国立大学法人
東京農工大学
Tokyo University of Agriculture and Technology

TUAT

AIMS Programme 2018
Guide & Application

Tokyo University of Agriculture and Technology

Faculty of Engineering

Tokyo University of Agriculture and Technology

AIMS Programme guide and application 2018

< Programme Guide >

1. LOCATION
   Where will you study?

Tokyo University of Agriculture and Technology
Faculty of Engineering
◆ 2-24-16 Nakacho, Koganei-Shi, Tokyo
184-8588 JAPAN

2. DURATION
   When will you study?

Early September 2018 to End of December 2018
◆ Extension to the end of January 2019 is possible for students who are interested in the Engineering Industrial Training Course

3. COURSE
   What will you study?

1) Preparatory Courses:
(September 2018)
3-week programme to learn about Japanese industries, technologies, culture, and society.

2) Specialized Courses and Research Internship:
(October to December 2018)
Specialized courses are available from the seven departments and an opportunity to do a research internship in connection with the student's specialization

3) Engineering Industrial Training:
(December 2018 to January 2019)
Only available for students staying until the end of January

4) ELIGIBILITY

Students from these universities are eligible to apply for the 2018 TUAT AIMS programme:

- University Teknology Malaysia (UTM)
- Malaysia-Japan International Institute of Technology (MJIIT)
- King Mongkut's University of Technology Thonburi (KMUTT)
- Institut Teknologi Bandung (ITB)
- University Brunei Darussalam (UBD)
- University of the Philippines Diliman (UPD)
- De La Salle University (DLSU)
- Saint Louis University (SLU)

5) COST

1) Tuition

No tuition fees will be charged.

2) Travel Costs (Air fee, Visa, Insurance etc.):

Please contact individual programme coordinators to confirm any financial assistance offered.

3) Accommodation:

◆ On-campus residence (Shared Flat)

(Approximately 10,000 JPY/ month) + Cleaning expenses (15,000 JPY)

- Utility bills are included.
- Internet is not included.

◆ On-campus residence (Single)

(Approximately 28,000 JPY/ month) + Cleaning expenses (15,000 JPY)

- Utility bills and Internet are not included.

◆ Off-campus residence (Shared Flat)

(TBA)

FYR last year (Approximately 20,000 JPY/ month) + Cleaning expenses (15,000 JPY)

- Utility bills and Internet are not included.

The accommodation will be assigned by considering gender and religion etc.

6) SCHOLARSHIP

The Faculty of Engineering of TUAT provides scholarships for certain students to alleviate financial difficulty and support studies in Tokyo. For more detailed information regarding the scholarships, please contact us.

7) APPLICATION PROCEDURE

Please send all documents to us.
The deadline for completed applications for the programme is:
the 1st of June 2018.

Applications must be made through the students' originating university.

◆ Documents to be prepared or arranged by applicant:
- ① Completed Application Form (Form A)
- ② Certificate of Health (Form B)
- ③ Statement of Financial responsibility (Form C)
- ④ Copy of Applicant's Passport
- ⑤ Two 4cm × 3cm Photos (please paste one photo to the Application Form)

◆ Documents to be requested by applicant from home institution:
- ⑥ Letter of Recommendation (Form D)
- ⑦ Academic Records Transcript

8) CONTACT DETAILS

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Organization for the Advancement of Education and Global Learning
Faculty of Engineering

