Sub-Program/ Component	Development of infrastructure to promote economic activity （Development Engineering・Information Communication Technology）

1	**University**	**Tokyo Institute of Technology** (National)
	Graduate School	Department of International Development Engineering, Graduate School of Science and Engineering
	URL of University	http://www.titech.ac.jp/english/index.html
	URL of Graduate School	http://www.ide.titech.ac.jp/index.html
	Program name	Department of International Development Engineering
	Degrees	・ Master of Engineering ・ Master of Arts
	Credit and years needed for graduation	30 Credits, 2 Years
	Note	The student is required to study for two years and to get 30 credits to complete the Master course. One 2-credit course consists of fifteen 90-minutes lectures including examination. In addition, the student should submit the master thesis and pass the final examination. Among the 30 credits, 8 compulsory credits are obtained through the seminars and the laboratory activities, which are supervised by the advisor. At least 16 credits including above 8 credits should be the courses provided in the Department. Among the rest 14 credits, 4 credits should be the courses provided in other departments. In addition to 30 credits, the student can take the Minor certificate by getting 8 credits provided in a single department.

２． Features of University

Tokyo Institute of Technology - TOKYO TECH - develops distinctive students with outstanding qualities of creativity and leadership. TOKYO TECH is making significant contributions to science and technology in many fields of expertise, creating new and powerful synergies. TOKYO TECH, being a research-based university, is dedicated to education and research, and to exploring knowledge in science and technology. Pursuing excellence, TOKYO TECH serves society and the world.

Some figures:
•Founded in 1881, and has been a prominent science and engineering university in Japan
•Budget for FY 2008: 44,954 mil. Yen
•Number of Research and Teaching staff: 1, 169 (Profs.:386, Asso.Profs.:339, Assit.Profs.:364)
•Number of students: 10,046 (Grads: 5,014, Undergrads: 4,911, Research Students:121)

•Number of International students from abroad: 1,092 (graduate:683, undergrad.:267, non-degree students:142, from 77 different countries)

3． Features of Graduate School

Graduate School of Science and Engineering

The underlying philosophy of the School is to contribute to the sustained advancement of humankind through the advancement of science and the creation of pioneering technologies based on a tradition of engineering excellence, the eternal and priceless source of knowledge accumulated over many generations. The School is resolved to encourage students to recognize the importance of the discovery and analysis of new phenomena as well as experimental synthesis, design optimization and innovation, so that they may better contribute to a deep understanding of the global issues of the new millennium.

Charter

1. To participate with intellectual curiosity and determination in the creation of new knowledge based on our tradition of engineering excellence.
2. To create an intellectually inspiring campus through the free exchange of views and information between departments and individual members of the School.
3. To promote the creation of knowledge by encouraging constructive interactions between individuals from diverse backgrounds.
4. To create new fields of study for the future of the Earth and humankind; and to contribute to society and the local community by supporting the development of new industries.

4． Features of the Program

Department of International Development Engineering

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Program Description

The goal of the education in the department is to produce the engineers who can take the leadership in the sustainable development of the global society by utilizing the science and technology. The areas of their contributions include the industry, public works, information and communication technologies, and environment. Toward this goal, several unique components are integrated into the course: first, skills on project formulation and management are emphasized. In addition to the case method, the ongoing international development projects are used as the course materials for the analyses of the problems and their solutions. The skills provide the vision of the high level “problem solution” to the engineering students. Second, advanced knowledge in engineering fields is provided with the focus on the sustainable development. Third, internship and field work are provided as an elective course. Fourth, thesis writing provides an opportunity for the training to build the capacity as the engineer. The searching for solution for a specific development problem is emphasized in addition to technology itself. Therefore, a co-advisor from different engineering fields may be appointed on request.

The weights of the curricula in international development and the engineering are about 3:7.

5． Necessary Curriculum to Obtain to the Degrees

Please see attached the sheet.

