ultimately contribute to the evolutions of advanced science and technology and the resolutions of broad societal problems.

2. Competencies Developed

This major aims to develop the following competencies to:

- Think and understand the essence that underlies a problem.
- Resolve problems using broad engineering knowledge and skills related to the field of mechanical engineering.
- Explore the forefront of science and technology.
- Fulfill R&D activities with an international perspective and a strong sense of ethics.
- Explain and convey one's ideas and thoughts to others logically.
- Present logical discussions and compile them in written documents.

3. Learning Goals

To make students in this major acquire the competencies mentioned above, this major provides the following learnings:

A) Specialized subjects in the field of mechanical engineering
B) Subjects of the peripheral and related fields
C) Broad abilities regarding thinking and resolving problems
D) Skills of logical communication
E) An international perspective and a sense of ethics

4. IGP Completion Requirements

The following requirements must be met to complete the Master's Degree Program of this major.

1. Attain a total of 30 credits or more from 400- and 500-level courses.
2. Fulfill requirements in Table M1 below.
   - Total 8 credits acquired from Research Seminars.
   - A minimum of 10 credits acquired from Electives in Research-related course and Major courses.
   - A minimum of 5 credits acquired from Liberal Arts and Basic Science Courses.
     (3 credits from Humanities and Social Science Course of which 2 credits must be from 400-level courses and 1 credit from 500-level courses, and 2credits from Career Development Courses.)
3. Pass the master's thesis review and defense.
4. In the case of Exception to Enrollment Period, being exempted from acquiring course credits that must be attained from Research Seminars, the exempted credits are waived from required ("the total 8 credits of Research seminars" and "the minimum 18 credits in Research seminars, Research-related course and major course". However the other requirements of credits are the same listed in Table M1 cannot be waived.

Table M1 shows course categories and the number of credits required to complete the Master's Degree Program of this major. It also shows the required minimum credits in each course category and points to be noted when selecting the required courses and electives.

The learning goals to be obtained by students through courses are listed as "associated learning goals". Before registering courses, students need to fully understand the course goals.

Table M1. Graduate Major in Mechanical Engineering Completion Requirements

Course category		<Required courses> Required credits	<Electives> Minimum credits required	Minimum credits required	Associated learning goals	Comments
Liberal arts and basic science courses	Humanities and social science courses		·2 credits from 400-level ·1 credit from 500-level	5 credits	B, C	
	Career development courses		2 credits		C, D	All Graduate Attributes (GA) should be acquired.

						(Refer to Section 7 for the definition of GA.)
	Other courses					
Core courses	**Research seminars**	Seminar in Mechanical Engineering S1 Seminar in Mechanical Engineering F1 Seminar in Mechanical Engineering S2 Seminar in Mechanical Engineering F2 A total of 8 credits, 2 credits each from the above courses.		18 credits	C, D, E	
	Research-related courses		10 credits		C, D, E	
	Major courses				A, B, C, D, E	
	Major courses and Research-related courses outside the Graduate Major in Mechanical Engineering standard curriculum					
Total required credits		**A minimum of 30 credits including those attained according to the above conditions**				
Note		**・Japanese Language and Culture Courses offered to international students can be recognized as equivalent to the Humanities and Social Science Courses of the corresponding course level.** **・For details of the Liberal Arts and Basic Science Courses, please refer to the relevant sections.**				

5. IGP Courses

Table M2 shows the Core Courses of the Master's Degree Program in this major. Graduate Majors listed in the Comments column offer core courses that are recognized as equivalent to the corresponding Major Courses or Research-related Courses in the standard curriculum of this major.

Table M2. Core Courses of the Graduate Major in Mechanical Engineering

Course category	Course number	Course title	Credits	Competencies	Learning goals	Comments