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TUAT AIMS Programme 2018/19 (Faculty of Engineering)		
	Common Courses (September)	**Credits**
C1	Summer Programme (TBD)	1～2
	Specialised Courses (October to December)	
	Department of Chemical Engineering	Credits
K1	Separation Process	3
K2	Environmental Engineering and Microbiology	3
K3	Chemical Reaction Engineering	3
K4	Chemical Engineering Laboratory	1
K5	Physical Chemistry	3
K6	Process Safety & Health Management	3
K7	Research Internship	2～3
	Department of Mechanical Systems Engineering	Credits
M1	Control Engineering	3
M2	Mechanics of Machines and Vibration	3
M3	Mechanical Component Design	3
M4	Mechanical Systems Engineering Laboratory II	1
M5	Advances in Mechanical Systems Engineering	1
M6	Fluid and Thermal Engineering	3
M7	Research Internship	2～3
	Department of Applied Physics	Credits
P1	Physics of Material	3
P2	Quantum Mechanics	3
P3	Statistical Thermodynamics	3
P4	Applied Physics Laboratory	2
P5	Research Internship	2～3
	Department of Computer and Information Science	Credits
S1	Parallel Processing & Computer Network	3
S2	Database	3
S3	Mathematics for Data Mining & Security	3
S4	Pattern Recognition & Machine Learning	3
S5	Research Internship	2～3
	Department of Biotechnology & Life Science	Credits
L1	Research Internship	2～3
	Department of Applied Chemistry	Credits
F1	Research Internship	2～3
	Department of Organic & Polymer Materials Chemistry	Credits
G1	Research Internship	2～3
	General Courses	Credits
A1	Research and Academic Writing Skills in Engineering	3
A2	Engineering Industrial Training (only available for students staying until the end of January)	1～3

Short Course Description

Dept. of Chemical Engineering	
K1	Separation Process
	Introduction to unit operations in chemical engineering: evaporation, liquid-liquid separation, liquid vapor separation, liquid-liquid extraction, solid-liquid separation, gas-solid separation and mechanical separation process.
K2	Environmental Engineering and Microbiology
	This course introduces essences and principles of environmental engineering, sustainability and microbiology. Throughout the course, students will learn fundamentals of environmental microbiology, diversified environmental problems and countermeasures, e.g., water/wastewater technologies, concept of recycling-oriented society, risk assessment and sustainability.
K3	Chemical Reaction Engineering
	This course provides students how to treat Kinetics of homogenous reaction, Reactor design, Basics of Non-ideal flow, and Solid Catalyzed reactions.
K4	Chemical Engineering Laboratory
	This laboratory course will provide the opportunity for students to train fundamentals of process dynamics/control, basic methodologies and skills regarding quantification of environmental pollution and to demonstrate measurements of environmental samples. Likewise, the course includes field visits.
K5	Physical Chemistry
	Introduction to engineering thermodynamics, phase equilibria, basic electrochemistry, kinetics, reaction rate and adsorption.
K6	Process Safety and Health Management
	This course will provide the student with the ability to manage process safety, abnormal situation management, and environmental health issues in chemical industry.

Dept. of Mechanical Systems Engineering	
M1	Control Engineering
	This course introduces the basic design theory of feedback control systems for linear dynamical systems. Several applications on automotive control as well as aircraft dynamics control are described based on control theories. Classical control and Modern control theories are introduced in the class. The theory of state observer and Kalman filtering are also introduced.
M2	Mechanics of Machines and Vibration
	This course introduces the topic of vibrations which is a direct application of the principles of kinetics. In this course, the study of discrete systems is limited to those whose configurations are described with one displacement or angular variable. We will describe the free vibration of particles and forced vibration of particles which are subdivided into un-damped and damped motion categories. Then, we will discuss the vibration of rigid bodies. Finally, an energy approach to the solution of vibration problems and several applications relevant to mechanical machineries, e.g. motors, rotational machines, etc. including vibration measurement and control are also introduced.
M3	Mechanical Component Design
	This course is designed to give students knowledge of the designer's needs in order to effectively help. The knowledge is about the role of each mechanical component, the required aspects, and the points to be considered for proper design. Students will be also exposed into the actual manufacturing process through short videos. Based on these basic knowledge, stress-stain analysis method will be introduced as general treatment. In this course, widely used and important mechanical components are focused, such as threads, gears, shafts, belts, brakes, dumpers, and bearings. Lubricants are also referred. As genera theoretical analysis method, Airy's stress function is introduced with a case study. As a proof of knowledge achievement, task report is requested at the end of the semester.
M4	Mechanical System Engineering Laboratory II
	Thermodynamics and Fluid dynamics are core subjects on Mechanical Engineering. These have developed though many experiments. In this course, students will learn the experimental method on thermo-fluid dynamics and perform several experiments. Furthermore, they will visit thermo-fluid dynamics laboratory so as to have an experience with the most-advanced research on the field and obtain knowledge about

