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University of Tsukuba Graduate Program
Graduate School of Life and Environmental Sciences
Master's Program in Geosciences
Geoenvironmental Sciences
Syllabus 2010

Master's Program in Geosciences
Geoenvironmental Sciences Field
2010 List of Classes

Required classes (Geosciences major)

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
01AC001	Isotope Geosciences	1	1 · 2	1st Trimester· Fri. 4	1
01AC002	Energy Resources, Mineral Resources and the Environment	1	1 · 2	2nd Trimester· Fri. 4	3
01AC011	Oral Presentation Skills in English	1	1 · 2	1st Trimester Wed. 2	5
01AC021	Writing English Papers in Geosciences I	1	1 · 2	2nd Trimester · Wed. 3	7
01AC022	Writing English Papers in Geosciences II	1	1 · 2	2nd Trimester· Wed. 2	9

Required classes (Geoenvironmental Sciences field)

Class number	Class name	Credits	Year	Trimester / day of the week/hour	Page
01AC031	Introduction to GIS	1	1 · 2	1st Trimester Wed.1	11
01AC032	Method of Statistical Analysis in Geosciences	1	1・2	Open in odd year	13
01AC034	Transport Processes in the Terrestrial Environments	1	1 · 2	1st Trimester· Fri. 6	15
01AC035	Special Lecture in Geoenvironmental Sciences	1	1 · 2	Intensive	17
01AC041	Special Field work in Geoenvironmental Sciences I	1	1 · 2	Intensive	18
01AC042	Special Field work in Geoenvironmental Sciences II	1	1 · 2	Intensive	20

01AC051	Internship (Practical Activities) in Geoenvironmental Sciences I	1	1 · 2	Intensive	22
01AC052	Internship (Practical Activities) in Geoenvironmental Sciences II	1	1 · 2	Intensive	24
01AC061	Special Seminar in Geoenvironmental Sciences	2	1 · 2	Intensive	26
01AC071	Special Study in Geoenvironmental Sciences	6	2	Intensive	28

Required classes (Geoenvironmental Sciences field)

Human Geography field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
01AC081	Methodology on Human Geography	1	1 · 2	1st Trimester · Thur. 3	30
01AC082	Special Lecture on Social Geography	1	1 · 2	2nd Trimester · Thur. 3	32
01AC083	Special Lecture on Cultural Geography	1	1 · 2	3rd Trimester · Thur. 3	34
01AC091	Seminar in Human Geography	3	1 · 2	1-3rd Trimester · Thur. 4	36
01AC101	Field Work in Human Geography	3	1 · 2	Intensive	38
01AC111	Special Lectures in Human Geography	1	1 · 2	Intensive	40

Regional Geography field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
01AC121	Methodology of Regional Geography	1	1 · 2	1st Trimester · Thur. 2	42
01AC122	Lecture on Regional Dynamics	1	1 · 2	2rd Trimester · Thur. 2	44
01AC123	Seminar in Regional Geography	1	1 · 2	3rd Trimester · Thur. 2	46
01AC124	Regional geography of distribution	1	1 · 2	3rd Trimester · Thur. 2	47
01AC131	Seminar on Regional Geography	3	1 · 2	1-3rd Trimester · Thur. 5	49
01AC141	Field Work in Regional Geography	3	1 · 2	Intensive	51
01AC151	Special lecture in Regional Geography	1	1 · 2	Intensive	53

Geomorphology field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
01AC161	Lecture on Weathering and Soil Erosion	1	1 · 2	1st Trimester ·Fri. 2	55
01AC162	Lecture on Sedimentary Geomorphology	1	1 · 2	2nd Trimester · Fri. 2	57
01AC163	Lecture on Geomorphology of Cryosphere	1	1 · 2	1st Trimester ·Thur. 1	59

Hydrological Sciences Field

Atmospheric Sciences Field

Geographical Information Science Field

Terrestrial Water Cycle Systems Field

Atmosphere-Ocean Interaction System Field

01AC001 Isotope Geosciences

Basic class information

Class #	01AC001
Class name	Isotope Geosciences
Class structure	Lectures
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, Friday, 4th class hour
Credits	

Instructors, etc.

Instructors	TSUJIMURA Maki, ARAKAWA Yoji
TF, TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	This class will introduce principles, measurement techniques, and application examples of various types of stable and radioisotopes, such as H, O and N, in relation to the evolution process of planetary materials in the earth and the process of hydrological and geochemical cycles of the lithosphere, hydrosphere and atmosphere of the earth .
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods

Before taking the class

Learning materials, references, and handouts

How to study for this class

General

01AC002 Energy Resources, Mineral Resources and the Environment

Basic class information

Class #	01AC002
Class name	Energy Resources, Mineral Resources and the Environment
Class structure	Lectures and presentations in seminars
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester and F4
Credits	1

Instructors, etc

Instructors	KOMURO Kosei, TASE Norio, and KANEKO Jun
TF, TA	
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites

Knowledge and Skills students will receive

Knowledge and Skills students will receive	Comprehensive knowledge and viewpoint related to earth, environments, resources, and energy
Relation to our educational goal	Relates to "produce professionals with a broad-range of specialized knowledge in earth, environment, resources, energy and excellent field work skills of field scientists, such as observation and research techniques."
Class objectives	Understanding relations among earth, environments, resources, and energy and their evaluation

Class contents

Overview of the class	Material and water circulations and changes of earth systems and earth environments are lectured and resource mining or use with relations to human activities should be understood.
Key words	Resources, resource problems, materials, energy, water Environmental problems and sustainability

Class plan	1 (Komuro) What are resources and resource problems? 2-3 (Komuro) What is global resource problem and roles of Scientists? New trends in earth system sciences and policy 4-5 (Komuro) Geologic radioactive waste disposal 6-8 (Tase) Water as renewable resources, circulation and Sustainability 9 (Kaneko) Energy and location 10 (Kaneko) Logistics and global environmental problems
Requirements	Basic knowledge of related fields

Evaluation methods

Evaluation methods	Evaluation will be based on oral presentation or attendance (60%) and report (40%)

Before taking the class

Learning materials, references, and handouts	Will be distributed in the classes
How to study for this class	
Others	

01AC011 Oral Presentation Skills in English

Basic class information

Class #	01AC011
Class name	Oral Presentation Skills in English
Class structure	Lecture and seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	Wednesday, 2nd class hour
Credits	1

Instructors, etc

Instructors	UENO Kenichi (Geoenvironmental Science), HISADA Kenichiro (Earth Evolution Science)
TF, TA	To be announced
Office hours	Please contact before visiting
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal	Relates to “background of a field scientist”.
Class objectives	To be able to communicate with foreign researchers and students and give presentations in English at international conferences.

Class contents

Overview of the class	This class consists of lectures and seminars on critical points about research presentations and questions in English.
Key words	English, presentation skills
Class plan	Geoenvironmental Science major (Ueno): The class will include creation of a CV, self-introductions, explanations of charts, verbal presentations, question-and-answer sessions, poster presentations, group discussions etc. In this class, students will be asked to talk in English in groups or pairs.

	Earth Evolution Science major (Hisada): The instructor will explain the content and critical points of a presentation by going through the sections of a presentation, such as introduction (research incentive), theory, results and conclusion. Also, students will compose a presentation, such as graduation research, and present it in English at the end of the Trimester.
Requirements	Students of other majors cannot take this class.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance (50%) and presentation skills (50%).

Before taking this class

Learning materials, references, and handouts:

	Students should download materials from sites the instructor indicates.
How to study for this class	Students should prepare materials for the verbal presentation seminar.
Others	1. Students should bring a dictionary to every class and participate actively in seminars in English. 2. Students should inform the instructor in case of absence caused by research preparation.

01AC021 Writing English Papers on Geosciences I

Basic class information

Class #	01AC021
Class name	Writing English Papers on Geosciences I
Class structure	lectures (80%) and seminar (20%)
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester, Wednesday, 3rd class hour
Credits	1

Instructors, etc.

Instructors	HAYASHI Yosei
TF and TA	To be announced
Office hours	Monday 2:00~5:00 PM
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Relates to “background of a field scientist”.
Class objectives	This class aims for students to acquire basic knowledge, practical English grammar and various writing rules. In addition, students will gain explanation and summarization skills and logic structuring techniques for writing a scientific thesis in English.

