

## 2-2. Countermeasures for Climate Change and Disaster Risk Management Policy and Infrastructure Development Policy for Sustainable Economic Growth

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### **Nagoya University (National) Graduate School of Environmental Studies (GSES) Graduate School of Engineering (GSE)**

#### ◆ Program name

Nagoya University Global Environmental Leaders Program

#### ◆ Degrees:

- a. Master of Environmental Studies (GSES)
- b. Master of Engineering (GSES and GSE)

#### ◆ Credit and years needed for graduation:

- a. 30 credits, 2 years
- b. 30 credits, 2 years

#### ◆ Program Certificate requirements

1. 10 credits (out of the 30 above) from the NUGELP curriculum (See below for curriculum details)
2. Master's thesis and oral presentation in English

#### ◆ Note

NUGELP is made up of faculty of the Civil and Environmental Engineering Group.

#### ◆ Address:

Furo-cho, Chikusa-ku, Nagoya-shi, Aichi  
464-8601, JAPAN



### **Features of University** <https://en.nagoya-u.ac.jp>

#### **Nagoya University:**

Nagoya University is one of the leading national universities located in Nagoya City in Central Japan (Chubu Region). It was established in 1920 first as a medical school and at present has nine undergraduate schools and 13 graduate schools, accommodating about 16,000 students including about 2,300 international students. Among 16 Japanese Nobel laureates in the 21st century, six are graduates of or have been affiliated with Nagoya University as faculty members during their career.



Toyoda Auditorium of Nagoya University

#### **City of Nagoya:**

Nagoya is the fourth biggest city in Japan in terms of population (over 2 million) and is one of the largest industrial areas in the country. The Nagoya-Chubu Region has been leading Japan's major industries such as automobile manufacturing, represented by Toyota Motor Corporation. The region is also known historically for its past experiences of having overcome industrial pollution and for its furtherance of environmental actions in both private and public sectors.

### **Features of Graduate School**

#### **Graduate School of Environmental Studies** <https://www.env.nagoya-u.ac.jp/english/>

The Graduate School of Environmental Studies was established in 2001 as the first interdisciplinary postgraduate school of environmental studies in Japan by integrating from natural sciences to engineering and social sciences.

The School has promoted education and research taking “Sustainability” and “Safety and Stability” as its main visions. These visions are based on a wide range of academic disciplines including engineering, architecture, physical sciences, economics, and politics. These academic disciplines enable us to provide meaningful solutions for the societal demands concerning an environmentally sustainable future for our earth.

Since its establishment, the School has been dedicated to research and education for sustainable development in developing countries. Not only by receiving students from these countries but also by co-working with local researchers and government officials for research and survey projects. The projects cover a variety of issues ranging from urban and transport planning, low carbon cities, infrastructure management to disaster management.

### **Graduate School of Engineering** <https://www.engg.nagoya-u.ac.jp/?lang=en>

The Graduate School of Engineering aims to foster researchers and engineers with the ability to create and lead the next generation of engineering and technology, as well as high expertise, comprehensiveness, and global perspective.

Among 17 Departments in Graduate School of Engineering, the Department of Civil and Environmental Engineering was established in 1961, after the severe damage by Typhoon Ise-wan. The department focuses on 6 problems to be tackled, i.e. reduction of natural disaster's damage, utilization, conservation and development of resources and energy, preservation and regeneration of existing infrastructure, conservation of natural environment and biodiversity, decarbonized region/city development, and creation of futuristic infrastructure.

**Assistance to International Students:** Nagoya University receives about 2,300 international students from more than 100 countries, over 80% of whom are from Asia. The Global Engagement Center (GEC) has abundant experience in supporting international students joining Nagoya University. Moreover, the staff of the Nagoya University Global Environmental Leaders Program (NUGELP) has abundant study and professional experience overseas, and is available to assist the program participants. The education and daily communication language under the Program is English. With such a support system at the University, JDS fellows are therefore able to start their study and life without major difficulties.



## **Features of the Program**

### **Nagoya University Global Environmental Leaders Program (NUGELP)**

(<https://www.civil.nagoya-u.ac.jp/nugelp/index.html>)

NUGELP was established in 2008 to develop environmental leaders who are able to identify and analyze infrastructure and environmental problems from a global and holistic perspective, and propose practical measures to solve the problems in Asia and Africa. The Graduate School of Environmental Studies and the Department of Civil and Environmental Engineering, the Graduate School of Engineering accepts Master's course students and trains them to be leaders.

