

New Education System Begins in April 2016

Outline of Education Reform at Tokyo Tech

June , 2015



We will cultivate students with the drive to excel and the vision to contribute to society through science and technology.



Cultivate talented people in science and technology with the skills and expertise to lead

Education Reform to Cultivate Talent



Talented people with the expertise and leadership skills to create a better future



- Acquisition of fundamental knowledge in a wide range of fields, including mathematics, physics, chemistry, and life sciences
- Basic and specialized knowledge at the world's highest level in the fields of science and technology
- Will to contribute to society in science and technology fields

Leadership



- Broad vision based on accomplishments both inside and outside their areas of expertise
- Ability to communicate and collaborate with people from different fields and cultures
- Drive to take on global issues
- Will and ability to take part in creating a better future

Overseas Study at the World's Top Universities



Encourage study abroad for all students





Invite faculty from the world's top universities



Aiming to become one of the world's top ten research universities



1. Education System

- Joining of the Undergraduate and Graduate Schools
- Seamless Transition between Degree Programs
- More Options for Specialized Fields
- Deepening of Expertise and Development of Interdisciplinary Knowledge

2. Quality Assured Education

- Revitalized Curricula
- Quarter System
- Achievement-Based Assessment

3. New Education Environment

- Redefining University Education
- Active Learning
- Tools for Self-Initiated Learning

4. Education Support Systems

- Enhanced Student Support System
- Enhanced Faculty Support System



Undergraduate and graduate schools will be joined - a first in Japan



Schools

Combining Undergraduate and Graduate Departments



Current System

Undergraduate 3 Schools 23 Departments

School of Science

Mathematics / Physics / Chemistry / Information Science / Earth and Planetary Sciences

School of Engineering

Metallurgical Engineering / Organic and Polymeric Materials / Inorganic Materials / Chemical Engineering / Polymer Chemistry / Mechanical Engineering and Science / Mechanical and Intelligent Systems Engineering / Mechano-Aerospace Engineering / Control and Systems Engineering / Industrial and Systems Engineering / Electrical and Electronic Engineering / Computer Science / Civil and Environmental Engineering / Architecture and Building Engineering / Social Engineering / International **Development Engineering**

School of Bioscience and Biotechnology

Bioscience / Biotechnology

Graduate 6 Schools, 45 Departments

Graduate School of Science and Engineering

Mathematics / Physics (Particle-, Nuclear- and Astro-Physics) / Physics (Condensed Matter Physics) / Chemistry / Earth and Planetary Sciences / Chemistry and Materials Science / Metallurgy and Ceramics Science / Organic and Polymeric Materials / Applied Chemistry / Chemical Engineering / Mechanical Sciences and Engineering / Mechanical and Control Engineering / Mechanical and Aerospace Engineering / Electrical and Electronics Engineering / Physical Electronics / Communications and Computer Engineering / Civil Engineering / Architecture and Building Engineering / International Development Engineering / Nuclear Engineering

Graduate School of Bioscience and Biotechnology

Life Science / Biological Sciences / Biological Information / Bioengineering / Biomolecular Engineering

Interdisciplinary Graduate School of Science and Engineering

Innovative and Engineered Materials / Electronic Chemistry / Materials Science and Engineering / Environmental Science and Technology / Built Environment / Energy Sciences / Environmental Chemistry and Engineering / Electronics and Applied Physics / Mechano-Micro Engineering / Computational Intelligence and Systems Science / Information Processing

Graduate School of Information Science and Engineering

Mathematical and Computing Sciences / Computer Science / Mechanical and Environmental Informatics

Graduate School of Decision Science and Technology

Human System Science / Value and Decision Science / Industrial Engineering and Management / Social Engineering

Graduate School of Innovation Management

Management of Technology / Innovation

New System

6 Schools, 19 Departments					
Schools Departments					
Science	Mathematics Physics Chemistry Earth and Planetary Sciences				
Engineering	Mechanical Engineering Systems and Control Engineering Electrical and Electronic Engineering Information and Communications Engineering Industrial Engineering and Economics				
Materials and Chemical Technology	Materials Science and Engineering Chemical Science and Engineering	Institute			
Computing	Mathematical and Computing Science Computer Science	for Liberal Arts			
Life Science and Technology	Life Science and Technology				
Environment and Society	Architecture and Building Engineering Civil and Environmental Engineering Transdisciplinary Science and Engineering Social and Human Sciences Innovation Science Technology and Innovation Management (professional master's degree program)				