Class contents

Overview of the class	With writing articles in international journals or master’s thesis in mind, the class will explain thesis structure and logic development with western elements, various rules of writing and commonly used English expressions.
Key words	Scientific paper, English writing
Class plan	1. What is an academic paper? 2. Basic sections of thesis. 3. What is a good title?

4. Writing an “introduction”

5. Writing about “research techniques”

6. Writing about “results and conclusion”

7. Writing a “conclusion”

8. Commonly used English expressions and common grammatical mistakes

9. Points to remember when posting a thesis paper.

10. Rating each other’s class work

Requirements: none

Evaluation methods

Evaluation methods: Evaluation will be based on attendance (60%) and presentations of class assignments (40%).

Before taking the class

There won’t be a textbook, but there will be many suggested readings.

How to study for this class: Students should make sure to resolve any vocabulary or grammar questions they have by using a dictionary. Also, students should become accustomed to reading English thesis papers with the points that were explained during classes in minds.

Others:

1. Students should make sure to do their assigned homework.

2. If a student has to miss a class for unavoidable reasons, such as attending a conference or conducting field work for a thesis paper, he/ she should hand in a “Reason of Absence Form” with a signature of a research instructor. If a class instructor accepts the absence as “unavoidable” the absence may be changed to “attended” by turning in an adequate report of an assignment given by the class instructor.

01AC022 Writing English Papers on Geosciences II

Basic class information

Class #	01AC022
Class name	Writing English Papers on Geosciences II
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester, Wednesday, 2nd class hour
Credits	1

Instructors, etc.

Instructors	YAGI Yuji, KUROSAWA Masanori
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class

Key words

Class plan

Requirements

Evaluation methods

Evaluation methods

Before taking the class

Learning materials, references, and handouts:

How to study for this class

Others

01AC031 Introduction to GIS

Basic class information

Class #	01AC031
Class name	Introduction to GIS
Class structure	lectures
Standard year for taking this class:	1・2
Available Trimester, day and time	1st Trimester ・Wed.1
Credits	1

Instructors, etc.

Instructors	MURAYAMA Yuji , MORIMOTO Takahiro
TF , TA	To be announced
Office hours	Friday 9:00- 11:00 am
Contact	E-mail: mura1@sakura.cc.tsukuba.ac.jp

Knowledge and skills students will receive

Relation to our educational goal	Relates to learning basic knowledge and methods of Spatial Information science from “a broad-range of specialized knowledge in earth, environment, resources, energy, and human activities.”
Class objectives	To learn the ideas and methods of Spatial Information Science and specific research processes.

Class contents

Overview of the class	The class will explain a versatile approach to the systematic construction, management, analysis, synthesis and transmission of spatial information and the techniques to apply this information to Human Geography. The class will also explain how to access and gather spatial information and build a spatial information database.
Key words	GIS Spatial analysis
Class plan	1. Gathering GIS related information

	2. Development of GIS 3. Access of spatial information 4. Analysis of spatial data 5. Spatial data modeling
Requirements	N.A

Evaluation methods

Evaluation methods	Presentation, Report, Attendance

Before taking the class

Learning materials, references, and handouts

How to study for this class	Lecture notes, reference and handouts: The instructor will assign reading materials and reference in class.
Others	Students should contact the instructor ahead of the time if they will miss a class for unavoidable reasons

01AC032 Method of Statistical Analysis in Geosciences

Basic class information

Class #	01AC032
Class name	Method of Statistical Analysis in Geosciences
Class structure	lectures
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester
Credits	1

Instructors, etc.

Instructors	ASANUMA Jun
TF and TA	not available
Office hours	after each class or TBA
Contact	asanuma@suiri.tsukuba.ac.jp

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, resources, etc.”
Class objectives	The class aims that the students learn basic ideas and practical techniques of statistical analysis. After this course, students should have the skills to solve actual problems through a statistical approach.

Class contents

Overview of the class	Students will learn the basics of statistical analysis and acquire practical methods of statistical analysis necessary for data analysis.
Key words	Statistical analysis, probability, statistical inference
Class plan	1. Basic statistics 2. Random variables and probability distribution 3. Population and sample 4. Point estimation and interval estimation 5. Correlation and regression

	6. Hypothetical tests 7. Analysis of variance
Requirements	Basic mathematics at the level of university admission in science or engineering departments.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance (40%) and assignments (60%).

Before taking the class

Learning materials, references, and handouts	The class will use a textbook made by the instructor. “Introduction to Statistics (Tokeigaku Nyumon)” 1991, (University of Tokyo Press) will be used as the reference. "Probability and Statistics for Engineering and the Sciences" by J. L. Devore is a good text for international students.
How to study for this class	Solving assignments suggested at each class is strongly recommended.
Others	1. Students are strongly encouraged to do the assignments that are given at every class. 2. When absent from a class, students are also strongly encouraged to study the course materials and to submit the assignments.

01AC034 Transport Processes in the Terrestrial Environments

Basic class information

Class #	01AC034
Class name	Transport Processes in the Terrestrial Environments
Class structure	lectures
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, Friday, 6th class hour
Credits	1

Instructors, etc

Instructors	SUGITA Michiaki
TF, TA	not available
Office hours	Please refer to www.geoev.tsukuba.ac.jp/~sugita
Contact	Please refer to www.geoev.tsukuba.ac.jp/~sugita

Knowledge and Skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge inearth, environment, resources, etc.”
Class objectives	To learn basic theory and application of transport of materials in atmosphere, hydrosphere and lithosphere and understand the meaning and uses

Class contents

Overview of the class	This class will explain basic theory and application of transport of materials in atmosphere, hydrosphere and lithosphere. Students will increase their understanding of meanings and utilization of important concepts, formulas and models by doing the assignments.
Key words	diffusion and advection, hydrology, meteorology
Class plan	1. Transport of substances 1.1 Introduction 1.2 Concentration

1.3 Conservation of mass and units

1.4 Transport processes

2. Theory of diffusion

2.1 Gradient transport theories

2.2 Statistical theories of diffusion

3. Transport processes in the Atmosphere

3.1 Local scale transport

3.2 Mid to large scale transport

3.3 Deposition

4. Transport processes in the Hydrosphere

4.1 Rivers and streams

4.2 Lakes

4.3 Groundwater

4.4 Soil wate

5. Summary and general discussions

Requirements	Math level equivalent to liberal arts education

Evaluation methods

Evaluation methods	Evaluation will be based on reports in every class.

Before taking the class

Learning materials, references, and handouts

How to study for this class	The course materials will be distributed through WebCT e-learning system of the Academic Computing & Communications Center. It is recommended that students to study report assignments available in WebCT system outside of class assignments.
Others	1. Students should turn in their reports. 2. Students should study and understand the contents of missed classes and turn in the assignments. Visit the instructor for questions

01AC035　Special Lecture Geoenvironmental Sciences

Basic class information

Class #	01AC035
Class name	Special Lecture Geoenvironmental Sciences
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1~ 3rd Trimester, Intensive program
Credits	1

Instructors, etc.

Instructors	lecture Non-full time
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class

Key words

Class plan

Evaluation methods

Evaluation methods

Before taking the class

Learning materials, references, and handouts

How to study for this class

Others

01AC041 Special Field Work on Geoenvironmental Sciences I

Basic class information

Class #	01AC041
Class name	Special Field Work on Geoenvironmental Sciences I
Class structure	field work
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	Intensive program
Credits	1

Instructors, etc.

Instructors	
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	This class trains students to become researchers who are able to think about geoenvironmental sciences from an all-around standpoint. The instructor will teach about field study and collection of data at a field work site selected by the both Natural Science and Human Science fields, in order to study the relationship between the environment and human activity multilaterally and regionally.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods	Evaluation will be based on participation of lab work and class

reports.

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC042 Special Field Work on Geoenvironmental Sciences II

Basic class information

Class #	01AC042
Class name	Special Field Work on Geoenvironmental Sciences II
Class structure	field work
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	Intensive program
Credits	1

Instructors, etc.

Instructors	
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	This class trains students to become researchers who are able to think about geoenvironmental sciences from an all-around standpoint. The instructor will teach about field study and collection of data at a field work site selected by the both Natural Science and Human Science fields, in order to study the relationship between the environment and human activity multilaterally and regionally.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods	Evaluation will be based on participation of lab work and class

reports.

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC051 Internship (Practical Activities) in Geoenvironmental Sciences I

Basic class information

Class #	01AC051
Class name	Internship (Practical Activities) in Geoenvironmental Sciences I
Class structure	practical training
Standard year for taking this class	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	1

Instructors, etc.