6． Academic Schedule

Academic Calendar

2010	
April 5 (Mon)	Entrance Ceremony (Undergraduate / Graduate)
April 7 (Tue), 9 (Fri), 10 (Sat)	Undergraduate Freshman Orientation
Spring Semester	
April 7 (Wed) - July 24 (Sat) (No classes will be held on April 9 (Fri),10(Sat))	Classes (15 weeks 2 days)
May 7 (Fri)	Suzukakedai Campus Festival preparation (no classes)
May 8 (Sat)	Suzukakedai Campus Festival (no classes)
May 26 (Wed) (Monday classes will be held on July 22 (Thu))	Tokyo Tech Foundation Day (no classes)
July 26 (Mon) - August 7 (Sat)	Make-up class days and examinations(2 weeks)
August 8 (Sun) - September 30 (Thu)	Summer holidays (7 weeks 5 days)
September 27 (Mon)	Diploma Conferring Ceremony (Undergraduate / Graduate)
Autumn Semester	
October 1 (Fri)	Entrance Ceremony for October-enrollment Graduate Students
October 1 (Fri) - December 22 (Wed) (Monday classes will be held on October 21 (Thu))	Classes (11 weeks 6 days)
October 22 (Fri)	Ookayama Campus Festival preparation (no classes)
October 23 (Sat)	Ookayama Campus Festival (no classes)
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December 23 (Thu) - January 5 (Wed)	Winter holidays (2 weeks)
2011	
January 6 (Thu) - January 31 (Sat) (Monday classes will be held on January 14 (Thu))	Classes (3 weeks 5 days)
January 14 (Fri)	National Center Test preparation (no classes)

January 15 (Sat)	National Center Test Examination (no classes)
February 1 (Tue) - February 15 (Tue) Friday make-up classes and examinations will be held on February 15 (Tue)	Make-up class days and examinations(2 weeks 1 day)
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(Reference)

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2011

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February 25(Fri) – February 26(Sat)

March 12(Sat) – March 13(Sun)

・Friday classes will be held only at Graduate School of Innovation Management.

・November 17(Wed) afternoon Disaster drills

(The information above can be found at
http://www.gakumu.titech.ac.jp/nyusi/prospectus/calendar_e.html)

7. Facilities

The students are provided computers and study spaces in the laboratories of their supervisors. Tokyo Tech Information Infrastructure, including e-mail account, campus wireless LAN, VPN connection, etc., is available for all registered students. Many common facilities for research and daily life are also available. Here are listed a few of them:

- **Tokyo Tech Library** provides the comprehensive Digital Library as well as the vast collection of academic journals and books. http://www.libra.titech.ac.jp/welcome_e.html
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- **Art and Crafts Education and Research Support Center** provides the training programs and facilities of machine tools and electric works.
- **Health Service Center** gives various supports to students, such as regular medical checkups and health counseling.
  http://www.gakumu.titech.ac.jp/gakuseisien/health/center/english/index.html
- **International Student Center** provides counseling and support services for international students, Japanese language education, and vibrant cultural activities.
  http://www.ryu.titech.ac.jp/index.php
- There are **dormitories** for international students but availability is less likely due to over-flowing demand against the limited capacity.

Facilities: Lavatories, Multi-Purpose Room, Reading Room, Kitchen, Laundry Room,

8． List of faculty members capable of guiding JDS fellows

Professors:

OTSUKI, Nobuaki, D. Eng.	Construction Materials
HINODE, Hirofumi, D. Eng.	Inorganic Materials and Properties, Catalyst and Chemical, Process, Chemical Engineering in General
TAKADA, Jun-ichi, D. Eng.	Wireless Communications, ICT and Development
MOCHIMARU, Yoshihiro, D. Eng.	Fluid Dynamics, Thermal Engineering, Chemical Engineering
KANDA, Manabu, D. Eng.	Environmental Hydrology
NAKASAKI, Kiyohiko, D. Eng.	Environmental Engineering, Biochemical Engineering
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Associate Professors:

ABE, Naoya, Ph. D.	Environmental Economics and Planning, Policy Studies
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PIPATPONGSA Thirapong, D. Eng.	Geotechnical Engineering, Continuum Mechanics

(Note: Both Profs. Hirose and Mochimaru can not be advisers to incoming students due to their planned retirements in the future.)