NUGELP provides solution-oriented education based on the following instructions:

- Students receive comprehensive instructions in English covering various disciplines ranging from civil engineering, transport analysis and planning, sustainability and environmental studies, environmental system analysis and planning, climate change and infrastructure to environmental industry systems.
- Through such instructions, they are able to acquire a deeper understanding of the issues, policies and the relevant technological know-how, and the capacity to design policies and institutions.
- As part of the coursework, students have opportunities to participate in practical and research internship at private companies, government bodies or international organizations in the Nagoya-Chubu Region, where a progressive approach to manage environmental problems is ongoing.
- The unique international and interactive nature of the program, in which international and Japanese students learn together, allows students to enhance their understanding of issues from perspectives of local and global viewpoints and improve their international communication skills. Students from China, Bhutan, Timor-Leste, Philippines, Indonesia, Myanmar, Afghanistan, Sudan and South Africa etc. are studying at NUGELP.
- In addition to the master's degree, a special certificate will be awarded by NUGELP to students who complete the program. It certifies that students have acquired comprehensive capacity and skills to take an active role as a future leader in the field of civil engineering and environmental studies for their home country and the global society.

Special events are also planned for JDS fellows during the two-year degree program.

- (i) Domestic and overseas study tours to study planning, design and maintenance management for infrastructure.
- (ii) Special lectures from alumni of civil engineering international program in Nagoya University.

## ***Necessary Curriculum to Obtain the Degrees***

NUGELP offers all its courses in English within a comprehensive and interdisciplinary curriculum. Master's program students are required to obtain a minimum of 30 credits mainly from the courses listed below as well as to defend their Master's thesis.



### **Target: Basic Knowledge and Skills as a Leader**

- **Sustainability and Environmental Studies (Lecture, 2 credits) by Hiroki TANIKAWA, Miho IRYO and Anatoly Zinchenko**  
The objective of the course is to provide students with several definitions, views, interpretations, and analyses on the notion of sustainability. The lectures are to be given by several lecturers that may include external guest speakers. Sustainability covers broad areas. It is therefore inevitable that the course consists of various topics. The course tries to clarify the topics from three viewpoints, namely: 1) Society and/or social sciences, 2) Observation and analysis by natural sciences, and 3) Urban and spatial perspective. One common element that should be noted here is "safety".
- **English Communication in Environmental Issues (Lecture, 2 credits) by Miho IRYO and Sohyun CHUN**  
Develop ability to learn and think about environmental problems in English and apply the ability for presenting and discussing one's ideas in English. English communication ability is a fundamental requirement for engineers and scientists working in the field of environmental problems, since environmental problems are not unique to any one country. In this course students will be assigned specific subjects concerning environmental problems and will be required to study the assigned subjects deeply, and then present and discuss the studied subjects in class in English.
- **Frontier in Civil Engineering (Lecture, 2 credits) by Associated Faculty**  
The aim of the lecture is to comprehensively examine the framework of civil engineering through the introductions of various research topics, projects and so on which the staff of civil engineering have investigated in recent years.  
[Course topics] 1. Guidance 2. Frontier of structural engineering 3. Frontier of material engineering 4. Frontier of coastal engineering 5. Frontier of river engineering 6. Frontier of geotechnical engineering 7. Frontier of urban and transportation planning.
- **Civil Engineering and Policies for Developing Countries I (Lecture, 2 credits) by Miho IRYO and Kiichiro HAYASHI**  
The objective of this course is to learn the basic knowledge related to sustainable development, environmental management, and international cooperation in developing countries for infrastructure development.  
[Course topics] 1. Development 2. Development and agriculture 3. Development and industrialization 4. Sustainable development 5. MDGs and SDGs 6. Environment and resource issues in developing countries 7. International environmental management (international treaty, international organization) 8. International cooperation.
- **Civil Engineering and Policies for Developing Countries II (Lecture, 2 credits) by Associated Faculty**  
The objectives of this course are 1) to study the fundamental knowledge on planning, design, construction and maintenance of infrastructure in Japan, as well as developing countries, 2) to survey various issues in civil engineering, including the environmental management and disaster risk reduction.  
[Course topics] 1. Introduction to disaster risk assessment 2. Water resources and river basin management 3. Coastal zone management 4. Infrastructure development under aid programs 5. Infrastructure projects in developing countries.