Research seminars	400 level	MEC.Z491.R	◎		Seminar in Mechanical Engineering S1	0-2-0	1,3,5	C, D	Language used in Seminar is Laboratory own.
		MEC.Z492.R	◎		Seminar in Mechanical Engineering F1	0-2-0	1,3,5	C, D	Language used in Seminar is Laboratory own.
	500 level	MEC.Z591.R	◎		Seminar in Mechanical Engineering S2	0-2-0	1,3,5	C, D	Language used in Seminar is Laboratory own.
		MEC.Z592.R	◎		Seminar in Mechanical Engineering F2	0-2-0	1,3,5	C, D	Language used in Seminar is Laboratory own.
Research-related courses	500 level	MEC.S531.L			Overseas Research Project M1c	0-0-1	2,3,4,5	E	
		MEC.S532.L			Overseas Research Project M2c	0-0-2	2,3,4,5	E	
		MEC.S533.L			Overseas Research Project M3c	0-0-3	2,3,4,5	E	
		MEC.S534.L			Overseas Research Project M4c	0-0-4	2,3,4,5	E	
Major courses	400 level	MEC.C431.L			Mechanics of Composite Materials	1-0-0	1	A	★
		MEC.C432.L			Structural Integrity Assessment	1-0-0	1,5	A	★
		MEC.C433.L			Solid Dynamics	1-0-0	1,5	A	★
		MEC.D431.L			Advanced Sound and Vibration Measurement	1-0-0	1	A	★Not available in academic year 2023
		MEC.D432.L			Rotor Dynamics	1-0-0	1,5	A	★
		MEC.D433.L			Self-excited Vibration	1-0-0	1,5	A	★
		MEC.E431.L			Thermodynamics of Nonequilibrium Systems	1-0-0	1	A	★
		MEC.E432.L			Properties of Solid Materials	1-0-0	1	A	★
		MEC.E433.L			Advanced Thermal-Fluids Measurement	1-0-0	1,5	A	★

		MEC.F431.L			Computational Thermo-Fluid Dynamics	1-0-0	1	A	★
		MEC.G431.L			Mechanical Processing	1-0-0	1	A	★
		MEC.G432.L			Metalforming	1-0-0	1	A	★
		MEC.G433.L			Joining	1-0-0	1,4	A	★
		MEC.H431.L			Advanced Mechanical Elements	1-0-0	1,4,5	A	★
		MEC.H432.L			Multibody Systems	2-0-0	1	A	★Not available in academic year 2023
		MEC.H433.L			Mechatronics Device and Control	1-0-0	~~2,~~1,3,5	A, B	★
		MEC.H434.L			Advanced Course of Actuator Engineering	1-0-0	1,5	A, B	★
		MEC.H435.L			Machine Dynamics of Rigid Systems	1-0-0	1,2,5	A	★
		MEC.J432.L			Mechanism and Control for Ultra-precision Motion	1-0-0	1,5	A, B	★
		MEC.L431.L			Human Brain Functions and Their Measurements	1-0-0	1,3	B	★
		MEC.M432.L			Practical Space Engineering Project	1-1-1	1,3,4,5	B, C	
		MEC.M433.L			Space Systems Analysis A	1-0-0	1	B	★★Not available in academic year 2023
		MEC.M434.L			Space Robotics	1-0-0	1	B	★
		MEC.M435.L			Space Systems Initiative	2-0-0	1,3,4,5	B, C	
		MEC.N431.L			Special Lecture in MEC M1S	1-0-0	1,2	A, B	★
		MEC.N432.L			Special Lecture in MEC M1F	1-0-0	1,2	A, B	★
		MEC.P402.L			Materials Simulation	2-0-0	1,5	B, C	★【TAC-MI】(TCM.A402)
		MEC.P404.L			Materials Informatics	2-0-0	1,5	B, C	★【TAC-MI】(TCM.A404)
		MEC.R431.L			Off-campus Project M1c	0-0-1	3,4,5	C, D	★
		MEC.R432.L			Off-campus Project M2c	0-0-2	3,4,5	C, D	★