Instructors	
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	The class consists of practical training in geoenvironmental sciences through a variety of sessions, such as practical activities (internship) and field trips, and passing a certification exam. Students will need to turn in a plan, receive acceptance from the supervisor of the major and turn in a report afterwards. Students also should subscribe to the Personal Accident Insurance for Students Pursuing Education and Research.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC052 Practical Activities (Internship) in Geoenvironmental Sciences II

Basic class information

Class #	01AC052
Class name	Practical Activities (internship) in Geoenvironmental Sciences II
Class structure	practical training (internship)
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	1

Instructors, etc.

Instructors	
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	The class consists of practical training in geoenvironmental sciences through a variety of sessions, such as practical activities (internship) and field trips, and passing a certification exam. Students will need to turn in a schedule, receive acceptance from the supervisor of the major and turn in a report after completion. Students also should subscribe to the Personal Accident Insurance for Students Pursuing Education and Research.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC061 Special Seminar in Geoenvironmental Sciences

Basic class information

Class #	01AC061
Class name	Special Seminar in Geoenvironmental Sciences
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	2

Instructors, etc.

Instructors	teacher in related field
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	The purpose of this class is to give guidance on writing a master's thesis in the field of Geoenvironmental Sciences. Students should report progress on their thesis in the intermediate and final phases, and the instructor will guide them through setting research themes, selecting analytical methods, explaining the result of analysis, and so on.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods	

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC071 Special Study on Geoenvironmental Sciences

Basic class information

Class #	01AC071
Class name	Special Study in Geoenvironmental Sciences
Class structure	
Standard year for taking this class:	2nd year
Available Trimester, day and time	intensive program
Credits	6

Instructors, etc.

Instructors	teacher in related field
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class	The instructor will give research guidance to students on their research topics in Geoenvironmental Sciences and give guidance in thesis writing.

Key words

Class plan

Requirements

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC081 Methodology on Human Geography

Basic class information

Class #	01AC081
Name of the class	Methodology in Human Geography
Class structure	lectures
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, Thursday, 3rd class hour
Credits	1

Instructors, etc.

Instructors	TABAYASHI Akira
TF and TA	To be announced
Office hours	Thursday, 9:00~12:00 am
Contact	Please refer to the University of Tsukuba graduate course websites

Knowledge and skills students will receive

Relation to our educational goal	Relates to learning basic knowledge and methods of Human Geography from “a broad-range of specialized knowledge in earth, environment, resources, energy, and human activities.”
Class objectives	To learn the ideas and methods of Human Geography and specific research processes.

Class contents

Overview of the class	The instructor will explain the perspectives and methodology of Human Geography and its academic and social meanings. In addition, he will go over the contents and research procedure in Human Geography with specific examples. This class will especially focus on understanding of field survey, which is a critical part of human geography, by studying research in Agriculture and Rural Geography, in addition to introducing to current trends in Human Geography research.
Key words	Human Geography, field survey, methodology

Class plan	1. Perspectives and methods of Human Geography 2~ 3. Studying landscape of rural community 4~5.Spatial-temporal changes of employment structure of rural community 6~7. Possibility of successors for agriculture and rural community 8. Commodification of rural spaces 9~10. Reading papers of present trends in Human Geography
Requirements	The instructor recommends taking a class in "Methodology on Regional Geography"

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and participation

Before taking the class

Lecture notes, references and handouts: The instructor will assign reading materials and references in class.

How to study for this class	Students should do preparation and review work for the class by reading materials and references given during class.
Others	1. Students should have an interest in various Human Geographical phenomena. 2. Students should contact the instructor ahead of time if they will miss a class for unavoidable reasons.

01AC082 Special Lecture on Social Geography

Basic class information

Class #	01AC082
Name of the class	Special Lecture on Social Geography
Class structure	Lectures
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester, Thursday 3rd class hour
Credits	1

Instructors, etc.

Instructors	YAMASHITA Kiyomi
TF and TA	To be announced
Office hours	Please consult the instructor for an appointment.
Contact	University of Tsukuba, Laboratory of Advanced Research A, Rm 305

Knowledge and skills students will receive

Relation to our educational goal	The goal is to create highly skilled professional field scientists in international society, which is increasingly ethnically diverse, by acquiring specialized knowledge in Social Geography, particularly Ethnic Geography.
Class objectives	To acquire skills for approaching various social problems from the perspectives of Social Geography.

Class contents

Overview of the class	The class consists of lectures on theory and methodology of Ethnic Geography and reading articles about Ethnic Geography from all over the world. Students will have presentations and discussions of their own unique theme.
Key words	Ethnic geography, ethnic group, ethnicity, ethnic town
Class plan	1~2. Theory and methods of Ethnic Geography 3~5. Reading articles in Ethnic Geography 6~9. Presentations on Ethnic Geographical consideration

	10. Conclusion and free discussion
Requirements	The instructor recommends taking a class in “Methodology on Human Geography” before this class.

Evaluation methods

Evaluation methods	Evaluation will depend especially on reports and presentations.

Before taking the class

Lecture notes, references and handouts:	“Ethnic World: Ethnic Community in Japan and the World” Kiyomi Yamashita, Akashi Shoten Co., Ltd. 2008
How to study for this class	Students should study and prepare well for the presentations.
Others	1. Students should contact the instructor ahead of the time if they will miss a class for unavoidable reasons.

01AC083 Special Lecture on Cultural Geography

Basic class information

Class #	01AC083
Class name	Special Lecture on Cultural Geography
Class structure	lectures
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	3rd Trimester, Thursday 3rd class hour
Credits	1

Instructors, etc.

Instructors	MATSUI Keisuke
TF and TA	To be announced
Office hours	Please consult the instructor for an appointment.
Contact	University of Tsukuba, Laboratory of Advanced Research A, Rm 306

Knowledge and skills students will receive

Relation to our educational goal	The class will review basic concepts, such as “place”, “sacred site”, “pilgrimage”, and “tourism” by referring to international articles on the Geography of Religion and Tourism. Students will learn the current trends in Cultural Geography.
Class objectives	To cultivate critical thinking skills by reading English articles and research perspectives in Cultural Geography.

Class contents

Overview of the class	The instructor will give lectures on available research findings on “pilgrimages to sacred sites” and “religious tourism”, followed by reading articles in English about religion and tourism. Students will be in charge of 1~2 articles to explain the contents as well as giving critical reviews to others.
Key words	Geography of Religion, tourism, sacred site, pilgrimage
Class plan	1. Introduction (orientation) 2~3. Research concept of “pilgrimages to holy sites” and ”religious

	tourism” 5~9. Reading articles on religious and Tourism Geography 10 Conclusion
Requirements	The instructor recommends taking a class in “Methodology on Human Geography” and “Special lecture on Social Geography” before this class.

Evaluation methods

Evaluation methods	Evaluation will be based especially on reports, contents of presentations and participation.

Before taking the class

Lecture notes, references and handouts: The instructor will give instructions during class.

How to study for this class	Students should study and prepare thoroughly for presentations.
Others	1. A student should contact the instructor ahead of time if they will miss a class for unavoidable reasons.

01AC091 Seminar on Human Geography

Basic class information

Class #	01AC091
Class Name	Seminar on Human Geography
Class structure	seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st ~3rd Trimester, Thursday 4th class hour
Credits	3

Instructors, etc.

Instructors	TABAYAHI Akira, YAMASHITA Kiyomi, MATSUI Keisuke
TF and TA	to be announced
Office hours	Please consult the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	The instructors will explain specialized knowledge related to Human Geography, such as cultural landscape, cultural ecology and regional analysis, through seminars.
Class objectives	To acquire specialized knowledge in Human Geography, skills to write a master thesis based on that knowledge, and the ability to conduct field work.

Class contents

Overview of the class	The purpose of this class is to give guidance to students on how to write a master thesis. The instructors will teach specific processes of thesis writing, such as setting a research a theme, research methods such as collecting documents, analysis framework, analysis methods, and conclusion derivation of analysis, by referring to domestic and international documents and through discussions.
Key words	Human geography, study method, thesis creation, space planning
Class plan	The class consists of student presentations and question-and-answer

	sessions with the instructor. The instructors will make the presentation schedule after the number of students has been determined.
Requirements	It is required that students have taken “Seminar on Regional Geography” class.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, quality of presentations, and participation in class.