### **Target: Advanced Technologies and Knowledge**

- **Environmental Systems Analysis and Planning (Lecture, 2 credits) by Hiroki TANIKAWA**

The course objectives are to understand “environmental systems”, i.e., the interaction of human activities and nature, to learn the scientific mechanisms of global environmental problems, such as climate change, to learn the basic principles and methods of analyzing environmental systems, e.g., environmental economics, mathematical models, life-cycle assessment, etc., and to learn the principle and methods of environmental management at local, national and global scales.

[Course Topics] 1. About Environmental System Analysis 2. Carrying Capacity, Water, Energy, Material Flow/Stock 3. Simple Global Warming modeling 4. Industrial Symbiosis modeling 5. The basis on Input and Output Analysis 6. Urban Climate Modeling.
- **Transportation Systems Analysis (Lecture, 2 credits) by Takayuki MORIKAWA**

To plan and evaluate efficient and sustainable transportation systems analysis, the objectives of this lecture are to learn transportation surveys, travel demand analysis, and evaluation methods of the systems. It also aims to build capacities of using them in transportation research and practices.

[Course Topics] 1. Transportation demand and travel survey 2. Aggregate demand model (trip generation, trip production/attraction, trip distribution & modal split) 3. Traffic assignment on network 4. Preview of disaggregate demand modeling 5. Disaggregate demand model (binary choice, multinomial choice, estimation and statistical test, aggregation and forecast, multi-dimensional choice, advanced discrete choice models).
- **Advanced Traffic Engineering and Management (Lecture, 2 credits) by Hideki NAKAMURA**

There is no doubt that a considerable portion of pollution emissions is resulted from transportation related activities and vehicular movements in particular. Managing traffic safely and efficiently is one of the most effective solutions to relieve environmental issues worldwide. Training specialists who have the knowledge and skills of traffic engineering is highly demanded especially in developing countries where travel demand is rapidly increasing despite insufficient transportation infrastructure. In this course, fundamentals and internationally forefront issues in traffic engineering are to be covered in theory and practice, so that students can effectively master the most important issues for practicing in highway planning and traffic operations.
- **Advanced Course in Lifecycle Design of Civil Structures (Lecture, 2 credits) by Hikaru NAKAMURA, Takeshi HANJI and Koji NISHIGUCHI**

This course objective is to study design method and maintenance of bridge structures in the context of lifecycle management of civil structures. After completing this course, students will be able to list different types of structural design methods and explain their differences, explain typical design flow of bridge structures, and understand current conditions of existing bridges and describe maintenance systems of bridges in Japan.

[Course Topics] 1. To study fundamental theory of reliability-based structural design and to understand structural reliability and different design methods such as the allowable stress method and the limit state design method 2. To understand a typical flow of structural design which includes structural planning, selection of structural systems, verification of required performances, lifecycle cost analysis, and maintenance plan, by studying design examples of steel and concrete structures 3. To understand current conditions of existing bridges in Japan and to study efficient maintenance systems of bridge structures.
- **Advanced Infrastructure Planning (Lecture, 2 credits) by Takayuki MORIKAWA and Toshiyuki YAMAMOTO**

The course objective is to understand the meanings and objectives of infrastructure and learn the infrastructure planning methods. The goals of the class are to be able to explain the public economy, and solve the problems to derive the appropriate results by applying the evaluation methods and decision methods considering the uncertainty.

[Course Topics] 1. Public economics (Social welfare and Pareto optimum, Consumer's behavior and demand curve, Producer's behavior and market equilibrium, Market failure, Externality, Public goods) 2. Introduction to decision making in infrastructure planning 3. Evaluation and decision making (Cost-benefit analysis and value of non-market goods, Evaluation methods of non-market goods and utility function, Value of travel time saving and project evaluation, Social welfare function and analytic hierarchy process) 4. Decision making under uncertainty (Expected utility theory, Bayesian decision making and value of information, Game theory and dilemma problem).