		MEC.E451.L			Advanced Course of Radiation Transfer	1-0-0	1,5	A	★【Energy Science and Engineering】(ENR.K440)
		MEC.E452.L			Advanced Course of Combustion Physics	1-0-0	1,5	A	★【Energy Science and Engineering】(ENR.K450) Taught in English in odd academic years
		MEC.E453.L			Interdisciplinary scientific principles of energy 1	1-0-0	1, 5	A	★【Energy Science and Engineering】（ENR.A401）
		MEC.E454.L			Interdisciplinary scientific principles of energy 2	1-0-0	1, 5	A	★【Energy Science and Engineering】（ENR.A402）
		MEC.E455.L			Interdisciplinary principles of energy devices 1	1-0-0	1, 5	A	★【Energy Science and Engineering】（ENR.A403）
		MEC.E456.L			Interdisciplinary principles of energy devices 2	1-0-0	1, 5	A	★【Energy Science and Engineering】（ENR.A404）
		MEC.E457.L			Interdisciplinary energy materials science 1	1-0-0	1, 5	A	★【Energy Science and Engineering】（ENR.A405）
		MEC.E458.L			Interdisciplinary energy materials science 2	1-0-0	1, 5	A	★【Energy Science and Engineering】（ENR.A406）
		MEC.E459.L			Energy system theory	1-0-0	1, 5	A	★【Energy Science and Engineering】（ENR.A407）
		MEC.E460.L			Marketing for Value Creation	1-0-0	2, 4	B	★【Energy and Informatics Program】（ENI.H401）

		MEC.E461.L			Finance and Data Analysis in Energy Markets	1-0-0	2, 4	B	★【Energy and Informatics Program】（ENI.H402）
		MEC.E462.L			Economic Development and Energy Policies	1-0-0	2, 4	B	★【Energy and Informatics Program】（ENI.H403）
		MEC.F451.L			Advanced Course of Turbulent Flow and Control	1-0-0	1,5	A	★【Energy Science and Engineering】(ENR.K430)
		MEC.T431.L			TokyoTech-KAIST DD technical research project (MEC)	0-2-0	1,3,5	C, D	★Only for students attending TokyoTech-KAIST DD program from KAIST side
		MEC.U431.L			Automotive Structural System Engineering A	3-0-0	1,2,3,4	A	★Not available in academic year 2023
		MEC.U432.L			Automotive Comfort Mechanics Engineering A	3-0-0	1,2,3	A	★Not available in academic year 2023
		MEC.U433.L			Advanced Production Engineering A	3-0-0	1,2,3	A	★
		MEC.U434.L			Advanced Internal Combustion Engine Engineering and Future Power Train A	3-0-0	1,2,3	A	★
	500 level	MEC.C531.L			Mechanics of High Temperature Materials	1-0-0	1,5	A, B	★
		MEC.D531.L			Experimental Modal Analysis for Structural Dynamics	1-0-0	1,5	A	Not available in academic year 2023
		MEC.D532.L			Silent Engineering	1-0-0	1,5	A	★
		MEC.E531.L			Plasma Physics	1-0-0	1,5	B	★
		MEC.E532.L			Cryogenic Engineering	1-0-0	1, 5	B	★
		MEC.F532.L			Rarefied Gas Dynamics	1-0-0	1,5	B	★
		MEC.G531.L			Precision Manufacturing Processes	1-0-0	1,5	A, B	★
		MEC.G532.L			Taguchi Method	1-0-0	1	C	

		MEC.H531.L			Robot Control System Design	1-0-0	1	A, B	★
		MEC.H532.L			Kinematic Analysis and Synthesis of Robots	1-0-0	1	A	★
		MEC.H533.L			Soft Robotics	1-0-0	1,5	A, B	★
		MEC.I531.L			Mechanical Biomimetics	1-0-0	1	B	★
		MEC.J531.L			Micro and Nano Systems	2-0-0	1	A, B	★
		MEC.M531.L			Space Systems Analysis B	1-0-0	1	B	★Not available in academic year 2023
		MEC.M532.L			Space Systems and Missions	2-0-0	1,4,5	B	
		MEC.M533.L			Special Topics of Advanced Space Engineering A	1-0-0	1,5	B	E:Only for even academic years
		MEC.M534.L			Special Topics of Advanced Space Engineering B	1-0-0	1,5	B	Not available in academic year 2023
		MEC.N531.L			Special Lecture in MEC M2S	1-0-0	1,2	A, B	
		MEC.N532.L			Special Lecture in MEC M2F	1-0-0	1,2	A, B	
		MEC.N533.L			Analytical and analogical methods to solve the heat transfer equation and the application to infrared image processing	1-0-0	1,2,3,4,5	B	★【Materials Science and Engineering】(MAT.P507)
		MEC.N534.L			Fundamentals of electrochemistry and the application to energy conversion materials	1-0-0	1,2,3,4,5	B	★【Materials Science and Engineering】(MAT.P506)
		MEC.E552.L			Leading edge energy technology	1-0-0	1,23	B	★【Energy Science and Engineering】(ENR.K580)

Note:

・◎:Required course, ○:Restricted elective, O:odd academic years, E:even academic years

・Competencies: 1 = Specialist skills, 2 = Intercultural skills, 3 = Communication skills, 4 = Critical thinking skills, 5 = Practical and/or problem-solving skills

・【 】Course offered by another graduate major

・★:Course gives priority to students affiliated with "Energy and Informatics Program" and "Graduate Major in Energy Science and Engineering".

