東京理科大学

Master's and Doctoral Course of Global Fire Science and Technology

Department of Global Fire Science and Technology
Graduate School of Science and Technology
Tokyo University of Science

Department of Global Fire Science and Technology

Master's Course in Fire Science and Technology, Graduate School of Global Fire Science and Technology, established byTUS in April 2010 is the first postgraduate course in Asia specialized in fire science and fire protection engineering. The Doctoral Course was also established in April 2012. This course provides high quality science based education and training to enable new career paths for those who are already working in industries of fire safety, such as building design, construction, materials, fire protection equipment manufacturers, property insurance and fire safety administration, as well as students seeking to acquire expertise in those fields.

This graduate school is an outcome of Global Center of Excellence program funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), entitled as "Center for Education and Research on Advanced Fire Safety Science and Technology in East Asia" aiming at establishing a central body that can facilitate high quality fire science education and research to help mitigate the increasing fire risk in East Asian countries that is emerging with rapid economic development. This program is being implemented by Center for Fire Science and Technology, Research Institute for Science and Technology, TUS. The Center has a large-scale Fire Research and Test Laboratory equipped with a wide range of testing facilities which can be used by students to learn basic theories in realistic settings.

The Department of Global Fire Science and Technology is scheduled to be set up in April, 2018 under the Graduate School of Science and Technology by reorganization of the Graduate School.

Mission

Aiming at mitigating the fire risk in mega cities of Asia where rapid urbanization is taking place, we are to nurture highly qualified safety professionals who can assess the fire risk of all types of premises and have capabilities to choose effective and appropriate protection measures.

Educational Objectives

In order to fulfill the mission of Department of Global Fire Science and Technology, we developed the following three objectives considering the difference in students' backgrounds and needs, where emphasis is placed on nurturing highly trained experts in building fire safety, city disaster prevention and fire safety administration.

- Enhancement of scientific knowledge for fire protection engineers
  The course will develop highly-trained protection engineers with sufficient knowledge in fire risk assessment and protection designing, as well as international codes and standards.
- Career enhancement for working-students
  The course will provide career enhancement programs for individual trainees, such as fire officers, fire administration officials, fire protection engineers, and insurance assessors.
- Overseas students from Asian countries
  The course is open to enrolment by students from overseas where fire prevention technologies and administrative procedures are currently under development. Education on fundamental fire science and practical training through experiments are provided in order to nurture skilled protection experts who would make various contributions to mitigate the fire risks in their countries.

Course Curriculum

"Fire Science" requires not only knowledge of architecture and urban design but also understanding of basic theory of physics and chemistry to reduce the risk of fire in the modern built environment. To deal with policy making and planning, one must also attain abilities to deduce a clear vision of tasks to solve apparent and potential problems, balancing with the economic and social situations of his/her country.

The course provides lectures on fire physics and chemistry, human behaviour, as well as experiments and exercises to help understand the basic theory and practice of fire science. In addition, lectures on fire protection engineering are provided to attain practical knowledge for risk assessment and safety design. For those who want to attain knowledge for administration purposes, lectures on fire protection engineering for policy making and planning are provided.

Doctoral Course

Personal development

- Research presentation exercise on fire science and technology
- Research technique exercise on fire science and technology
- Research paper writing exercise on fire science and technology

Research guidance

- Doctrate study 1A on fire science
- Doctrate study 1B on fire science
- Doctrate study 2A on fire science
- Doctrate study 2B on fire science
- Doctrate study 3A on fire science
- Doctrate study 3B on fire science

Master's Course

Research guidance

- Special study 1A on fire science
- Special study 1B on fire science
- Special study 2A on fire science
- Special study 2B on fire science

Fire protection engineering for policy making and planning

- Urban disaster mitigation and preparedness*
- Outlook of building fire and disaster mitigation*
- Risk analysis and safety evaluation
- Engineering for fire service
- Introduction to fire investigation*
- Fire regulation to respective characteristics of various buildings
- Laws and regulations for fire safety

Fire protection engineering for practical designing

- Introduction to material design
- Fire-protection equipment design*
- Structural fire safety design*
- Modeling of fire phenomena*
- Building fire safety design exercise
- Principles of evacuation safety design
- Fluid dynamics on fire and combustion

Basic theory and practice of fire science

- Fundamentals of fire physics and chemistry II*
- Human safety engineering for buildings II
- Experimental study on fire dynamics*
- Advanced fire extinguishing science
- Fundamentals of fire physics and chemistry I*
- Human safety engineering for buildings I*
- Introduction to Disaster Prevention
- Simulation exercise on smoke movement and evacuation*
- Chemical fires*

- Adult graduate students
- University graduates
- Students from overseas

Asterisks (*) indicates that those lectures are given in English.