9． Message for Applicants

The Department of International Development Engineering (IDE) was established to foster engineers who can contribute to global welfare from a technical aspect. IDE develops global engineers who can lead others in international fields, solve problems related to poverty and regional differences in developing countries, and work to halt the worldwide destruction of the environment by utilizing science and technology.

The field of science and technology is becoming borderless and more open, and in line with this trend, we have lowered the barriers between individual and traditional engineering fields to offer a curriculum in which students can learn universal concepts in a comprehensive and interdisciplinary way. We also provide lectures by engineers and businessmen working in their fields throughout the world, and offer overseas internships and field work in order to help students develop communication skills that will help them discuss topics of interest with their counterparts overseas and acquire knowledge to help them take the initiative in global projects.

Let’s take a step toward becoming a global engineer who can make decisions on the international stage beyond the boundaries of disciplines and nationalities.

2010-2011 edition

Department of International Development Engineering (IDE)

Tokyo Institute of Technology

http://www.ide.titech.ac.jp/

Department of International Development Engineering (IDE)
Tokyo Institute of Technology

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The weights of the curricula in international development and the engineering are about 3:7.

Contents of Program

Academic credit requirement

The student is required to study for two years and to get 30 credits to complete the Master course. One 2-credit course consists of fifteen 90-minutes lectures including examination. In addition, the student should submit the master thesis and pass the final examination. At least one academic supervisor is assigned to the student at the entrance to advise the candidate to conduct the research toward the master thesis. Among the 30 credits, 8 mandatory credits are obtained through the seminars and the laboratory activities, which are supervised by the advisor. At least 16 credits including above 8 credits should be the courses provided in the Department. Among the rest 14 credits, 4 credits should be the courses provided in other departments. In addition to 30 credits, the student can take the Minor certificate by getting 8 credits provided in a single department.

Specialized Courses and Seminars

All courses except for those with * are elective. There are some courses which are offered every other year. Supervisors advise students for their course works, considering the background of individual students.

Course Title	Lecturers	Credits
*International Development Projects - Case Method	Yamaguchi/Takada	2
Sustainable Development and Integrated Management Approach	Yamaguchi/Takada	2
Environmental Engineering in International Development	Hinode/Sasaki/Kanda	2
Principles of International Co-existence	Hirose	2
Utilization of Resources and Wastes for Environment	Otsuki/Nakasaki/Egashira	2
Project Evaluation for Sustainable Infrastructure	Hanaoka	2
Introduction to Economics for Engineers	Abe	2
Mathematical Science in Development Engineering	Yamashita	2
Advanced Geotechnical Engineering	Pipatpongsa	2
Regional Atmospheric Environment	Kanda	2
Durability and Maintenance of Construction Materials	Otsuki	2
Advanced Concrete Technology	Otsuki	2
Rural Telecommunications	Takada	2
Mathematics and Statistics for International Development	Yamashita	2
Industrial Resources in the World	Egashira	2
Chemical Process System for Development	Hinode/Egashira	2
New Trends in Numerical Analysis	Mochimaru	2
Welding and Joining Technology	Takahashi	2
Perspective Understanding of Various Kinds of Material	Takahashi	2
*Advanced International Development Laboratory I	Department Chair	1
*Advanced International Development Laboratory II	Supervisor	1
*Advanced International Development Laboratory III	Supervisor	1
*Advanced International Development Laboratory IV	Supervisor	1
*Advanced International Development Seminar I	Supervisor	1
*Advanced International Development Seminar II	Supervisor	1
*Advanced International Development Seminar III	Supervisor	1
*Advanced International Development Seminar IV	Supervisor	1
Field Work in International Development Engineering A	Department Chair	1
Field Work in International Development Engineering B	Department Chair	1