・The character preceding the three digits in the course number denotes the course's subdiscipline (i.e., "D" represents the subdiscipline code in the course number ABC.D400.R): C (Mechanics of Materials), D (Mechanical Dynamics), E (Thermodynamics), F (Fluid Dynamics), H

(Design and Drawing, Information Processing, Courses for Developing Creativity), L (Bioengineering), M (Space Engineering), Q (IGP relating lectures), R (Off-campus Project), S (Overseas Research Project), U (TAIST), Z (Research Seminars)

6. IGP Courses That Can Be Counted as Humanities and Social Science Courses

None

7. IGP Career Development Courses and IGP Courses That Can Be Counted as Career Development Courses

In order to fulfill the completion requirements for the master's degree program, students must attain at least 2 credits in Career Development Courses, and should satisfy all of the Graduate Attributes (GA) specified in Table MA-1 of the "Career Development Courses" listed as one of the "Liberal Arts and Basic Science Courses" in the Guide to Graduate Education and International Graduate Program, as well as shown below. Students will be evaluated in regards to GA achievements at the time of their degree completion. As to the courses with two GAs, both GAs stipulated for the courses are considered to be acquired if students receive the corresponding credits for those courses.

Career Development Courses and Major Courses that enable students to acquire GA and that are recognized as equivalent to Career Development Courses, offered by the Graduate Major, are listed in Table M3 below. Students can also acquire GA and credits by taking the Career Development Courses offered by Innovator and Inventor Development Platform (IIDP) listed as one of the "Liberal Arts and Basic Science Courses" in the Guide to Graduate Education and International Graduate Program.

However, it must be noted that credits attained from those courses that can be counted as Career Development Courses can be counted towards the completion requirements of master's degree program, either for the Major Courses or for the Career Development Courses (i.e., not for both). Nevertheless, even in the cases from those mentioned above where attained credits pertaining to these courses are not considered as Career Development Courses, their associated GAs may be considered by the Graduate Major to have been acquired.

For Graduate Attributes, refer to the Guide to the Career Development Courses.
The Graduate Attributes of the Master's Degree Program are listed in Table MA-1 as follows:

GA0M: You can clearly plan your own career and recognize the abilities necessary for realizing it while considering ethics and relevance to societal problems.

GA1M: You can acquire the knowledge, skills, and ethics necessary for realizing your planned career and contribute to societal problem-solving while collaborating with other experts.

Table M3. Courses of the Graduate Major in Mechanical Engineering recognized as equivalent to Career Development Courses, and Career Development Courses

Course category	Course number	Course title	Credits	GA*	Learning goals	Comments
	MEC.R431.L	Off Campus Project M1c	0-0-1	GA1M	C, D	

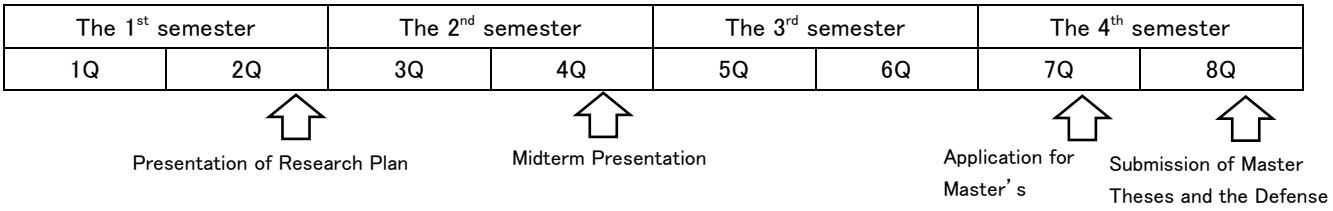
Courses that can be counted as Career Development Courses								
	MEC.R432.L			Off Campus Project M2c	0-0-2	GA1M	C, D	
	MEC.S531.L			Overseas Research Project M1c	0-0-1	GA1M	E	
	MEC.S532.L			Overseas Research Project M2c	0-0-2	GA1M	E	
	MEC.S533.L			Overseas Research Project M3c	0-0-3	GA1M	E	
	MEC.S534.L			Overseas Research Project M4c	0-0-4	GA1M	E	

Credits in Career Development Courses must be attained from among the above-listed courses and those listed as such in the Liberal Arts and Basic Science Courses Guide.