- **Advanced Fluvial and Coastal Hydrodynamics (Lecture, 2 credits) by Tomoaki NAKAMURA and Ryota TSUBAKI**

The aim of this course is to understand physical processes in rivers and oceans. This class will provide advanced theories and technologies applied in the management of rivers and coasts.

[Course Topics] 1. Outline of the course 2. Governing equations for incompressible viscous fluid flow 3. Shallow water equations 4. Flow resistances in open-channel flow 5. Long wave theory 6. Shallow water wave theory 7. Wave-averaged conservation equations.
- **Advanced Geotechnical Engineering (Lecture, 2 credits) by Toshihiro NODA and Kentaro NAKAI**

This lecture aims to learn how the basic knowledge learned in soil mechanics and geomechanics are applying to actual geotechnical engineering, and to understand its theoretical background. Specifically, the purpose is to learn about settlement and failure (bearing capacity) problems in soft ground, as well as how to deal with uncertainties in the actual field of geotechnical engineering such as the safety factor method and reliability design.

[Course Topics] 1. Introduction to geotechnical engineering 2. Multi-dimensional consolidation analysis 3. Observational method for predicting consolidation settlement (Asaoka method) 4. Mean effective stress and bearing capacity 5. Undrained bearing capacity ( $\phi_u=0$  circular slip surface analysis).
- **Advanced Numerical Analysis (Lecture, 2 credits) by Tomio MIWA and Kentaro NAKAI, Tomoaki NAKAMURA and Koji NISHIGUCHI**

This lecture provides basic theories of numerical analyzing techniques which are often used in the civil engineering field. The goal is to understand and apply numerical optimization method, finite element method, approximate analysis of ordinary differential equation and finite difference method for computational fluid dynamics simulation through the lecture and practical work.

[Course Topics] 1. Finite element method 2. Optimization problem 3. Finite difference method 4. Approximate analysis of ordinary differential equation.
- **Advanced Steel Structures (Lecture, 2 credits) by Kazuo TATEISHI**

Deterioration and its prediction method for steel structures are lectured. The goal of this course is to understand the following issues: Importance of maintenance of infrastructures, Deterioration in steel structures, Calculation method for remaining life of steel members based on fracture mechanics, Fatigue and corrosion in steel members, Inspection method for steel structures.

[Course Topics] 1. Importance of maintenance and difficulties 2. Experiences of damage in steel structures and repair/retrofitting methods 3. Fatigue and preventing method 4. Linear fracture mechanics and its application 5. Corrosion and preventing method 6. Inspection method for steel structures.
- **Advanced Concrete Structures (Lecture, 2 credits) by Hikaru NAKAMURA and Taito MIURA**

The objective of this course is to learn advanced knowledge of the design, construction and maintenance of concrete structures, to acquire applied skills that make use of the knowledge in practice. After completing this class, students will be able to: Confirm basic knowledge of RC structures, Understand nonlinear analysis of concrete, Understand time dependent behavior of concrete, Understand construction for quality control.

[Course Topics] 1. Basic knowledge of design of concrete structures 2. Outline of nonlinear structural analysis for concrete structures 3. Outline of diffusion analysis for concrete structures 4. Volume change and cracking of concrete. 5. Quality control of concrete 6. Proposal of design and construction concepts for quality control.
- **Advanced Mechanics of Geomaterials (Lecture, 2 credits) by Masaki NAKANO**

The aim of this course is to acquire the basics and applications of geomaterials mechanics for safely constructing and maintaining various geotechnical structures. Concretely, this course introduces the mechanical behavior of remolded clay and natural deposited clay, and the difference between the two. Then, the course also introduces the basics of plastic mechanics, an elasto-plastic constitutive model, and the mechanical behavior of remolded clay and naturally deposited clay based on the constitutive model. In addition, the object is expanded to sand, problematic soil, and improved soil, and their mechanical behavior is also explained based on elasto-plastic mechanics. In addition, in the design of the geotechnical structure, the advantages and disadvantages of each are compared by comparing the current design method and the approach using the elasto-plastic constitutive model.
- **Advanced Urban Planning (Lecture, 2 credits) by Hirokazu KATO**

In the state of the aging and declining population, global environmental issues and catastrophic natural disasters, you explore desired urban planning and required economic and financial systems to support it. The goals by learning this lecture is as follows: 1) To learn and explain the necessity of urban planning and its basic items and requirements, 2) To understand and explain the contents, problems and reasons for Japanese spatial planning, 3) To understand and explain the direction of spatial planning in Japan and developing countries in the future.