Schools, Departments, and Majors



School	Department		Undergraduate Major	Graduate Major						
	Mathematics	1	Mathematics	Mathematics						
Science	Physics		Physics	Physics						
	Chemistry		Chemistry	Chemistry	Energy Scient and Engineeri	re ng				
	 Earth and Planetary Sciences 		Earth and Planetary Sciences	Earth and Planetary Sciences		_				
	Mechanical Engineering		Mechanical Engineering	Mechanical Engineering	Energy Scient and Engineeri	e Engii ng Sciences	neering and Design	Human Centered Science and Biomedical Engineering	Nuclear Engineering	
	 Systems and Control Engineering 	sdno.	Systems and Control Engineering	Systems and Control Engineering		Engii Sciences	neering and Design			
Engineering	 Electrical and Electronic Engineering 	emic gr	Electrical and Electronic Engineering	Electrical and Electronic Engineering	Energy Scient and Engineeri	ng		Human Centered Science and Biomedical Engineering	Nuclear Engineering	
	 Information and Communications Engineering 	acade	Information and Communications Engineering	Information and Communications Engineering		_		Human Centered Science and Biomedical Engineering		
	 Industrial Engineering and Economics 	f seven	Industrial Engineering and Economics	Industrial Engineering and Economics		Engii Sciences	neering and Design			
Materials and Chemical	 Materials Science and Engineering 	one o	Materials Science and Engineering	Materials Science and Engineering	Energy Scient and Engineeri	re ng		Human Centered Science and Biomedical Engineering	Nuclear Engineering	
Technology	Chemical Science and Engineering	ars join	Chemical Science and Engineering	Chemical Science and Engineering	Energy Scient and Engineeri	ce ng		Human Centered Science and Biomedical Engineering	Nuclear Engineering	
Computing	 Mathematical and Computing Science 	1st yea	Mathematical and Computing Science	Mathematical and Computing Science						Artificial Intelligence
Computing	Computer Science		Computer Science	Computer Science						Artificial Intelligence
Life Science and Technology	Life Science and Technology	Ļ	Life Science and Technology	Life Science and Technology				Human Centered Science and Biomedical Engineering		
	 Architecture and Building Engineering 		Architecture and Building Engineering	Architecture and Building Engineering		Engii Sciences	neering and Design			Urban Design and Built Environment
	 Civil and Environmental Engineering 		Civil and Environmental Engineering	Civil Engineering		Engii Sciences	neering and Design			Urban Design and Built Environment
Environment and	 Transdisciplinary Science and Engineering 	Ļ	Transdisciplinary Science and Engineering	Global Engineering for Development Environment and Society	Energy Scient and Engineeri	e Engii ng Sciences	neering and Design		Nuclear Engineering	
Society	 Social and Human Sciences 			Social and Human Sciences						
	 Innovation Science 			Innovation Science						
	 Technology and Innovation Management (professional master's degree program) 			Technology and Innovation Management						
Institute for Liberal Arts				Liberal arts courses t	aken throug	nout each r	program			



Seamless transition between degree programs

The new education system will allow for easier transitions from bachelor's to master's and master's to doctoral programs.



Students will be able to better visualize their academic goals and choose from various courses and challenges to achieve those goals.



Current curriculum



New curriculum



Impact of new curriculum

Earlier involvement in graduate-level research

Under certain conditions, undergraduates will be able to take master's-level courses and join research projects. Qualifying master's students will be able to do the same for doctoral-level courses and research. This will provide a more seamless transition between degree programs.

Leadership education

With the new education system, students will gain vital leadership skills through broad training in their majors, research, and liberal arts courses.



Students will have more options for specialized fields of study

S DepartmentsDepartment of Metallurgical EngineeringDepartment of Organic and Polymeric
MaterialsDepartment of Inorganic MaterialsDepartment of Inorganic Materials

Example: A student interested in studying materials

2nd-year undergraduates must join a department to advance, even if they are unsure of the field in which they wish to specialize.

Education system which divides fields

Few faculty in each department

Limited range of fields offered

Limited flexibility to meet students' education needs

💑 = Faculty member



Under the new education system, the student will first receive general training in courses before deciding on a field of specialization. Students will also have the option to change their field halfway through their degree. With faculty from a wider range of fields, students will have greater options for study.

Education system which combines fields

More faculty from a wider range of fields provides the flexibility to support students' individual education goals.