＊GA: Graduate Attributes

8. Research Related to the Completion of Master Theses

Students in this major aim at acquiring the abilities described in the section of ‘3. Learning Goals’ by accomplishing the research activities of their master theses. The following shows the progress for students to receive their master’s degrees at the end of the 8th quarter.



* Presentation of Research Plan

Students conduct ‘Presentation of Research Plan’ in the 2nd quarter to clearly understand the background and objectives of their research projects, in terms of their career formation.

* Evaluation Criteria for Master Theses

The master theses should be their original writings including their analyses and considerations based on new findings in the academic field of mechanical engineering or useful knowledge contributing to the development of technologies related to mechanical engineering.

* Evaluation and Examination Procedure of Master Theses and the Final Oral Defense

The thesis committee per each student consists of at least three members of Graduate Major in Mechanical Engineering including a supervisor and excluding a subadvisor. The thesis should be distributed to the committee at least one week before the final oral defense for the members to review the thesis. The student should be evaluated and examined upon both the master thesis and the oral defense. Exceptionally, students who would like to enter the Doctoral Degree Program should be examined by the thesis committee composed of at least five members.

【Doctoral Degree Program】

1. Outline

This major aims at fostering human resources who possess the leadership and capability to propose research projects for resolving societal problems from global perspectives, promote advanced research projects that lead to innovation of mechanical engineering, and return the profit obtained from research activities to society with new values, based on the systematic expertise of mechanical engineering and broad knowledge of its surrounding academic fields.

2. Competencies Developed

This major aims to develop the following advanced-level competencies to:

- Think and understand the essence that underlies a problem.
- Propose and develop new mechanical engineering systems by organizing broad engineering knowledge and skills related to the field of mechanical engineering.
- Lead and pioneer the forefront of science and technology.
- Enterprise and fulfill R&D projects as a leader.
- Fulfill R&D activities with an international perspective and a strong sense of ethics.
- Explain and convey one's ideas and thoughts to others logically.
- Present logical discussions and compile them in written documents.

3. Learning Goals

To make students in this major acquire the competencies above, this major provides the following learnings:

A) Specialized subjects in the field of mechanical engineering
B) Subjects of the peripheral and related fields
C) Broad abilities including abilities for being a leader and creatively proposing new ideas and projects.
D) Skills of logical communication
E) An international perspective and a sense of ethics

4. IGP Completion Requirements

The following requirements must be met to complete the Doctoral Degree Program of this major.

1. Attain a total of 24 credits or more from 600-level courses.
2. Fulfill requirements in Table D1 below.
   - Total 12 credits acquired from Research Seminars.
   - A minimum of 2 credits acquired from Electives in Research-related Courses and Major Courses.
   - A minimum 6 credits acquired from Liberal Arts and Basic Science Courses. (Two credits must be from Humanities and Social Science Courses, and four credits from Career Development Courses.)
3. Pass the Doctoral Dissertation review and defense.
4. In the case of Exception to Enrollment Period, exempted from acquiring course credits that must be attained from Research Seminars, the exempted credits are waived from a total required credits of 24 in Table D1, and also are waived from a minimum of 14 credits in Research Seminars and Research-related courses and major courses.

Table D1 shows course categories and the number of credits required to complete the Doctoral Degree Program of this major. It also shows the required minimum credits in each course category and points to be noted when selecting the required courses and electives.

The learning goals to be obtained by students through courses are listed as "associated learning goals". Before registering courses, students need to fully understand the course goals.