Members

Kenichi Ikeda, Professor
- Fire-resistive construction
- Structural fire safety design
- Diagnosis of fire-damaged building
- Structural design of building

Shiro Ichimura, Professor
- Sports Science
- Preventive Medicine and Public Health

Yoshifumi Ohmiya, Professor
- Building fire safety planning
- Human behavior in fire
- Smoke control
- Mechanisms of fire development

Mamoru Kohno, Professor
- Building Material and structure
- Fire safety engineering
- Structural reliability

Ichiro Hagiwara, Professor
- Evacuation safety
- Fire safety design of buildings
- Performance-based Code

Yoshiyuki Matsubara, Professor
- Safety engineering
- Static electricity as an ignition cause and mitigation of chemical industry fire

Ken Matsuyama, Professor
- Fire dynamics
- Heat and Transfer, Fluid dynamics
- Theoretical analysis of water suppression system
- Measurements engineering

Masayuki Mizuno, Associate Professor
- Human behavior in fire
- Egress safety
- Simulation of human movement in fires

Shinya Yanagita, Associate Professor
- Behavioral Physiology
- Exercise Physiology

School Enrollment Information

Please contact the following e-mail address : m.mizuno@rs.noda.tus.ac.jp

Classroom

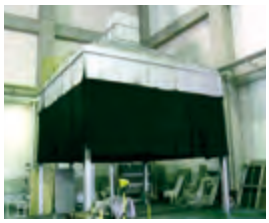
- *The school year starts on 1st of April and ends on 31st of March of each year. The term of study required for graduation is two years.*
- *Lectures are provided during the evening hours on weekdays at Kagurazaka Campus located in central Tokyo, as convenient to working-students.*
- *Experimental exercises and training are held on Saturdays utilizing dedicated large-scale laboratory facilities in Noda campus.*

Fire Research and Test Laboratory, Center for Fire Science and Technology (CFSaT)

Facade of Fire Research and Test Laboratory

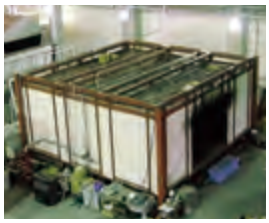
Structural Fire resistance Furnace
(Large scale, for Walls)

Structural Fire resistance Furnace
(Large scale, for Beams, Slabs and Columns)



Calorimeter Hood (5 m × 5 m)

Structural Fire resistance Furnace
(Medium scale)

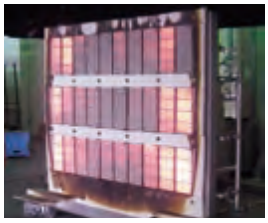


Full-Scale Compartment
for Fire Experiment (with Water Pump)

Room Corner Testing Unit
(ISO 9705)

FTIR Gas Analyzer
(ISO 19702)

Cone Calorimeter
(ISO 5660)



ICAL Testing Unit
(Radiant Heat Panel)(ISO 14696)

Secondary Combustion Furnace

In March 2005, TUS opened the Fire Research and Test Laboratory, Center for Fire Science and Technology (hereinafter, CFSaT) as a research laboratory specializing in fire science with world-class testing facilities and equipment. CFSaT is located at Noda campus. The CFSaT building area is approximately 1500 m^2 with a total floor area of 1900 m^2 and a ceiling height of 20 m. This research laboratory has been designed by members of the Center utilizing their experiences in fire research and disaster investigations. This cutting-edge facility enables us to conduct diverse research experiments as a center for fire science.

CFSaT is comprised of two parts, a Full-Scale Fire Test Hall and Small-Scale Test Laboratories. The Full-Scale Fire Test Hall is a large-scale laboratory with floor area of 1000 m^2 and ceiling height of approximately 18 m. This Test Hall can be used for making full-scale experiments, such as assessing the fire resistive performance of structural members or materials, testing burning behavior of combustible materials, and observing large-scale smoke movement. In order to provide education and research based on actual practice, CFSaT is equipped with tools and apparatuses capable of creating actual fire situations.