*: Compulsory

Course Description

International Development Projects with Case Method

This course aims at introducing practical approaches to development projects. Traditional teaching in the classroom based on lectures and exams, often do not address the need for practical, problem-solving skills. The important and crucial ability for effective project management is the ability to think, analyze, discuss, and develop solutions to problems as professionals may encounter in the field. The case method is an effective approach to strengthening these skills.

Sustainable Development and Integrated Management Approach

This course aims at introducing various approaches to sustainable development. The first half of the course looks at major theories of international development and how they are applied in practical situations. The latter part will take a close look at on-going development projects in selected countries with implication of role of engineering (and engineers). The students are expected to participate in discussion and analyze the project from engineering point of view within the context of “Sustainable Development” Then the course will be followed by the field trip to the development project site, possibly for conducting feasibility studies. The students are responsible to prepare, to contribute, and to express own opinions and ideas. This means, the students’ participation in classroom makes a difference.

Environmental Engineering in International Development

This lecture outlines international environmental problems mainly from the engineering side. Topics such as population growth, air pollution, deforestation and desertification, energy problem, waste management are covered.

Principles of International Co-existence

Engineers sometimes encounter difficult ethical problems In order to co-exist with others, we should know about ourselves as well as others. In this lecture, we look into the relationship between others and us in the different levels of individual, races, corporations and nations.

Utilization of Resources and Wastes for Environment

In order to achieve "sustainability" in our society, we have maximized resources productivity (product generated per unit resources) in industrial activities and minimized material/energy load (wastes) to the environment. In addition, wastes have been reused and recycled properly, even if wastes are generated. This lecture provides several examples of such industrial processes and technologies as above which effectually utilize resources and wastes.

Project Evaluation for Sustainable Infrastructure

This course aims to provide the methods necessary to undertake project evaluation for sustainable infrastructure. The methods comprise of microeconomics background, cost estimation, cost benefit analysis, impact analysis, comprehensive judgment and life cycle cost analysis. Case studies of various infrastructures are also provided.

Introduction to Economics for Engineers

This course mainly aims to provide basic concepts and theories of microeconomics to those engineering graduate students who did not study economics in the past for their easy (and not complete) access to current economic topics and fields of applied economics such as environmental economics and development economics.

Mathematical Science in Development Engineering

The objective of this course is to provide basic mathematics for understanding control theory in mechanical production and various phenomena in the international development engineering. The linear algebra, functional analysis, and the optimization theory, which are very important bases of mathematics, are explained.

Advanced Geotechnical Engineering

The course aims to provide the theoretical framework and backgrounds of advanced geomechanics consisting of basic theories of stress-strain-strength relations of geomaterial, formulation of the rate constitutive models, numerical analyses and computational techniques. Basic to advanced Engineering examples will be introduced throughout the study to create logics of application in International Development Engineering practice.

Regional Atmospheric Environment

The purpose of this lecture is twofold. One is to understand the fundamental knowledge and theoretical concepts of Boundary-Layer Meteorology (BLM). The other is to review the recent applications of BLM to physical urban planning and civil engineering.

Durability and Maintenance of Construction Materials

Lectures on durability and maintenance of construction materials including concrete and steel, especially related to developing countries.

Advanced Concrete Technology

The advanced construction methods, materials will be introduced. Also the fundamental knowledge of cement, hardened cement paste and concrete will be lectured. Lectures on new materials and new construction methods for concrete structures will be presented.