Table D1. Graduate Major in Mechanical Engineering Completion Requirements

Course category		<Required courses> Required credits	<Electives> Minimum credits required	Minimum credits required	Associated learning goals	Comments
Liberal arts and basic science courses	Humanities and social science courses		2 credits	6 credits	B, C	
	Career development courses		4 credits		C, D	All Graduate Attributes (GA) should be acquired. (Refer to Section 7 for the definition of GA.)
	Other courses					
Core courses	Research seminars	Seminar in Mechanical Engineering S3 Seminar in Mechanical Engineering F3 Seminar in Mechanical Engineering S4		14 credits	C, D, E	

		Seminar in Mechanical Engineering F4 Seminar in Mechanical Engineering S5 Seminar in Mechanical Engineering F5 A total of 12 credits, 2 credits each from the above courses.				
	Research-related courses		2 credits		C, D, E	
	Major courses				A, B, C, D, E	
	Major courses and Research-related courses outside the Graduate Major in Mechanical Engineering standard curriculum					
Total required credits		**A minimum of 24 credits including those attained according to the above conditions**				
Note		**・Japanese Language and Culture Courses offered to international students can be recognized as equivalent to the Humanities and Social Science Courses of the corresponding course level.** **・For details of the Liberal Arts and Basic Science Courses, please refer to the relevant sections.**				

5. IGP Courses

Table D2 shows the Core Courses of the Doctoral Degree Program of this major. Graduate Majors listed in the Comments column offer core courses that are recognized as equivalent to the corresponding Major Courses or Research-related Courses in the standard curriculum of this major.

Table D2. Core Courses of the Graduate Major in Mechanical Engineering

Course category		Course number	Course title			Credits	Competencies	Learning goals	Comments
Research	600 level	MEC.Z691.R	◎		Seminar in Mechanical Engineering S3	0-2-0	1,3,4,5	C, D	
		MEC.Z692.R	◎		Seminar in Mechanical Engineering F3	0-2-0	1,3,4,5	C, D	
		MEC.Z693.R	◎		Seminar in Mechanical Engineering S4	0-2-0	1,3,4,5	C, D	

		MEC.Z694.R	◎		Seminar in Mechanical Engineering F4	0-2-0	1,3,4,5	C, D	
		MEC.Z695.R	◎		Seminar in Mechanical Engineering S5	0-2-0	1,3,4,5	C, D	
		MEC.Z696.R	◎		Seminar in Mechanical Engineering F5	0-2-0	1,3,4,5	C, D	
Research-related courses	600 level	MEC.Q613.L			Off-campus Project SSSEP	0-0-4	2,3,4,5	C, D, E	For IGP(A) (SSSEP) students only
		MEC.R651.L			InfoSyEnergy-joint research projects 1	0-0-2	3, 4, 5	C, D	★【Energy and Informatics Program】 (ENI.C611)
		MEC.R652.L			InfoSyEnergy-joint research projects 2	0-0-4	3, 4, 5	C, D	★【Energy and Informatics Program】 (ENI.C612)
		MEC.S631.L			Overseas Research Project D1c	0-0-1	2,3,4,5	E	
		MEC.S632.L			Overseas Research Project D2c	0-0-2	2,3,4,5	E	
		MEC.S633.L			Overseas Research Project D3c	0-0-3	2,3,4,5	E	
		MEC.S634.L			Overseas Research Project D4c	0-0-4	2,3,4,5	E	
		MEC.S635.L			Overseas Research Project D5c	0-0-5	2,3,4,5	E	
		MEC.S636.L			Overseas Research Project D6c	0-0-6	2,3,4,5	E	
Major courses	600 level	MEC.N631.L			Special Lecture in MEC D1	1-0-0	1,2	A, B	★
		MEC.N632.L			Special Lecture in MEC D2	1-0-0	1,2	A, B	★
		MEC.N633.L			Special Lecture in MEC D3	1-0-0	1,2	A, B	★
		MEC.N634.L			Special Lecture in MEC D4	1-0-0	1,2	A, B	★
		MEC.N635.L			Analytical and analogical methods to solve the heat transfer equation and the application to infrared image processing (Advanced)	1-0-0	1,2,3,4,5	B	★【Materials Science and Engineering】 (MAT.P601)