Before taking the class

Lecture notes, references and handouts: The instructor will give instructions during class.

How to study for this class	Students should study and prepare thoroughly for presentations.
Others	

01AC101 Field Work in Human Geography

Basic class information

Class #	01AC101
Class name	Field Work in Human Geography
Class structure	field work
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	3

Instructors, etc.

Instructors	TABAYASHI Akira, YAMASHITA Kiyomi, MATSUI Keisuke
TF and TA	to be announced
Office hours	Please consult the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	This class will explain specialized knowledge related to Human Geography, such as cultural landscapes, cultural ecology and regional analysis, through field work.
Class objectives	To acquire specialized knowledge in Human Geography as well as the skills to write thesis papers based on this knowledge and conduct field work.

Class contents

Overview of the class	The instructors will choose an area and stay there for about one week. During the excursion, the instructors will give guidance on methods of field work, such as observation of landscapes and land use survey, interviews and questionnaire survey, and analysis of the results and deriving conclusions. Also, the instructors will give guidance on report writing.
Key words	Human Geography, field work, research paper writing
Class plan	The field work locations will be given at the orientation during class.

	The locations we have used recently are Narita-city in Chiba prefecture, Chikusei-city in Ibaraki prefecture and Mobara-city in Chiba prefecture.
Requirements	It is required that students have taken either of the classes, “Seminar on Human Geography” or “Seminar on Regional Geography”.

Evaluation methods

Evaluation methods	Evaluation will be based on participation in class and quality of reports.

Before taking the class

Lecture notes, references and handouts: The instructor will give instructions at orientation during class.

How to study for this class	Students should do preparation and review for the field work location and research theme.
Others	

01AC111 Special Lecture in Human Geography

Basic class information

Class #	01AC111
Class name	Special Lecture in Human Geography
Class structure	lectures
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	1

Instructors, etc.

Instructors	part-time lecturer
TF and TA	To be announced
Office hours	Please consult the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	The students will acquire specialized knowledge related to Human Geography, such as cultural landscapes, cultural ecology, and regional analysis, through lectures.
Class objectives	To acquire specialized knowledge in Human Geography and skills to execute research based on that knowledge.

Class contents

Overview of the class	The instructors will give lectures on topics, which are considered critical in the current research trends on Human Geography, with specific examples.
Key words	Human Geography, urban/ rural, Cultural Ecology, global/local
Class plan	The class instructor will determine and announce later.
Requirements	It is required that students have taken either one of these classes: “Seminar on Human Geography” or “Seminar on Regional Geography”.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, quality of presentations, and class participation.

Before taking the class

Lecture notes, references and handouts: The instructor will give instructions during class.

How to study for this class	Reading articles and books related to the class is recommended.

Others

01AC121　Methodology in Regional Geography

Basic class information

Class #	01AC121
Class name	Methodology in Regional Geography
Class structure	lectures and seminars
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, Thursday 2nd class hour
Credits	1

Instructors, etc

Instructors	TEZUKA　Akira
TF,　TA	To be announced
Office hours	Thursday and Friday　17:00~18:00
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal	Students will acquire fundamentals related to the history of modern geography.
Class objectives	To understand the diversity and the transitions of geographical paradigms in regional understanding.

Class contents

Overview of the class	The class will go over the various research trends in modern geography.
Key words	methodology, modern geography, geographical thoughts, urban geography
Class plan	The instructor will explain the history of modern geographical thoughts and students will have presentations using textbooks on urban geography during seminars.
Requirements	It is required that students will take either of the following two classes, Seminar on Regional Geography or Seminar on Human Geography.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, participation in class and presentation on assigned documents.

Before taking the class

Learning materials, references, and handouts	Tezuka, A., 1991, *Classics in Geography* (Chirigaku no Koten), Kokon shoin. Pacione, M., 2009, *Urban Geography* (3rd ed.), Routledge.
How to study for this class	Students should prepare for the presentation on assigned documents.
Others	Students will not be allowed to be absent more than 1/3 of the classes.

01AC122 Lecture on Regional Dynamics

Basic class information

Class #	01AC122
Class name	Lecture on Regional Dynamics
Class structure	lecture (50%) and seminar (50%)
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester, Thursday 2nd class hour
Credits	1

Instructors, etc.

Instructors	KUREHA Masaaki
TF and TA	to be announced
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	This class will explain specialized knowledge related to regional human activities and environmental changes with perspectives of regional dynamics.
Class objectives	To acquire skills to understand spatial structural changes of various , regions, including urban and rural regions, with professional perspectives.

Class contents

Overview of the class	The class will explain the various research topics on changing regions based on domestic and international research, with a focus on the reality of incorporating tourism and its influences on human activities and the environment.
Key words	regional geography, regional structure, human activity, tourism region
Class plan	Students will have presentations using English textbooks during seminars. The instructor will explain the reality of changing regions due to incorporation of tourism in order for students to increase their

	understanding.
Requirements	It is required that students have taken either of the classes “Seminar on Human Geography” or “Seminar on Regional Geography”.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, participation in class and presentation of assigned documents.

Before taking the class

Lecture notes, references and handouts: Instructions will be given at the beginning of the course.

How to study for this class	Students should prepare for the presentation of his/ her choice.
Others	If a student misses 1/3 of the classes, he/she will not be allowed to continue taking the class.

01AC123 Lecture on Regional Ecology

Basic class information

Class #	01AC123
Class name	Lecture on Regional Ecology
Class structure	lecture and seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	3rd Trimester, Thursday 2nd class hour
Credits	1

Instructors, etc.

Instructors

TF and TA

Office hours

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class

Key words

Class plan

Requirements

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts:

How to study for this class

Others

01AC124　Regional geography of distribution

Basic class information

Class #	01AC124
Class name	Regional geography of distribution
Class structure	Lecture and presentation
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	3rd Trimester · Thursday 2nd class hour.
Credits	1

Instructors, etc

Instructors	KANEKO Jun
TF, TA	To be announced
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal	The students will acquire specialized knowledge related to distribution system and consumption with economical region in Japan.
Class objectives	To acquire skills to understand spatial structural changes of distribution system in Japan, with professional perspectives.

Class contents

Overview of the class	The class will go over the various research topics on regional geography of distribution.
Key words	distribution system, type of operation, commercial accumulation
Class plan	Students will have presentations using Japanese textbooks on distribution geography during seminars.
Requirements	It is required that students have taken either of the classes “Seminar on Human Geography” and “Seminar on Regional Geography”.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, participation in class and

reports on assigned documents.

Before taking the class

Learning materials, references, and handouts:

Arai, Y. and Hashimoto, K. eds., 2007, “Reconstruction of Japan's distribution system (*Ryutsu Kukan no Saikouchiku*)”, Kokon shoin.

How to study for this class: Students should prepare for the presentation of his/ her choice.

Others: 1/3 of the classes, he/she will not be allowed to continue taking the class.

01AC131 Seminar on Regional Geography

Basic class information

Class #	01AC131
Class name	Seminar on Regional Geography
Class structure	seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st ~3rd Trimester, Thursday 5th class hour
Credits	3

Instructors, etc

Instructors	TEZUKA Akira, KUREHA Masaaki, KANEKO Jun
TF, TA	To be announced
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal	Students will acquire specialized knowledge related to regional human activities and environmental changes with perspectives of regional ecology.
Class objectives	To acquire specialized knowledge in regional geography and the skills to conduct field work and write a thesis based on this knowledge.

Class contents

Overview of the class	The purpose of this class is to give guidance on writing a thesis. The instructors will teach specific thesis writing skills, such as setting a research topic, research methods, and analysis methods and conclusion derivation, by referring to domestic international articles and original regional survey reports.
Key words	regional geography, research methods, thesis writing, human activity
Class plan	The class consists of students' presentations and question-and-answer sessions with the instructor. Presentation schedule will be made after the number of students has been determined.

Requirements	“Seminar on Human Geography” is a prerequisite for this class.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, quality of presentations and participation in class.

Before taking the class

Learning materials, references, and handouts:	Instructions will be given during class.
How to study for this class	Students should prepare well for the presentations.

01AC141　Field Work in Regional Geography

Basic class information

Class #	01AC141
Class name	Field Work in Regional Geography
Class structure	field work
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	3

Instructors, etc

Instructors	TEZUKA Akira, KUREHA Masaaki, KANEKO Jun
TF,　TA	To be announced
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal	Through field work, students will acquire specialized knowledge related to regional human activities and environmental changes.
Class objectives	To acquire specialized knowledge in regional geography and skills to write a thesis based on the knowledge and execute field work.