- **Advanced Continuum Mechanics (Lecture, 2 credits) by Masaki NAKANO and Toshihiro NODA**  
The aims of this course are to review the concept of vector/tensor and to understand the basics of continuum mechanics such as kinematics (geometry of motion), equilibrium rules, and objectivity. Students will be able to 1) Understand and explain the basis of Vector and Tensor Analysis, 2) Explain material and spatial descriptions of the physical value of body, material/spatial time derivatives and expression of deformation of body using tensor, 3) Understand and explain properties of Cauchy's stress tensor, 4) Understand and explain law of mechanics and Cauchy's first/second law of motion, and apply them to the interpretation and representation of the mechanical behavior of continuum body.
- **Advanced Structural Mechanics (Lecture, 2 credits) by Junji KATO**  
The objective of this course is to learn the basic knowledge of nonlinear computational mechanics and topology optimization for advanced and numerical structural design.  
[Course Topics] 1. Nonlinear computational mechanics based on the finite element method (Newton-Raphson method, Geometric nonlinear structural analysis, Basis of numerical instability problem) 2. Topology optimization (Foundation of mathematics of optimization, Formulation of sensitivity analysis).
- **Advanced Coastal and Offshore Engineering (Lecture, 2 credits) by Norimi MIZUTANI, Tomoaki NAKAMURA, and Yonghwan CHO**  
The aim of this course is to understand wave dynamics in a coastal zone and wave-structure interactions. Students will be able to 1) understand and explain hydraulic phenomena related to the radiation stress, 2) understand and explain diffraction problems, 3) understand and explain wave dynamics including evanescent waves, 4) understand and explain the dynamic behavior of floating bodies.  
[Course Topics] 1. Radiation stress and wave dynamics in a shallow water 2. Diffraction wave theory (vertical cylinder, axisymmetric structure) 3. Dynamic behaviour of floating bodies 4. Potential and the boundary element method 5. Green function and numerical methods.
- **Advanced Theory of River Basin Management (Lecture, 2 credits) by Yuji TODA**  
This course aims to obtain the comprehensive understanding of the theoretical background and the recent technologies for river and river basin management. The attainment target is to get the fundamental knowledge of river basin managements and to acquire the understanding of new technologies of river engineering and fluvial hydraulics.  
[Course Topics] 1. Outline of river and river basin management 2. Sediment transport 3. Fluvial Hydraulics 4. Eco-Hydraulics
- **Advanced Soil Dynamics (Lecture, 2 credits) by Toshihiro NODA and Kentaro NAKAI**  
In this lecture, students will know the seismic damage example such as liquefaction during the actual earthquake and will learn the basic matters and advanced contents related to the ground dynamics, such as the cyclic response of the ground during the earthquake. By learning this lecture, the goal is to be able to: 1) Understand seismic damage caused by recent earthquakes 2) Understand the concept of seismic design 3) Understand the vibration mechanism of the mass / mass system 4) Understand the double reflection theory 5) Understand how to understand dynamic problems of water-soil two-phase system based on mixture theory.

**Target: Interdisciplinary Topics**

- **Environmental Industry Systems (Lecture, 2 credits) by Hiroki TANIKAWA, Takayuki MORIKAWA and Miho IRYO**  
The student will learn the practical skills as a leader in developing infrastructure by learning examples of how to apply the expertise and engineering techniques related to environmental conservation activities and technologies to the real world. Lecturers are invited from companies mainly in the Chubu region, which has an advantage in environmental conservation activities and environmental technologies, for lectures on the latest environmental initiatives in business. 1) Lectures by companies and discussions: Listen to lectures on application examples of environmental conservation activities and environmental technologies from companies and discuss their contents. 2) Group presentations: Based on the contents of the lectures and the contents learned in other subjects, a group discussion will be held on the connection between theory and practice, and the results will be presented.
- **Sustainable City Studies (Lecture, 2 credits) by Hiroki TANIKAWA**  
Students will learn policies, plans, technological and institutional measures to realize Sustainable Society with the idea of sound material cycle society and decarbonization cities, with a view to integrating climatic change mitigation in urban development.  
[Course Topics] 1. Global climatic system 2. Mechanisms of global warming 3. Climatic change and human history 4. Economy, energy and environment and IPCC AR 5. Industrial Ecology and Circular Economy 6. Human activities and energy in cities 7. Urban forms, land use and energy 8. Material and Energy metabolism in cities 9. Material and Energy metabolism of buildings and districts 10. Sound Material Cycle Society and Circular Economy 11. Metal resource and sustainability 12. Stock-type Society and sustainability