		MEC.N651.L			InfoSyEnergy-international forum 1	0-0-2	3, 4, 5	C, D, E	★【Energy and Informatics Program】（ENI.B611）
		MEC.N652.L			InfoSyEnergy-international forum 2	0-0-2	3, 4, 5	C, D, E	★【Energy and Informatics Program】（ENI.B612）
		MEC.N653.L			InfoSyEnergy-international forum 3	0-0-2	3, 4, 5	C, D, E	★【Energy and Informatics Program】（ENI.B613）
		MEC.S651.L			InfoSyEnergy-international field work-short term	0-0-2	3, 4, 5	C, D, E	★【Energy and Informatics Program】（ENI.C616）
		MEC.S652.L			InfoSyEnergy-international field work-long term	0-0-4	3, 4, 5	C, D, E	★【Energy and Informatics Program】（ENI.C617）
		MEC.T631.L			Teaching Practice in Mechanical Engineering	0-0-2	1,3,5	D	
		MEC.R631.L			Off Campus Project D1c	0-0-1	3,4,5	C, D	
		MEC.R632.L			Off Campus Project D2c	0-0-2	3,4,5	C, D	
		MEC.R633.L			Off Campus Project D3c	0-0-3	3,4,5	C, D	
		MEC.R634.L			Off Campus Project D4c	0-0-4	3,4,5	C, D	
		MEC.R635.L			Off Campus Project D5c	0-0-5	3,4,5	C, D	
		MEC.R636.L			Off Campus Project D6c	0-0-6	3,4,5	C, D	
		MEC.R637.L			Cooperative Education through Research Internships of Mechanical Engineering	0-0-6	1,3,4,5	C,D	

Note:

・◎:Required course, ○:Restricted elective, O:odd academic years, E:even academic years

・Competencies: 1 = Specialist skills, 2 = Intercultural skills, 3 = Communication skills, 4 = Critical thinking skills, 5 = Practical and/or problem-solving skills

・【 】Course offered by another graduate major

・★:Course gives priority to students affiliated with "Energy and Informatics Program" and "Graduate Major in Energy Science and Engineering".

・The character preceding the three digits in the course number denotes the course's subdiscipline (i.e., "D" represents the subdiscipline code in the course number ABC.D600.R): N (Special Lecture in Mechanical Engineering), Q (IGP relating lectures), R (Off campus project), S (Overseas research project), T (Teaching practice), Z (Research Seminars).

6. IGP Courses That Can Be Counted as Humanities and Social Science Courses

None

7. IGP Career Development Courses and IGP Courses That Can Be Counted as Career Development Courses

In order to fulfill the completion requirements for the doctoral degree program, students must attain at least 4 credits in Career Development Courses, and should satisfy all of the Graduate Attributes (GA) specified in Table A-1 of the "Career Development Courses" listed as one of the "Liberal Arts and Basic Science Courses" in the Guide to Graduate Education and International Graduate Program, as well as shown below. Students will be evaluated in regards to GA achievements at the time of their degree completion. As to the courses with two GAs, both GAs stipulated for the courses are considered to be acquired if students receive the corresponding credits for those courses.

Career Development Courses and Major Courses that enable students to acquire GA and that are recognized as equivalent to Career Development Courses, offered by the Graduate Major, are listed in Tables D3 below. Students can also acquire GA and credits by taking the Career Development Courses offered by Innovator and Inventor Development Platform (IIDP) listed as one of the "Liberal Arts and Basic Science Courses" in the Guide to Graduate Education and International Graduate Program.

However, it must be noted that credits attained from those courses that can be counted as Career Development Courses can be counted towards the completion requirements of doctoral degree program, either for the Major Courses or for the Career Development Courses (i.e., not for both). Nevertheless, even in the cases from those mentioned above where attained credits pertaining to these courses are not considered as Career Development Courses, their associated GAs may be considered by the Graduate Major to have been acquired.

For Graduate Attributes, refer to the Guide to the Career Development Courses.
The Graduate Attributes of the Doctoral Degree Program are listed in Table A-1 as follows:

GA0D: You can clearly design your own career and contribute to realizing scientific, technological, or social innovation through a comprehensive understanding of the knowledge, skills, social responsibilities and ethics required to become an active member of academia and/or industry.

GA1D: You can lead in realizing scientific, technological, or social innovation by acquiring the advanced leadership skills, entrepreneurial skills, knowledge and expertise, and by developing social responsibility necessary for materializing your designed career.