More opportunities for cross-disciplinary study

Deepening of Expertise and Development of Interdisciplinary Knowledge



Seamless transitions between degree programs will allow for both deeper pursuit of expertise and development of interdisciplinary knowledge.

> Acquire broad, fundamental knowledge

Choose field of expertise matching goals

Deepen expertise



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New, high-quality curricula

- Each department will offer newly-designed, high-quality curricula.
- To maintain high quality, the newest curricula will always be used throughout the Institute.

Curricula that make it easy for students to select courses

- Course progression and relationship between courses will be better defined.
- Academic competencies that will be acquired through each course will be more clearly stated.
- Broader learning opportunities will be available through minors under an interdisciplinary option

Curricula tuned to those of the world's top universities

- For improved compatibility with other top universities' curricula, a course numbering system will be implemented and syllabi will be globally accessible in English.
- Achievement-based assessments will be used to show the extent of knowledge a student has acquired.



• Life science courses will be compulsory

First-year undergraduates will take courses that are fundamental to studying science and technology. Life sciences will be added to the compulsory courses in addition to math, physics, chemistry, English, and liberal arts. The courses will thoroughly cover the basics and provide broad, foundational knowledge.

New 100-level courses will be offered

In one example, new undergraduates will take a Frontiers of Science and Technology course, where they will attend lectures by leading Tokyo Tech researchers, Nobel Prize-level scientists, and industry experts.

Classes conducted in English

All major courses will be conducted in English in the master's and doctoral degree programs. Some basic courses in the bachelor's degree program will be taught by international faculty in English. All students will be strongly recommended to study abroad or gain other international experience.



Quarter system

Under the quarter system, one academic year will be divided into four quarters.

1Q	2Q	Summer Vacation	3Q	4Q		
April-early June	Mid June– early August	Mid August–mid September	Late September– late November	Early December– early February		
			Exact periods for	or each quarter are under review.		
Upon implementing:						

- Intensive learning in shorter periods will enhance learning effectiveness.
- Flexible academic plans will make it easier to study abroad or do internships.
- Offering courses more frequently will better accommodate students.
- Enrollment in Tokyo Tech will be more accessible for international students.



Achievement-based assessment

Academic progress will be measured using achievement-based assessments and learning portfolios, emphasizing the extent of knowledge acquired rather than simply the number of years of study.



Students will view their progress in terms of knowledge acquired rather than credits earned.

Academic advisors will provide guidance based on students' learning portfolios, allowing them to better grasp their strengths and weaknesses and take charge of their own educational paths.



Standard model

Students are assessed on whether or not they can progress to the next stage.

A chievement-based assessment to join a department and advance to 2nd year after completing 100-level courses

B

Achievement-based assessment to begin independent research project (equivalent to the current graduation research)

Achievement-based assessment for graduation





Early graduation model

Aspiring students will be able to progress to the next stage earlier.

Achievement-based assessment to join a department and advance to 2nd year after completing 100-level courses





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Inspiring ambition with the new Lecture Theatre

New undergraduates will attend lectures by leading Tokyo Tech researchers, Nobel Prize-level scientists, and industry experts.

> Students will be exposed to the wonders of research and motivated to pursue careers in science and technology.

Strike while the iron is hot.





Active learning

Through group work, discussions, and presentations, students will take more active roles in their education.

Students will cultivate initiative, communication skills, and leadership skills.

From passive participation to active learning





Online learning

Massive open online courses (MOOC) will provide greater flexibility and allow for study both on and off campus.

Content will be taught in English and Japanese.

Students will engage in flipped learning, course preparation, and review.

Tokyo Tech will gain greater recognition as one of the world's top universities.

Preparation and review will deepen students' understanding of course content.





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Enhanced support system for students

- Academic advisors will support students in their goals, education plans, and employment searches.
- Learning portfolios will help provide seamless transitions between degree programs.
- To support their ambitions, students can consult their academic advisors at any time. All students will have at least one scheduled meeting with their academic advisors per academic year.

Enhanced support system for faculty

- Faculty will be provided training in new teaching methods and in teaching in English.
- Organizations providing education training will be strengthened to further enhance faculty's teaching abilities.

For Prospective Students





Science and technology offer paths to a new world.

Study hard, enjoy your life at Tokyo Tech, and grow to become leaders of the future.

Tokyo Tech will wholeheartedly support you in achieving your goals.