➤ **Climate Change and Infrastructure (Lecture, 2 credits) by Miho IRYO**

This lecture aims to acquire the knowledge about the current status and risks of climate change and international initiatives, and to develop the capacity to consider mitigation and adaptation measures from the perspective of sustainable infrastructure development. The objective of this lecture is to acquire the following knowledge and skills.

[Course Topics] 1. Scientific basis of climate change and its impact on social system (Learn about climate change and its impact on social systems based on IPCC reports.) 2. Climate change mitigation and adaptation (Through group work, learn how to analyze the potential regional risks of climate change and propose mitigation and adaptation measures.) 3. International efforts to mitigate and adapt to climate change (Learn the historical background of international climate change measures under the Framework Convention on Climate Change, and deepen your understanding of the international decision-making process.)

➤ **Environmental Urban Systems (Lecture, 2 credits) by Miho IRYO**

The aim is to deepen the understanding of the technical and institutional systems required to build an environmental city, mainly from the perspective of city planning and transportation planning.

[Course Topics] 1. Components of urban environment and their issues 2. Historical review of city structures and location theory 3. Observation and assessment of environmental impact 4. Urban / transportation plan for environmental improvement 5. Consensus building and community development 8. Case studies and presentations of environmental improvement in various cities

**Target: Research-oriented internship**

➤ **Global Research Internship (Research training, 2 credits) by Associated Faculty**

As part of the Global Environmental Leaders Program, this course aims at providing research and survey opportunities at universities, research institutions, companies, governments in Japan and overseas to acquire the ability to conduct practical and applied research. Internship should be conducted based on close communication with Academic Advisor(s). Students are expected to acquire practical research know-how through On-site Research Training (ORT). Details of the internship such as period and terms of implementation should be decided through consultation with Academic Advisor(s) and experts at host institutions.

**List of faculty members capable of guiding JDS Fellows**

<https://www.civil.nagoya-u.ac.jp/introduction/teacher-e.html>

An academic advisor shall be tentatively assigned upon selection. Assignment will be based on the submitted documents, consultation and the interview from the viewpoint of JDS fellows' academic and professional background and research interests. All faculty members listed below are authorized to supervise JDS fellows. For more information, please visit the following website and see the accompanying document.

(<http://www.civil.nagoya-u.ac.jp/introduction/teacher-e.html>)

**Structural Engineering, Materials, and Informatics**

Name, Title	Area of Specialization	Research Themes
Junji KATO Prof.	Computational Mechanics, Topology Optimization	Topology optimization and design for structures and materials based on finite element method, Advanced design for additive manufacturing considering future products
Kazuo TATEISHI Prof.	Structural Engineering	Fatigue and fracture of steel bridges, Fatigue of steel-concrete composite slab
Hikaru NAKAMURA Prof.	Concrete Mechanics	Durability mechanics of concrete, Seismic design of concrete structures
Takeshi HANJI Associate Prof.	Steel Structures, Bridge Engineering	Maintenance and fatigue in steel structures, Seismic assessment and rehabilitation of steel bridges, Applications of image technique to infrastructures
Taito MIURA Associate Prof.	Concrete Engineering, Maintenance Engineering	Chemo-mechanical coupling analysis, Fracture mechanics, Micro-damage, Cementitious composite material, Discrete analysis

Koji NISHIGUCHI Lecturer	Computational Mechanics, High-Performance Computing, Fluid-Structure Interaction Problems	High-performance computing, Computational mechanics, Fluid-structure interaction, Constitutive Equation of Materials, Finite element method, Finite volume method, Computational fluid dynamics, Solid mechanics
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### **Hydraulics, Hydrology, Coastal, and Ocean Engineering**