Class contents

Overview of the class	During the camp for one week, the instructors will give guidance on methods of surveys. Paying attention to relationships between whole area and a portion of the area and linkage of various elements which make up the area, the instructors will give guidance on analyzing research results and writing conclusions, in addition to writing report.
Key words	regional geography, fieldwork, report writing
Class plan	The instructors will specify the location of field work at the orientation during class. The locations we have used are Nagano Basin in Nagano prefecture, Kofu Basin in Yamanashi prefecture and Suwa Basin in Nagano prefecture.

Requirements	It is required that students have taken either of the classes, “Seminar on Human Geography” and “Seminar on Regional Geography”.

Evaluation methods

Evaluation methods	Evaluation will be based on quality of presentations and participation in class.

Before taking the class

Learning materials, references, and handouts:	Instructions will be given at the orientation during class.
How to study for this class	Students should do preparation and review work on the survey area and the theme.

01AC151 Special Lecture in Regional Geography

Basic class information

Class #	01AC151
Class name	Special Lecture in Regional Geography
Class structure	lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	1

Instructors, etc.

Instructors	Lecturer Non-Full-time
TF and TA	To be announced
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Students will acquire specialized knowledge related to regional human activities and environmental changes, through lecture.
Class objectives	To acquire specialized knowledge in regional geography and skills to prosecute research.

Class contents

Overview of the class	The class will teach recent research trends in regional geography, and give lectures on especially important topics with specific examples.
Key words	regional geography, regional structure, environmental changes, human activity
Class plan	It will be given after instructor is chosen.
Requirements	It is required that students have taken either of the classes “Seminar on Human Geography” and “Seminar on Regional Geography”.

Evaluation methods

Evaluation methods	Evaluation will be based on quality of reports and participation in

class.

Before taking the class

Lecture notes, references and handouts : Instructions will be given during classes.

How to study for this class　　Students should read articles and books related to the class.

Others

01AC161 Lecture in Weathering and Soil Erosion

Basic class information

Class #	01AC161
Class name	Lecture in Weathering and Soil Erosion
Class structure	lecture
Standard year for taking this class:	1st year
Available Trimester, day and time	The lecture will not be offered in this year.
Credits	1

Instructors, etc.

Instructors	-
TF and TA	-
Office hours	-
Contact	-

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class	-
Key words	Geomorphology, weathering, erosion, geomorphic form process, speed of erosion
Class plan	-

Requirements

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and reports etc.

Before taking the class

Lecture notes, references and handouts:

How to study for this class

Others

01AC162 Lecture in Sedimentary Geomorphology

Basic class information

Class #	01AC162
Class name	Lecture in Sedimentary Geomorphology
Class structure	lecture
Standard year for taking this class:	1st year
Available Trimester, day and time	2nd Trimester, Friday 2nd class hour
Credits	1

Instructors, etc.

Instructors	SEKIGUCHI Tomohiro
TF and TA	To be announced
Office hours	Contact the instructor before or after class for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, and resources, etc.”
Class objectives	To understand the relationship between geomorphology and sedimentary processes.

Class contents

Overview of the class	The class will teach basic knowledge for understanding Sedimentary Geomorphology and its formation processes, which are (1) physical characteristics of clastic materials, (2) basic characteristics of fluid movement, and (3) transportation and sedimentation of clastic materials, in order to increase understanding of the dynamics of Sedimentary Geomorphology.
Key words	geomorphology, sedimentation, land form process

Class plan

1. Introduction: Sedimentation and geomorphology, physical characteristics of clastic materials
2. Basic characteristic of fluid movement: one way flow

3. Basic characteristic of fluid movement: ocean waves and combined flow

4. Transport of clastic material/ sedimentation I

5. Transport of clastic material/ sedimentation II

6. Dynamics of Sedimentary Geomorphology: Bed form I

7. Dynamics of Sedimentary Geomorphology: Bed form II

8. Dynamics of Sedimentary Geomorphology: Fluvial Geomorphology

9. Dynamics of Sedimentary Geomorphology: Coastal Geomorphology

10. Dynamics of Sedimentary Geomorphology: Sea bottom Geomorphology

Requirements	Basic knowledge on geomorphology and geology.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, reports etc.

Before taking the class

Lecture notes, references and handouts :

How to study for this class

Others

01AC163 Lecture in Geomorphology of Cryosphere

Basic class information

Class #	01AC163
Class name	Lecture in Geomorphology of Cryosphere
Class structure	Lecture
Standard year for taking this class:	1st and 2nd year
Available Trimester, day and time	1st Trimester, Friday 2nd class hour
Credits	1

Instructors, etc

Instructors	MATSUOKA Norikazu
TF and TA	
Office hours	Monday, Tuesday & Friday, 9:00~11:00 AM
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal	Promoting 'background of a field scientist'.
Class objectives	To acquire specialized knowledge in landforms in the Cryosphere as well as skills to conduct field and laboratory research.

Class contents

Overview of the class	The class describes characteristic landforms and near-surface structures in periglacial environments and discusses research methods for periglacial processes.
Key words	periglacial environment, permafrost, geomorphology, polar region, alpine

Class plan

1. Periglacial environments: Classification & environmental significance
2. Ground freezing: Thermal regime in frozen/unfrozen ground
3. Periglacial weathering: Frost/non-frost weathering, rockfalls & rockwall retreat
4. Frost heave and sorting: Differential heave vs. convection

5. Periglacial slopes: Solifluction, rapid mass movements & slope evolution

6. Permafrost processes: Thermal contraction cracking & permafrost creep

7. Cold desert geomorphology in Antarctica: Processes & rates

8. Periglacial environments in Japan: Glacial vs. interglacial

Requirements	Basic knowledge on geomorphology, climatology and geology.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, reports etc.

Before taking the class

Learning materials, references, and handouts:

Williams, P.J. & Smith, M.W., 1989. The Frozen Earth: Fundamentals of Geocryology. Cambridge Univ. Press.

Ballantyne, C.K. & Harris, C. 1994. The Periglaciation of Great Britain. Cambridge Univ. Press.

French, H., 2007. The Periglacial Environment, 3rd ed. Wiley.

How to study for this class	Surveying related references and data, including those introduced during the lecture.
Others	Questions during the lecture are highly recommended. Absence due to fieldwork or a scientific meeting has to be informed prior to the lecture.

01AC164 Lecture on Hydrogeomorphology

Basic class information

Class #	01AC164
Class name	Lecture on Hydrogeomorphology
Class structure	Lecture
Standard year for taking this class:	1st year
Available Trimester, day and time	1st Trimester, Thursday 1st class hour
Credits	1

Instructors, etc

Instructors	HATTANJI, Tsuyoshi
TF, TA	None
Office hours	Tuesday. 2:00 ~ 5:00 pm, Thursday 10:00 ~ 11:00 am
Contact	Refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Knowledge on erosion processes or landslide disaster.

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, and resources, etc.”
Class objectives	To understand the relationship between hillslope hydrological processes and geomorphic processes such as erosion and mass movement.

Class contents

Overview of the class	The class will explain how various hydrological processes in hillslope affects various geomorphic processes such as erosion, mass movement and channel initiation.
Key words	Geomorphology, Hillslope hydrology, Erosion, Landslide
Class plan	1. Introduction: What is Hydrogeomorphology? 2. Soil production 3. Rainfall-runoff processes and landform evolution

4. Channel initiation by overland flow

5. Channel initiation by shallow landslides

6. Deep-seated landslides

7. Channel initiation by groundwater flow

8. Hydrogeomorphology in karst area

9. Cosmogenic radionuclides dating and hydrogeomorphology

10. Conclusion

Requirements

Evaluation methods

Evaluation methods	Evaluation will be based on attendance (60%) and reports (40%)

Before taking the class

Learning materials, references, and handouts

"Hydrogeomorphology", Onda, Y., Okunishi, K., Iida, T., Tsujimura, M. (eds.), 1996, Kokon Shoin (in Japanese).

"The Earth's Changing Surface", Matsukura, Y., 2008, Asakura Shoten (in Japanese).

How to study for this class: Review using above references is recommended.

Others

01AC171 Seminar in Geomorphology

Basic class information

Class #	01AC171
Class name	Seminar in Geomorphology
Class structure	seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1~3rd Trimester, Friday 5th class hour
Credits	3

Instructors, etc.