Table D3. Courses of the Graduate Major in Mechanical Engineering recognized as equivalent to Career Development Courses, and Career Development Courses

Course category	Course number	Course title	Credits	GA*	Learning goals	Comments
Courses that can be counted as Career Development Courses	MEC.T631.L	Teaching Practice in Mechanical Engineering	0-0-2	GA1D	D	
	MEC.R631.L	Off Campus Project D1c	0-0-1	GA1D	C, D	
	MEC.R632.L	Off Campus Project D2c	0-0-2	GA1D	C, D	
	MEC.R633.L	Off Campus Project D3c	0-0-3	GA1D	C, D	
	MEC.R634.L	Off Campus Project D4c	0-0-4	GA1D	C, D	
	MEC.R635.L	Off Campus Project D5c	0-0-5	GA1D	C, D	
	MEC.R636.L	Off Campus Project D6c	0-0-6	GA1D	C, D	
	MEC.S631.L	Overseas Research Project D1c	0-0-1	GA1D	E	
	MEC.S632.L	Overseas Research Project D2c	0-0-2	GA1D	E	
	MEC.S633.L	Overseas Research Project D3c	0-0-3	GA1D	E	
	MEC.S634.L	Overseas Research Project D4c	0-0-4	GA1D	E	
	MEC.S635.L	Overseas Research Project D5c	0-0-5	GA1D	E	
	MEC.S636.L	Overseas Research Project D6c	0-0-6	GA1D	E	
	MEC.R637.L	Cooperative Education through Research Internships of Mechanical Engineering	0-0-6	GA1D	C,D	
Career Development Courses	MEC.P661	Doctoral Recurrent Program 1 (Mechanical Engineering Course)	0-0-1	GA0D GA1D		Career Development Course offered by the Graduate Major in Mechanical Engineering. You cannot count for the Major Course.
	MEC.P662	Doctoral Recurrent Program 2-1 (Mechanical Engineering Course)	0-0-2	GA0D GA1D		
	MEC.P665	Doctoral Recurrent Program 2-2 (Mechanical Engineering Course)	0-0-2	GA0D GA1D		
	MEC.P663	Doctoral Recurrent Program 3 (Mechanical Engineering Course)	0-0-3	GA0D GA1D		
	MEC.P664	Doctoral Recurrent Program 4 (Mechanical Engineering Course)	0-0-4	GA0D GA1D		

Credits in Career Development Courses must be attained from among the above-listed courses and those listed as such in the Liberal Arts and Basic Science Courses Guide.

＊GA: Graduate Attributes

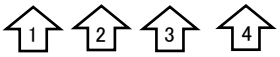
Students enrolled in the educational program for leading graduate schools, the Tokyo Tech Academy for Leadership (ToTAL) or WISE Programs may be offered courses recognized as equivalent to Career Development Courses besides those listed as such in the "Liberal Arts and Basic Science Courses" in the Guide to Graduate Education and

International Graduate Program. For details about available courses or completion requirements, please refer to the Study Guide of the Academy that offers the relevant program.

8. Research Related to the Completion of Doctoral Theses

Students in this major aim at acquiring the abilities described in the section of '3. Learning Goals' by accomplishing the research activities of their doctoral theses. The following shows the progress for students to receive their doctoral degrees at the end of the 12th quarter.

The 1st semester		The 2nd semester		The 3rd semester		The 4th semester		The 5th semester		The 6th semester	
1Q	2Q	3Q	4Q	5Q	6Q	7Q	8Q	9Q	10Q	11Q	12Q



1. Midterm Presentation
2. Application for Doctoral Degree
3. Doctoral Thesis Submission and the Defense
4. Final Examination and Evaluation

* Evaluation Criteria for Doctoral Theses

The doctoral thesis should be an own dissertation that contains novelty, originality, and sufficient academic value in mechanical engineering and its relating fields. Also, the main parts of the thesis should be published in the international standard journals, or to reach a similar level to the publication.

* Evaluation and Examination Procedure of Doctoral Theses and the Final Oral Defense

The doctoral thesis committee per each student consists of at least five members of Graduate Major in Mechanical Engineering including a supervisor and excluding a subadvisor. It is recommended to actively include the external examiners from other research institutes or companies. The student should be evaluated and examined upon both the doctoral thesis and the oral defense. The committee decides whether the student can get the doctoral degree by checking his / her corrections and modifications made to the satisfaction of all members in the final examination and evaluation.