<b>Name, Title</b>	<b>Area of Specialization</b>	<b>Research Themes</b>
Norimi MIZUTANI Prof.	Coastal and Ocean Engineering	Tsunami disasters and their countermeasures, Study on dynamic interaction among wave, structure and foundation
Yuji TODA Prof.	Hydraulics	Fluid flow-biological-chemical interaction, Primary production of periphyton
Tomoaki NAKAMURA Associate Prof.	Coastal Engineering	Stability of coastal structures and their foundations in fluid-structure-seabed-sediment interaction fields
Ryota TSUBAKI Associate Prof.	Hydraulics, River Engineering	Advanced field monitoring of fluid flow and sediment transport, High resolution inundation flow simulation and its application to mitigate physical and environmental risks

### **Geotechnical Engineering**

<b>Name, Title</b>	<b>Area of Specialization</b>	<b>Research Themes</b>
Masaki NAKANO Prof.	Geotechnical Engineering	Mechanical behavior of new geomaterial made from surplus soil and industrial by-product, Mechanical behavior of intermediate-soils and problem soils, Large compression of soil due to decay of structure
Toshihiro NODA Prof.	Geotechnical Engineering	Soil-water coupled dynamic/static finite deformation analysis, Interactive behavior of soil-structure system
Kentaro NAKAI Associate Prof.	Geotechnical Engineering	Description and interpretation of cyclic behavior of sand, Interpretation of the difference between sand and clay, Dynamic analysis of structured soil

### **Transportation, Infrastructure, and Environmental Planning**

<b>Name, Title</b>	<b>Area of Specialization</b>	<b>Research Themes</b>
Hideki NAKAMURA Prof.	Transportation Engineering	Performance-oriented highway planning and design methodology, Evaluation of junction design and traffic signal control
Toshiyuki YAMAMOTO Prof.	Transportation Planning	Travel behavior analysis, Environmentally sustainable transport, Intelligent transport system
Hirokazu KATO Prof.	Transport and Environmental Planning	Environmental impact assessment of transport policy, Environmental lifecycle assessment of transport sector, Impact assessment of global warming on cities, Urban management and regional transport strategy development in an era of declining population, fewer children, and aging of society
Tomio MIWA Associate Prof.	Transportation Planning	Transport management using ITS, Analysis on traffic network utilizing probe-vehicle system, Understanding and modeling driver's route choice behavior
Miho IRYO Associate Prof.	Transportation Engineering	Traffic flow and safety analysis of vehicles and pedestrians, Traffic simulation development
Xin ZHANG Lecturer	Transportation Engineering	Evaluation of junction design and traffic signal control, Road user maneuver modeling, Traffic simulation



### **Environmental and Environmental System Engineering**

<b>Name, Title</b>	<b>Area of Specialization</b>	<b>Research Themes</b>
Kiichiro HAYASHI Prof.	International Environmental Cooperation	Environmental impact assessment and biodiversity assessment, Environmental policy development
Hiroki TANIKAWA Prof.	Engineering of Environmental Systems	Metabolism of material and energy in cities, and the design of low carbon cities
Takashi HIBINO Prof.	Environmental Studies of Materials	Energy materials, Fuel cells, Hydrogen generation, Waste biomass and plastics, Carbon resource utilization
Hiroaki SHIRAKAWA Associate Prof.	Environmental and Resource Economics	Energy and resource demand and supply in Asian countries, Assessment of regional interdependencies of environment and economy, Efficiency assessment of urban environmental management economic valuation of environmental policy
Nagahisa HIRAYAMA Associate Prof.	Environmental & Sanitary Engineering, Environmental Emergency Management	Social systems engineering/ Safety system, Civil and environmental engineering
Sho-ichi IMAWATSU Associate Prof.	Environmental Studies of Materials	Sustainable cities and communities, Resource utilization, Material transformation, Green chemistry, Synthetic organic chemistry, Nanocarbon (Fullerene)
Anatoly ZINCHENKO Associate Prof.	Environmental Studies of Materials	Polymer chemistry, Nanometer-scale chemistry, Environmental load reduction and remediation, Biophysics, chemical physics and soft matter physics
Hiroto SHIRAKI Associate Prof.	Environmental policy and social systems	Energy system analysis, Energy consumption behavior analysis, Technological and economic assessment of climate change mitigation measures