Instructors	MATSUOKA Norikazu, SEKIGUCHI Tomohiro, HATTANJI Tsuyoshi
TF and TA	None
Office hours	SEKIGUCHI Tomohiro, Contact the instructor before or after class for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, and resources, etc,” and promoting ‘background of a field scientist’.
Class objectives	To acquire highly specialized knowledge and to increase thinking power, analytical capability, presentation and discussion technique, in order to become a researcher, teacher or leader in various quarters.

Class contents

Overview of the class	The class will introduce academic papers in Geomorphology and discuss research methods.
Key words	Geomorphology, geomorphic process, academic paper, presentation, discussion
Class plan	1st year The class will mainly talk about: (1) introduction to foreign academic

papers of high interest, (2) presentation of research plan conception, (3) report on currently conducted experiments and research, in addition to discussions in class about the contents. Students will give presentations at least once every Trimester.

2nd year

Students will give presentations on research for a master's thesis while it is in progress and at completion. The class will discuss each research method and the derivation of the conclusion. Students will give presentations at least once every Trimester.

It is required that students have taken all of the classes "Geomorphology", "Geomorphology of Slopes", "Process Sedimentology" and "Climate Geomorphology" classes in College of Geosciences.

Evaluation methods

Evaluation methods	Evaluation will be done comprehensively and will be based on attendance and presentation quality.

Before taking the class

Class materials and references	Because necessary references for research will depend on the research theme, students should consult instructor for these.
How to study for this class	For introduction of thesis, students should look through related theses and articles for better understanding of the thesis and the background of the research.
Others	1. When introducing their thesis in class, students should bring copies of related theses for the class. 2. Students should be active in asking questions during discussion, and the presenter should prepare for an active discussion. 3. Absences will be treated as attended if they are due to causes such as attending an academic conference or doing field work for thesis.

01AC181 Field Work in Geomorphology

Basic class information

Class #	01AC181
Class name	Field Work in Geomorphology
Class structure	field work
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	Intensive program
Credits	3

Instructors, etc.

Instructors	MATSUOKA Norikazu, SEKIGUCHI Tomohiro, HATTANJI Tsuyoshi
TF and TA	None
Office hours	HATTANJI Tsuyoshi, Tuesday 14:00~17:00 (University of Tsukuba, Laboratory of Advanced Research A204)
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Promoting 'background of a field scientist'.
Class objectives	Students will learn field work and observation techniques in studying geomorphologic processes. In addition, they will learn data processing techniques for field work.

Class contents

Overview of the class	The class will have camps at typical geomorphic sites in order to learn various field work methods, techniques, and analysis and derivation of conclusions.
Key words	Geomorphology, geomorphic process, field work, observation, data analysis
Class plan	The class will have field work for about 6 days at the selected site. Field work includes observation and taking measurements at the geomorphic site, taking notes of soil properties, measurements of physical properties, observation of geomorphic processes, data

	analysis, etc. Typically, students will do field work and observation from morning until sunset. From then, they will do data analysis, discussion, and preparation for the next day's field work and observation until evening. Details for each field work location will be given during orientation. The recent locations and theme are as follows. Hidaka region in Hokkaido prefecture- Mountain Geomorphology, Hydrogeomorphology Aoshima in Miyazaki prefecture- Coastal Geomorphology, rock weathering.
Requirements	Basic knowledge on geomorphology and geology.

Evaluation methods

Evaluation methods	Evaluation will be done comprehensively and will be based on attendance and report quality.

Before taking the class

Lecture notes, references and handouts:

	Details of field work for each location will be given during orientation.
How to study for this class	Students should read handouts and references thoroughly ahead of time.
Others	1. Students should be aware that there may be multiple instances of 2~3 day experiments for a total of 6-day field work. 2. Students should be aware that after field work locations are decided, dates, location and orientation info will be given via email. 3. Students should attend the orientation before the field work.

01AC191 Special Lecture in Geomorphology

Basic class information

Class #	01AC191
Class name	Special Lecture in Geomorphology
Class structure	intensive program
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	Intensive program
Credits	1

Instructors, etc.

Instructors	lecturer Non-Full-Time
TF and TA	
Office hours	
Contact	

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, and resources, etc.”
Class objectives	

Class contents

Overview of the class	The class will select a specific theme in Geomorphology and explain methods and research results with topics.
Key words	
Class plan	
Requirements	Basic knowledge on geomorphology.

Evaluation methods

Evaluation methods	

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC201 Hydrological and Geochemical Cycle

Basic class information

Class #	01AC201
Class name	Hydrological and Geochemical Cycle
Class structure	lecture and seminar
Standard year for taking this class:	1st year
Available Trimester, day and time	1st Trimester, Thursday, 5th class hour
Credits	1

Instructors, etc

Instructors	YAMANAKA Tsutomu, TASE Norio
TF, TA	To be announced
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the Hydrological Sciences' website. http://www.geoenv.tsukuba.ac.jp/~hydro/.

Knowledge and Skills students will receive

Relation to our educational goal	Relates to "produce professionals with a broad-range of specialized knowledge in earth, environment, resources, energy and excellent field work skills of field scientists, such as observation and research techniques."
Class objectives	Students should learn fundamental process of hydrological/ geochemical cycle and their interrelationship, as well as methods of field investigation, data analysis and numerical modeling, by learning basic literatures and reviewing articles.

Class contents

Overview of the class	This class will explain basic theory and application of hydrological/geochemical cycle in atmosphere, hydrosphere, lithosphere and biosphere. Students will increase their understanding and applying of important concepts and tools.
Key words	hydrological cycle, geochemical cycle, tracer, isotope

Class plan	1. Introduction: tracing hydrological/geochemical cycle
	2. Fundamentals of isotopic tracer approach
	3. Applications in hydrometeorology
	4. Applications in hydrogeology
	5. Applications in ecohydrology
	6-10. Reviews of recent advances
Requirements	Basic knowledge of hydrology and related fields

Evaluation methods

Evaluation methods	Evaluation will be based on attendance (60%) and presentation (40%)

Before taking the class

Learning materials, references, and handouts

"Hydrological Sciences (Suimon Kagaku)", University of Tsukuba Hydrological Sciences Laboratory, 2008, Kyoritsu.

"Environmental Isotopes in Hydrogeology", Clark and Fritz, 1997, CRC Press.

"Isotope Tracers in Catchment Hydrology", Kendall and McDonell eds., 1998, Elsevier.

How to study for this class	Students should read an English paper published in international journal and present its contents and their understanding.
Others	1. Students should do preparation work.2. If a student has to miss a class for unavoidable reasons such as attending conferences or conducting field work for his/her own research, he/she should turn in a "Reasons Form" with a research instructor's signature. If the class instructor accepts it as "unavoidable absence", it may be treated as attended if the student turns in a good report on instructor's assignment.

01AC202 Subsurface water hydrology

Basic class information

Class #	01AC202
Class name	Subsurface water hydrology
Class structure	lecture and exercise
Standard year for taking this class:	1_{st} or 2_{nd} year
Available Trimester, day and time	2^{nd} Trimester, Thursday, 5^{th} class
Credits	1

Instructors, etc

Instructors	TSUJIMURA Maki
TF, TA	To be announced
Office hours	Any time
Contact	See the web site of hydrology lab

Knowledge and Skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, and resources, etc.”
Class objectives	To learn basic method of data interpretation and analysis on subsurface water hydrology

Class contents

Overview of the class	The method of data interpretation, analysis, and discussion will be lectured and trained in the field of subsurface water hydrology
Key words	Subsurface water, soil water, groundwater, hydrology
Class plan	1. Basic of subsurface water behavior 2. Soil moisture behavior 3. Water budget of subsurface water 4. Aquifer test 5. Hydrogeology 6. Interaction between surface water and subsurface water

	7. Chemical processes in subsurface water
Requirements	Basic knowledge on natural sciences. Basic knowledge of hydrology is welcome.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and reports or examination.

Before taking the class

Learning materials, references, and handouts	
	“Hydrological Science (Suimonkagaku)”, Hydrology lab. Univ. Tsukuba, 2008, Kyoritsu Shuppan
How to study for this class	Students should join this course with high motivation and interest
Others	None

01AC203 Boundary-Layer Hydrology

Basic class information

Class #	01AC203
Class name	Boundary-Layer Hydrology
Class structure	lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	3rd Trimester, Thursday 5th class hour
Credits	1

Instructors, etc.