Rural Telecommunications

Telecommunications enable the communications instantly between any points in the world. Moreover, it has become common understanding that the telecommunication infrastructure is indispensable for the development of the industry and economy. However, the reality is very severe in the developing world, especially in rural and remote areas. Imbalance of the distribution of telecommunications in the world has been intolerable for the long time. This lecture overviews the historical aspects and the enabling technologies of rural telecommunications, both in the social and the technical aspects.

Mathematics and Statistics for International Development Engineering

Basic mathematics and statistics are lectured for international development engineering. Vector space, generalized inverses of matrices, eigenvalue problem, singular value decomposition, optimization (conjugate gradient method, quasi-Newton's method, Lagrange's method of undetermined coefficients, and dual problem), principal component analysis, statistical estimation, Cramer-Rao's lower bound, and test (chi-squared-test, F-test, and t-test) are explained.

Chemical Process System for Development

The lecture instructs the conceptual basis necessary for chemical process synthesis under consideration of various present conditions in developing regions. The respective unit processes essential to protect environments are introduced as well.

Industrial Resources in the World

The lecture explains present conditions of resources, e.g., energy, mineral, and problems of the respective resources. Impact on environment by resource development, especially water pollution by wastewater, is also discussed to know the recycling and effective utilization of inorganic resources.

New Trends in Numerical Analysis

Inclusive targets are: treatment of partial differential equations, multiplicity of solutions, stability, and spectral finite difference analysis.

Welding and Joining Technology

Welding and joining processes are the key technology in the industry. The processes will be reviewed including recent advanced processes. Phenomena and mechanisms of the processes will be explained based on material science, mechanics, and electrical engineering.

Perspective Understanding of Various Kinds of Material

Material properties such as latent heat, electric conductance, diffusion coefficient, elasticity, strength, etc... will be explained for variety of materials such as metals, ceramics, semiconductors, concretes, composites, etc... from the universal view point using bases of quantum mechanics, statistical mechanics, thermo-dynamics, etc...

International Engineering Communication A

The subject explores principles and skills of human communication in international English and in the context of international engineering research and practice.

International Engineering Communication B

The subject adopts a holistic view of project management emphasizing the sociocultural and communication aspects of Project Management. The perspective of stakeholders, particularly the project manager will be considered.

Advanced International Development Laboratory I

Each individual student belongs to the research lab to conduct the research work. However, it is essential for them to experience the other fields of engineering to involve in the international development.

Advanced International Development Laboratory II

As the preparation process of the master thesis, students should learn how to manipulate the tools, equipments, instruments, computer hardware and software, to conduct the researches.

Advanced International Development Laboratory III, IV

To complete the master thesis, students should conduct the prototyping, fabrication, test, measurement, programming, simulation, etc.

Seminar in International Development Engineering I-IV

Students should learn the textbooks and original papers to understand the fields of study first. Then students should present and discuss about the research approach and outcomes for the master thesis.

International Development Engineering Field Work A and B

Students shall plan and practice the activities related to the international development engineering. Through the experience of these activities, the students can learn the connection between the course works and the real development.

(Examples of activities)

- Field study for the international development projects.
- Internship or working experience in the domestic or international organizations related to the international development.
- Internship or training in foreign or domestic companies.
- Review and survey of state-of-art technologies by participating to an international conference. Visit of other research institution to give presentation or to discuss on research topic, by utilizing this occasion.

4. Faculty Staffs

OTSUKI, Nobuaki, D. Eng.	Construction Materials
HINODE, Hirofumi, D. Eng.	Inorganic Materials and Properties, Catalyst and Chemical, Process, Chemical Engineering in General
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PIPATPONGSA Thirapong, D. Eng.	Geotechnical Engineering, Continuum Mechanics

5. Enrollment Period and Academic Calendar

The enrollment period is two years from October 2010 to September 2012. The academic calendar for 2010-2011 is shown for the reference:

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7. Qualification

Master of Engineering is awarded. Depending on the thesis topic, Master of Arts may be awarded.