	the measurement and controlling techniques.
M5	Advances in Mechanical Systems Engineering
	Mechanical Systems Engineering is one of the key approach to solve the current problems where keywords are “safe and secure”, “quality of life”, “clean environment”, “supply of food and energy”, etc. In this course, each lecture is selected from each significant field in mechanical systems engineering, provided by the professors of department of mechanical systems engineering, also including the researcher of external institute.
M6	Fluid and Thermal Engineering
	The course combines the basic principles in Thermodynamics, Heat Transfer and Fluid Mechanics into one integrated subject. The course will cover: introductory concepts and definitions of thermodynamics, first law of thermodynamics, evaluating properties, control volume analysis for mass and energy, Carnot cycle, fluid statics and buoyancy, control volume analysis for momentum conservation, Bernoulli equations, and heat transfer modes including conduction, convection and radiation. Case studies based on real-world thermal systems will be used throughout the class to illustrate the connection between these interdisciplinary subjects.

Dept. of Applied Physics	
P1	Physics of Materials
	The aim of this course is to understand physical origins of electricity, magnetism, and optical property of materials, which are applicable to investigation of newly developed materials including semiconductors and superconductors in materials science. Applications to industrial technology, for example, quantum devices and magnetic and optical memories are also focused on.
P2	Quantum Mechanics
	The aim of this course is to understand the fundamental concept of quantum physics. The lecture will start from the interpretation of the wave equation and several basic quantum systems will be discussed by using the Schrodinger equations.
P3	Statistical Thermodynamics
	The aim of this course is to understand the fundamental concept of statistical physics. The lecture will start from the definition of entropy in the sense of statistical physics. Based on the definition, Boltzmann and Gibbs factors will be derived, and its application to physical phenomena in equilibrium states will be discussed.
P4	Applied Physics Laboratory
	This course provides students the experimental training in measurement methods for detecting photons and luminescence of spectra line. Students also learn how to characterize the functions of model Stirling engine and heat pump through measurement of various parameters such as temperature, pressure, and rotation speed.

Dept. of Computer and Information Science	
S1	Parallel Processing and Computer Network
	Currently, high performance computers consist of multiple computers connected via network and perform parallel processing efficiently. In this class, we discuss about network technologies of local and wide area network as well as system area network called SAN. Cache technology for parallel processing is discussed, too. Based on these technologies, we survey parallel computer systems with various multi-cache technologies for a data center.
S2	Database
	This course aims to understand the basic database and data analysis. This course has three parts: 1) RDB & SQL Basis, 2) KVS (Key Value Store), and 3) Data analysis Basis. In the first part, DBMS (Database Management System), relational data model and normal forms are introduced. SQL (Structure Query Language) is explained to define and operate DB in the part. In KVS part, we introduce the KVS (its concept, architecture, benefits) and explain data-processing with real-world KVSs. In Data Analysis Basis part, we focus on the statistical analysis of data and information retrieval for large DB.
S3	Mathematics for Data Mining & Security
	This course aims to cultivate a better understanding of roles of mathematics in information science through introducing principles of data mining and security. In the data mining section, we will examine popular data mining techniques (anomaly detection, clustering, classification, regression, and data visualization) with some practice problems for understanding of the necessity of mathematical optimization and linear programming problem. In the security section, we will learn basics on the number theory and algebra such as Euclidean algorithm, polynomial, and extension field, accompanied with some applications such as the RSA cryptography and the Reed-Solomon code.
S4	Pattern Recognition and Machine Learning
	Pattern recognition classifies, identifies or recognizes symbols, structures or any type of information represented, conveyed or even hidden in a set of signals which are redundant and often noisy. It is theoretically and scientifically important to learn human abilities of pattern recognition and practically important to realize smooth human machine interaction.