Instructors	JUN Asanuma
TF and TA	None
Office hours	After each class or TBA
Contact	asanuma@suiri.tsukuba.ac.jp.

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, and resources, etc.”
Class objectives	The class aims for the students to understand land surface-atmospheric interaction, structure of the atmospheric boundary layer, turbulent flow characteristics and water, material and energy transportation. In addition, students should be able to apply the knowledge to their research.

Class contents

Overview of the class	Lectures will include basic theory and application of transportation processes of materials in the atmosphere, hydrosphere and lithosphere. Assignments will help students understand meaning and use of important concepts, mathematical formulas and models.
Key words	atmospheric boundary layer, turbulent flow transportation, surface-atmospheric interaction
Class plan	1. Water in the atmosphere: hydrodynamics in the lower atmosphere

(1) water vapor in the air

(2) Hydrostatics and atmospheric stability

(3) Turbulent flow transportation of water vapor

(4) Transportation processes of materials and the atmospheric boundary layer

(5) Similarity law of turbulent flow

(6) Boundary condition of earth surface

2. Evaporation

(1) Mechanism of evaporation and mass transport equation

(2) Heat balance method

(3) Water balance method

(4) Climatology of evaporation

Requirements	Mathematics equivalent to university admission in science or engineering

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and reports

Before taking the class

Lecture notes, references and handouts

"Hydrology: An Introduction", Brutsaert, W., 2005, Cambridge University Press

How to study for this class

Others

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01AC211 Seminar in Hydrological Sciences

Basic class information

Class #	01AC21
Class name	Seminar in Hydrological Sciences
Class structure	seminar
Standard year for taking this class:	1_{st} or 2_{nd} year
Available Trimester, day and time	1~3_{rd} Trimester, Wednesday 5_{th} class hour
Credits	3

Instructors, etc

Instructors	SUGITA Michiaki, TASE Norio, ASANUMA Jun, TSUJIMURA Maki, YAMANAKA Tsutomu
TF, TA	None
Office hours	Please contact the instructors for an appointment.
Contact	Please refer the website of the Hydrological Sciences field.

Knowledge and Skills students will receive

Relation to our educational goal	Relates to "acquiring a broad-range of specialized knowledge in earth, environment, resources, etc. and research skills for field scientists.
Class objectives	To understand research methods, data analysis, defining the problem in hydrology, and be able to apply this knowledge for writing a doctoral thesis.

Class contents

Overview of the class	The instructors will select various topics in hydrological sciences, focusing on those related to hydrological cycles, water balance, and energy balance. Students will introduce domestic and international articles of a related field in class, and the class will have discussions of research methods, data analysis methods and defining problems. The instructors will also give guidance for writing a doctoral thesis.
Key words	Hydrological cycle, geochemical cycle, water balance, energy balance

Class plan	The class will have presentations and discussions in Hydrology throughout the school year.
Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on attendance.

Before taking the class

Learning materials, references, and handouts

"Hydrology (Suimongaku)", SUGITA Michiaki, 2008, Kyoritsu Shuppan (translated from"Hydrology: An Introduction", Brutsaert, W., 2005, Cambridge University Press)

How to study for this class	Students should read many theses in Hydrology to increase his/ her understanding. Also, students should have a presentation of their own research findings at a conference.
Others	1. Students should actively participate in discussion. 2. Students should understand the materials of any missed classes. He/ she should come to instructor for questions.

01AC221 Field Work in Hydrological Sciences

Basic class information

Class #	01AC221
Class name	Field Work in Hydrological Sciences
Class structure	field work
Standard year for taking this class:	1_{st} or 2_{nd} year
Available Trimester, day and time	intensive program
Credits	3

Instructors, etc

Instructors	SUGITA Michiaki, TASE Norio, ASANUMA Jun, TSUJIMURA Maki, YAMANAKA Tsutomu
TF, TA	None
Office hours	Please contact the instructors for an appointment.
Contact	Please refer the website of the field.

Knowledge and Skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, resources and research skills of a field scientist.”
Class objectives	Students will learn research methods, data analysis methods, defining the problems in hydrology and be able to apply that knowledge for writing a doctoral thesis.

Class contents

Overview of the class	The instructors will give guidance for field work, observation methods, data organization and analysis, and interpretation of results in relation to various topics in Hydrological Sciences.
Key words	hydrological cycle, geochemical cycle, water balance, energy balance
Class plan	The class is an intensive program that includes planning of field work and construction of a report.
Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and report.

Before taking the class

Learning materials, references, and handouts	
	"Hydrological Science", Michiaki Sugita, 2008, Kyouritsu Shuppan. (translated from "Hydrology: An Introduction", Brutsaert, W., 2005, Cambridge University Press)
How to study for this class	Students should read many thesis papers in hydrology to increase his/her understanding.
Others	1. Students should actively participate in class. 2. Students who have missed field work will not receive any credit.

01AC231 Special Lecture in Atmospheric Sciences

Basic class information

Class #	01AC231
Class name	Special Lecture in Atmospheric Sciences
Class structure	lecture
Standard year for taking this class:	1_{st} or 2_{nd} year
Available Trimester, day and time	Intensive program
Credits	1

Instructors, etc

Instructors	invited lecturer
TF, TA	None
Office hours	Announced at the beginning of the class.
Contact	Announced at the beginning of the class.

Knowledge and Skills students will receive

Relation to our educational goal	Relates to “acquiring a broad-range of specialized knowledge in earth, environment, and resources, etc.”
Class objectives	To learn current trends in research and methodology development.

Class contents

Overview of the class	The instructor will give lectures in current topics in Hydrological Sciences as well as specialized lectures.
Key words	Hydrological Sciences
Class plan	Given at the beginning of the class.
Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and reports or examination.

Before taking the class

Learning materials, references, and handouts	“Hydrology (Suimongaku)”, SUGITA Michiaki, 2008, Kyoritsu Shuppan (translated from“Hydrology: An Introduction”, Brutsaert, W., 2005, Cambridge University Press)
How to study for this class	Students should solve the end of chapter problems in the above textbook.
Others	1. Students should actively participate in class and should not miss any classes. 2. Students who missed a class should understand the material of the missed class.

01AC241 Methodology in Meteorology

Basic class information

Class #	01AC241
Class name	Methodology in Meteorology
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2st Trimester, Thursday ,1nd class hour
Credits	1

Instructors, etc.

Instructors	KUSAKA Hiroyuki
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	This class will explain the research methodology of Meteorology. In addition, it will go over specific research techniques and current research trends. The class materials may change according to the students' requests.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods	Grading will be based on attendance, participation in class, and report quality.

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC242 Method of Climatology

Basic class information

Class #	01AC242
Class name	Methodology of Climatology
Class structure	seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, Tuesday 2nd class hour
Credits	1

Instructors, etc

Instructors	UEDA Hiroaki
TF, TA	to be announced
Office hours	Please consult the instructor for an appointment.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive

Relation to our educational goal:	Understanding the physical processes that are responsible for climate system.
Class objectives	Acquiring specialized knowledge in the climate and ocean dynamics in terms of air-sea-land interactions.

Class contents

Overview of the class:	Lecture is given on the air-sea-land interaction involved in the climate system by taking monsoon climate and EL Niño.
Key words:	Monsoon, ENSO, climate dynamics
Class plan	
Requirements	It is required that students have taken “Seminar on Atmospheric science” class.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, quality of presentations, and participation in class.

Before taking the class

Learning materials, references, and handouts: The instructor will give instructions during class.

How to study for this class: Students should study and prepare thoroughly for presentations.

Others

01AC243 Methodology in Atmospheric Science

Basic class information

Class #	01AC243
Class name	Methodology in Atmospheric Science
Class structure	Lecture
Standard year for taking this class:	1st and 2nd year
Available Trimester, day and time	3rd trimester, Tuesday, 2nd class hour
Credits	1

Instructors, etc

Instructors	TANAKA Hiroshi L.
TF, TA	N/A
Office hours	Any time but an appointment required
Contact	Refer to the University of Tsukuba graduate course websites

Knowledge and Skills students will receive

Basic methodology in atmospheric science

Relation to our educational goal	Understand natural science
Class objectives	Understanding meteorology, climatology, and atmospheric science

Class contents

Overview of the class	Basic concept of dynamic meteorology is instructed with a support by reports.
Key words	Meteorology, climatology, atmospheric science
Class plan	Fundamentals in conservation laws, dynamics and thermodynamics will be instructed, especially in the area of energetic, baroclinic instability, Hamiltonian system, and normal mode of the atmosphere
Requirements	None

Evaluation methods

Evaluation methods	Evaluation will be based on reports and attendance

Before taking the class

Learning materials, references, and handouts	Lecture will be given by the specified handouts and a textbook.
How to study for this class	Students are requested to answer the reports from the contents of the lecture.
Others	Basic knowledge in dynamic meteorology is required.