### **Land and Infrastructure Design**

<b>Name, Title</b>	<b>Area of Specialization</b>	<b>Research Themes</b>
Takashi TOMITA Prof.	National Space Design	National and regional space design for sustainable and resilient society, Coastal disaster management, Social implementation of national and regional design methodology
Shinichiro NAKAMURA Associate Prof.	National Land Use Design	Water resource management, Urban river restoration, Adaptation for climate change
Mutsumi TASHIRO Lecturer	Land and Infrastructure Design	Road design on soft ground, Traffic management, Mobility services

## ***Academic Schedule***

### **■ FIRST YEAR ■**

#### October

- Admission to the Nagoya University Global Environmental Leaders Program (NUGELP)
- Guidance for new students

#### October-February (Fall Semester): **First Semester**

- Attend lectures, practices and seminars
- Individual instruction by academic advisor(s)
- NUGELP Study tour and Seminar: Presentation and discussion by students and academic advisors

#### April-August (Spring Semester): **Second Semester**

- Attend lectures, practices and seminars
- Individual instruction by academic advisor(s)
- NUGELP Study tour: Presentation and discussion by students and academic advisors

#### September: **Global Research Internship**

- Internship at universities, research institutes, companies and local governments.

## ■ SECOND YEAR ■

### October-February (Fall Semester): Third Semester

- Attend lectures, practices and seminars
- Individual instruction by academic advisor(s)
- NUGELP Study tour and Seminar: Presentation and discussion by students and academic advisors

### March: Interim reporting and discussion toward a Master's thesis

- NUGELP Workshop: Compile and present an interim report at a program workshop
- Discuss with students and academic advisor(s)

### April-August (Spring Semester): Fourth Semester

- Attend lectures, practices and seminars
- Individual instruction by academic advisor(s)
- Compile a Master's thesis

### June-July: Submission and defense of the Master's thesis

### September: Completion of the Master's program

- Receive a master's degree (Master of Environmental Studies (GSES) or Master of Engineering (GSES, GSE) and program certificate
- Return to home countries to develop one's career as global leaders
- Global alumni networking supported by Nagoya University
- Continued academic and career development support from Nagoya University

## **Facilities** [https://en.nagoya-u.ac.jp/academics/campus\\_life/housing/index.html](https://en.nagoya-u.ac.jp/academics/campus_life/housing/index.html)

**Dormitory:** JDS fellows will be given priority to be accommodated in the university dormitories for the first one year.

**Learning in research groups:** Students are provided with individual desks, PCs with internet access, and also access to equipment and systems necessary to develop their own research under the supervision of academic advisors.

**Library:** The University holds its library of a total of 3.3 million copies for educational and research use and subscribes to some 32,000 titles of online journal. The University Library System provides a large number of desks and learning rooms for students to enhance their learning performance.

## **Message for Applicants**

**Nagoya University Center for Global Environmental Leaders:** In order to cultivate the specialists on civil engineering and environmental studies who will lead infrastructure and environmental policy and measures in the coming decades, Nagoya University established the Nagoya University Center for Global Environmental Leaders, directed by the Dean of Graduate School of Environmental Studies. The university-wide center supports capacity developments, global alumni networking and continued assistance to alumni as well as the regular operation of NUGELP, in close collaboration with the cooperated graduate schools and the International Education & Exchange Center.



In NUGELP, two English speaking staffs assist international students. Communication between the NUGELP Office and the students is conducted in English so that international students can smoothly start their study without difficulties.

**Global Engagement Center (GEC):** GEC provides various assistance to students from overseas including academic and daily life support, courses of Japanese and other languages and cultural understanding, and cultural exchange programs with local communities.

**JDS programs in Nagoya University:** Nagoya University has been a host university of JDS Fellows at the Graduate School of Law and the Graduate School of International Development. NUGELP has also accepted JDS Fellows from 2011. The University therefore has abundant experience in operating the program and also to assist JDS Fellows. Also thanks to other programs by JICA such as the long-term training program, many experts from developing countries are studying at Nagoya University.