List of Research Topics for Research Internship (AIMS Programme 2018)

No.	Department	Fields	Name of Supervisor	Requirements for applicants	Numbers of acceptance	Comments
K-1	Chemical Engineering	Environmental Analysis	Prof. Masaaki HOSOMI		2	
K-2	Chemical Engineering	Reaction and Drying Kinetics	Assoc. Prof. Susumu INASAWA	Reaction engineering, Transport phenomena	1	
K-3	Chemical Engineering	Powder/Particle Technology	Prof. Hidehiro KAMIYA		2	
K-4	Chemical Engineering	Green Materials Processing	Assoc. Prof. Wuled LENGGORO		1	
K-5	Chemical Engineering	Reactive Transport Phenomena	Assoc. Prof. Yuichiro NAGATSU		6	Students will do experiment on fluid dynamics with chemical reaction.
K-6	Chemical Engineering	Functional Membrane Systems	Assoc. Prof. Hidenori OHASHI		2	Students will learn graft polymerization from material surfaces. It is prefarable to have some knowledge on polymer science.
K-7	Chemical Engineering	Effective energy utilization	Assoc. Prof. Makoto SAKURAI		2	Students will conduct experimental study on energy conversion process.

K-8	Chemical Engineering	Crystallization / Separation & Purification	Prof. Hiroshi TAKIYAMA		2	Purification technique by using crystallization: 1) Understanding phase equilibria. 2) Characterization of crystalline particle properties.
K-9	Chemical Engineering	Bio-process Technology	Assoc. Prof. Akihiko TERADA		2	A student will operate and maintain a bioreactor for wastewater treatment. He/She will be equipped with essence on bioreactor engineering and biokinetics of microorganisms.
K-10	Chemical Engineering	Process Systems Engineering	Prof. Yoshiyuki YAMASHITA		3	Students will investigate chemical process design or modeling project. Advanced computer softwares will be used.

No.	Department	Fields	Name of Supervisor	Requirements for applicants	Numbers of acceptance	Comments
M-1	Mechanical Systems Engineering	Mechanics of materials Experimental mechanics	Prof. OGSAWARA, Toshio	Mechanics of materials	1	Mechanical testing and finite element analyis (FEA) of carbon fiber reinforced composite materials for aircraft structure
M-2			NATSU Wataru		1	
M-3	Mechanical Systems Engineering	Robotics	VENTURE Gentiane	Computer programming	1	robot dynamics control or human motion analysis. The research topic is decided after discussion and to match interests both of the lab and the student.

M-4	Mechanical Systems Engineering	Tribology, Fracture of materials	IKEDA, Koji	Materials Science or related subjects	1	Lubrication effect of palm oil will be selected as research topic. Student is welcomed who is interested in damage and fracture during friction.
M-5	Mechanical Systems Engineering	Robotics	MIZUUCHI, Ikuo		1	Please have a look at http://mizuuchi.lab.tuat.ac.jp/MizuuchiLab-Poster-2015.pdf We can arrange several types of short-term projects related to robotics, and the applicant will be able to select one of them. A proposal of a project may be also acceptable.

No.	Department	Fields	Name of Supervisor	Requirements for applicants	Numbers of acceptance	Comments
P-1	Applied Physics	Optics, Quantum Electronics	Prof. Kazuhiko Misawa	Not specified	1	
P-2	Applied Physics	Biophysics and Soft Matters	AssociProf.Miho Yanagisawa	Not specified	1	
P-3	Applied Physics	Atomic and Molecular Physics, Surface Science	AssociProf.Atsushi Hatakeyama	Not specified	1	
P-4	Applied Physics	Superconducting Materials	AssociProf.Akiyasu Yamamoto	Not specified	1	
P-5	Applied Physics	Biophysics	AssociProf.Yoshinori Murayama	Not specified	1	Physics of DNA and Microorganism

No.	Department	Fields	Name of Supervisor	Requirements for applicants	Numbers of acceptance	Comments
S-1	Computer and Information Science	Systems Software	Mitaro Namiki	OS's basis, Language C, Assembler	1	
S-2	Computer and Information Science	Database Management System for IoT		RDBMS		
S-3	Computer and Information Science	Embedded Systems for Sensor Network		Embedded processors, Sensors		
S-4	Computer and Information Science	Computer Graphics and Visualization	Takafumi Saito	Language C, OpenGL	1	
S-7	Computer and Information Science	Computer Vision	Ikuko Shimizu	C,C++	1	
S-8	Computer and Information Science	Image Processing		C,C++		
S-9	Computer and Information Science	3D modeling		C,C++		