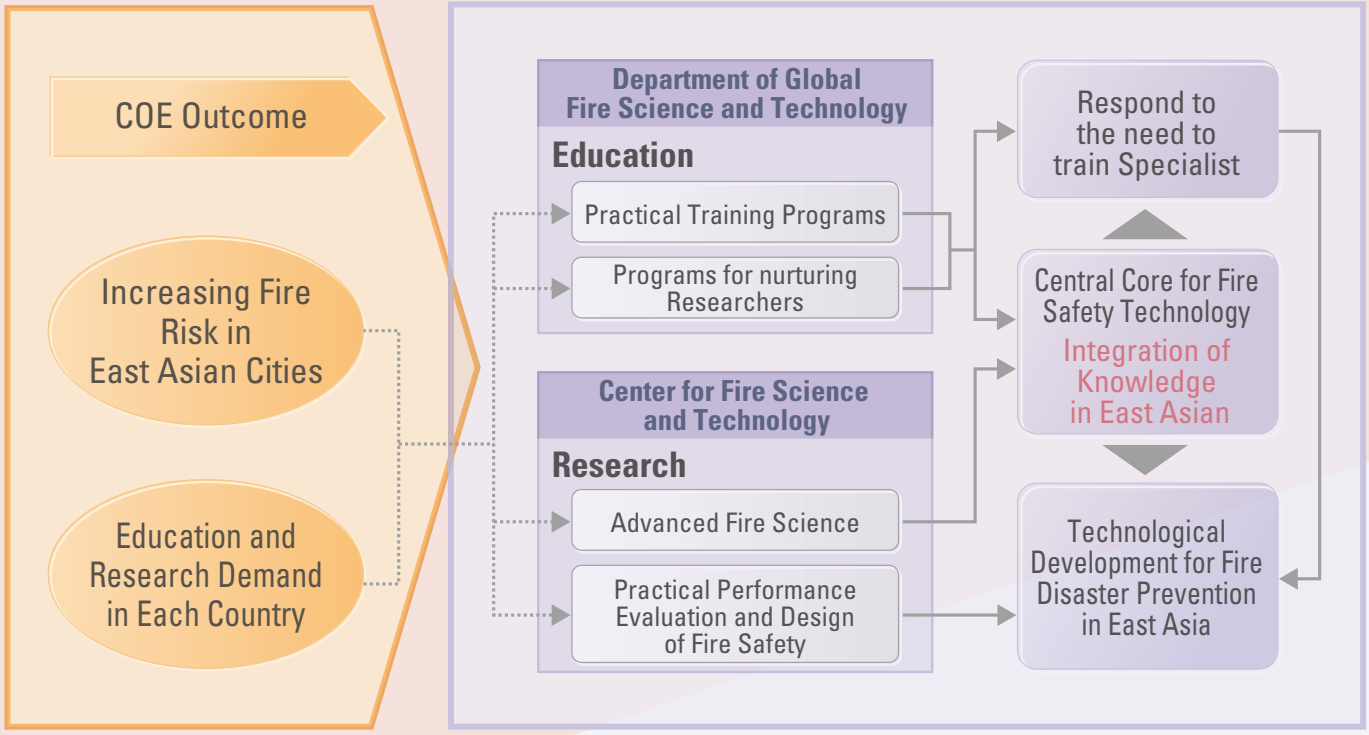
The Full-Scale Fire Test Hall is also equipped with essential tools for fire research such as furniture calorimeter hoods, and furnaces for fire resistance testing. Utilizing this large space, full-scale experiments can be performed, such as testing structural fire resistance of loaded structural members and frames, burning experiments of combustible furniture fittings, investigation of smoke behavior, and burning behavior of vehicles.

The Small Test Laboratories are comprised of multi-purpose experiment room, cone calorimeter testing room, temperature and humidity controlled rooms, library, observation room, data processing room, conference room, precision measuring equipment room and storage room.

Center for Fire Science and Technology

The Center for Fire Science and Technology, TUS is currently implementing the Global COE Program in establishing a "Center for Education and Research on Advanced Fire Safety Science and Technology in East Asia." Prior to this Global COE Program, a 21st Century COE Program has been promoted under the title of "Center of Advanced Fire Safety Science and Technology for Buildings." The 21st Century COE Program produced two major outcomes, one is the development of "theory" pertaining to performance-based fire safety design, and the other is the development in "practice" through experimental research utilizing full-scale experimental facilities. Upon these two pillars, the Center will further research and deepen our knowledge of how to control potential fire risks that are increasing along with the emergence of new spatial configurations (high-rise or underground) and use of new materials (e.g. aluminum and plastics). These are inevitable changes brought about by modernization, industrialization and the increased need for energy conservation. Specifically, in response to the drastic modernization in East Asia, utilizing new spatial configurations and materials, fire risk needs to be assessed in major cities, working together with researchers of each region, and utilizing research networks and specific education system to be developed in order to establish effective measures for mitigating such risks. These activities will help society control critical accidents from occurring in underground facilities or high-rise buildings.

Once a disastrous fire occurs, by applying the theory and utilizing full-scale test facilities a highly reproducible analysis can be made, and then effective and specific measures can be taken to prevent the recurrence of similar fire accidents. In addition, the professional abilities of fire protection engineers (who put the safety measures into practice based on research findings) could be better defined and better standardized via education provided to firefighters.



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