S-10	Computer and Information Science	Human-computer interaction (human activity recognition using depth camera)	Kinya Fujita	C++ language, Basic knowledge and programming skill on Computer Vision	1	
S-12	Computer and Information Science	Mathematical Optimization	Ryuhei Miyashiro	Linear and Integer Programming	1	
S-13	Computer and Information Science	Signal processing for wireless communications	Shinya Sugiura	C++, statistics, information theory, electromagnetic theory, paper reading (http://ieeexplore.ieee.org/iel7/5/6685843/06678765.pdf?arnumber=6678765)	1	In advance of this internship, it is needed to read the following paper: http://ieeexplore.ieee.org/iel7/5/6685843/06678765.pdf?arnumber=6678765
S-14	Computer and Information Science	Ubiquitous Computing	Kaori Fujinami	-Basic knowledge of physical computing (Arduino, sensors, etc.) and/or Android programming	1	
S-15	Computer and Information Science	Interconnection Networks	Keiichi Kaneko	Fundamental Knowledge about Algorithms, Programming Skill	1	Design of a topology and/or a routing algorithm

S-16	Computer and Information Science	Multimedia-based Pedagogical Systems		Experience of Implementation of an Interactive System		Design and implementation of a learning system
S-19	Computer and Information Science	Software Defined Network	Nariyoshi Yamai	UNIX/Linux, Program language Ruby	1	
S-20	Computer and Information Science	DNS Security		UNIX/Linux, Programing language Perl/Ruby/Python		
S-21	Computer and Information Science	Biomedical Signal Processing	Toshiyuki Kondo	Programming skills (Matlab, C#)，Signal Processing, Pattern Recognition	1	
S-22	Computer and Information Science	Bioengineering, Robotics		Programming skills (Matlab, C#)， Pattern Recognition, Control Theory		
S-24	Computer and Information Science	Machine learning, Pattern Recognition	Masaki Nakagawa		1	
S-25	Computer and Information Science	Pattern Recognition, Machine learning, Image & Video Processing	Seiji Hotta		1	

S-26	Computer and Information Science	Signal Processing on Graphs	Yuichi Tanaka	Linear algebra, signal processing, MATLAB, [Optional] graph theory	1	

No.	Department	Fields	Name of Supervisor			Comments
L-1	Biotechnology & Life Science	Biophysical chemistry	Prof. Nobuhumi Nakamura			
L-2	Biotechnology & Life Science	Chemical Biology	Assoc. Prof. Kaori Sakurai			
No.	Department	Fields	Name of Supervisor			Comments
F-1	Applied Chemistry	Organometallic Chemistry	Prof. Masafumi Hirano			
F-2	Applied Chemistry	Organic Synthesis / Chemical Biology	Prof. Hiroki Ohguri			
F-3	Applied Chemistry	Catalysis and Green Chemistry Field	Assoc. Prof. Keiji Mori			
F-4	Applied Chemistry	Functional Nanoporous Materials	Assoc. Prof. Kazuyuki Maeda			
F-5	Applied Chemistry	Batteries and Supercapacitors	Prof. Katsuhiko Naoi			
F-6	Applied Chemistry	Electrochemistry and Energy Storage Devices	Assoc. Prof. Morihiro Saito			It is preferable to have some knowledge about 1) physical chemistry 2) catalytic science, and 3) Ion transport.

F-7	Applied Chemistry	Crystal growth of wide bandgap semiconductors	Prof. Yoshinao Kumagai			
F-8	Applied Chemistry	Thin film engineering	Assoc. Prof. Hisashi Murakami			
F-9	Applied Chemistry	Organic Iodine Chemistry	Assoc. Prof. Akio Saito			It is preferable to have some knowledge about organic chemistry.
F-10	Applied Chemistry	Synthetic Organofluorine Chemistry	Prof. Takashi Yamazaki			
No.	Department	Fields	Name of Supervisor			Comments
G-1	Organic & Polymer Materials Chemistry	Synthesis and Characterization of Polymer	Prof. Kenji Ogino			