01AC251 Seminar in Atmospheric Sciences

Basic class information

Class #	01AC251
Class name	Seminar in Atmospheric Sciences
Class structure	seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1~3rd Trimester, Thursday, 6th class hour
Credits	3

Instructors, etc

Instructors	HAYASHI Yosei, TANAKA Hiroshi, UENO Kenichi, UEDA Hiroaki, KUSAKA Hiroyuki
TF, TA	to be announced
Office hours	Please contact the instructor before visiting.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive:

Relation to our educational goal	Relates to "producing professionals who can utilize specialized knowledge in Geosciences, have a high level of knowledge, and are part of knowledge-based society in various ways."
Class objectives	To be able to quantitatively explain, discuss and review research articles in Atmospheric Sciences.

Class contents

Overview of the class	Students will choose themes in Atmospheric Sciences, and the instructors will give guidance in writing a thesis. Students will be asked to introduce domestic and international articles and research findings, followed by a class discussion. In the second year, students will make presentations of review articles in specific to research topics (intensive seminar).
Key words	thesis introduction, research presentation
Class plan	

Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and intensive seminar presentations.

Before taking the class

Learning materials, references, and handouts: none

How to study for this class	Students should prepare for the presentations through careful review.
Others	1. Students should send emails about the contents of their presentations to classmates using the mailing list prior to the class. 2. Students who may miss the intensive seminar should consult the instructor.

01AC261 Field Work in Atmospheric Sciences

Basic class information

Class #	01AC261
Class name	Field Work in Atmospheric Sciences
Class structure	seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	**3**

Instructors, etc

Instructors	HAYASHI Yousay, TANAKA Hiroshi, UENO Kenichi, UEDA Hiroaki, KUSAKA Hiroyuki
TF, TA	to be announced
Office hours	Please contact the instructor before visiting.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive:

Relation to our educational goal	Relates to "Students will acquire a broad-range of specialized knowledge and research skills of a field scientist."
Class objectives	To be able to give measurements and analysis in Atmospheric Sciences.

Class contents

Overview of the class	In this class, students will cooperate to work on meteorological observations and gather data. They will quantitatively analyze and review the gathered data.
Key words	observation, data gathering, analysis.
Class plan	During a set period, students will work intensively on meteorological observations and gathering data. The students will also practice quantitatively analyzing gathered data. The class will have a different leading instructor every year and have field work with unique

	perspectives.
Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, voluntary work, and reports.

Before taking the class

Learning materials, references, and handouts: none

How to study for this class	Students should study theories and measurement procedures in relation to 76 field work ahead of time.
Others	1. Students should attend the guidance if it is available ahead of time. As a general rule, students should show up and leave at the site of field work. 2. Students who do not participate in the field work will not receive any credit.

01AC271 Special Lecture in Atmospheric Sciences

Basic class information

Class #	01AC271
Class name	Special Lecture in Atmospheric Sciences
Class structure	lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	1

Instructors, etc

Instructors	Invited lecturer
TF, TA	to be announced
Office hours	Please contact the instructor before visiting.
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and Skills students will receive:

Relation to our educational goal	Relates to "produce specialized researchers and university teaching staffs, who can research geoenvironmental structures and changes scientifically, and highly specialized professionals who can tackle various problems that occur in geoenvironment and various regions."
Class objectives	The instructor will decide.

Class contents

Overview of the class	The class will include current topics in Atmospheric Sciences as well as specialized lectures.
Key words	Atmospheric sciences, special lecture
Class plan	Special lectures will be given by an invited lecturer.
Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and reports.

Before taking the class

Learning materials, references, and handouts:	The instructor will give handouts.
How to study for this class	Students should go over the lecture contents before class.
Others	1. Students should check the class plan ahead of time. 2. If a student fails to turn in an assigned report he/she will not receive any credit.

01AC281 Methodology in Geographical Information Science I

Basic class information

Class #	01AC281
Name of the Class	Methodology in Geographical Information Science I
Class structure	Lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, Wednesday, 1st class hour
Credits	1

Instructors, etc.

Instructors	MURAYAMA Yuji
TF and TA	To be announced
Office hours	Friday 9:00 – 11:00 am
Contact	E-mail: mura1@sakura.cc.tsukuba.ac.jp

Knowledge and skills students will receive

Relation to our educational goal	Relates to learning basic knowledge and methods of Geographical Information Science from "a broad-range of specialized knowledge in earth, environment, resources, energy, and human activities."
Class objectives	To learn the ideas and methods of Geographical Information Science and specific research processes.

Class contents

Overview of the class	The class will have lectures on a versatile approach of how to systematically build, manage, analyze, integrate and transmit geological spatial information and the method of applying the information to Human Geography. Also, the class will go over acquiring spatial data and building a spatial information database.
Key words	GIS, Spatial analysis
Class plan	1. Gathering GIS related information 2. Development of GIS 3. Acquiring spatial data

	4. Analyzing spatial data
	5. Spatial data modeling
Requirements	

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, participation in class, and reports.

Before taking the class

Lecture notes, references and handouts: The instructor will give handouts.

How to study for this class	Lecture notes, references and handouts: The instructor will assign reading materials and references in class.
Others	Students should contact the instructor ahead of the time if they will miss a class for unavoidable reasons.

01AC282 Methodology in Geographical Information Science II

Basic class information

Class #	01AC282
Class name	Methodology in Geographical Information Science II
Class structure	Lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester, Wednesday, 1st class hour
Credits	1

Instructors, etc.

Instructors	MORIMOTO Takehiro
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Understanding SIS related with geoenvironmental science
Class objectives	Understanding how to use GIS in the agriculture field

Class contents

Overview of the class	The class will use regional problems where human-nature interactions occur, in order to introduce research methods, such as Geological Information System (GIS), and methods to present research findings, with examples of agriculture/farming community and land-use research.
Key words	GIS, Spatial analysis
Class plan	
Requirements	N.A.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, participation in class, and reports.

Before taking the class

Lecture notes, references and handouts : The instructor will give handouts.

How to study for this class

Others

01AC283 Methodology in Geographical Information Science III

Basic class information

Class #	01AC283
Class name	Methodology in Geographical Information Science III
Class structure	Lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	3rd Trimester, Wednesday, 1st class hour
Credits	1

Instructors, etc.

Instructors	KUSAKA Hiroyuki
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Understanding SIS related with geoenvironmental science
Class objectives	Understanding how to use GIS in the climatology

Class contents

Overview of the class	The class will introduce current trends in geoenvironmental research using spatial information systems. It will give special consideration to international research findings on various physical geographical phenomena, such as atmospheric phenomena.
Key words	GIS, Spatial analysis
Class plan	
Requirements	N.A.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, participation in class, and reports.

Before taking the class

Lecture notes, references and handouts : The instructor will give handouts.

How to study for this class

Others

01AC291 Seminar in Geographical Information Science

Basic class information

Class #	01AC291
Class name	Seminar in Geographical Information Science
Class structure	Seminar
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1~3rd Trimester, Thursday, 4th class hour
Credits	3

Instructors, etc.

Instructors	MURAYAMA Yuji, MORIMOTO Takehiro, KUSAKA Hiroyuki
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	Students will acquire specialized knowledge related to SIS and environmental changes.
Class objectives	To acquire specialized knowledge in SIS and the skills to conduct field work and write a thesis based on this knowledge.

Class contents

Overview of the class	This class will review the effectiveness and problems of spatial information science with new analysis methods found in Spatial Information Science and related geographical research. The class will also introduce and discuss domestic and international research articles that are related to each student's research.
Key words	GIS, SIS
Class plan	Presentation and discussion
Requirements	N.A.

Evaluation methods

Evaluation methods	Grading will be based on attendance, participation in class, and reports.

Before taking the class

Lecture notes, references and handouts : The instructor will give handouts.

How to study for this class

Others

01AC301 Field and Laboratory Work in Geographical Information Science

Basic class information

Class #	01AC301
Class name	Field and Laboratory Work in Geographical Information Science
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	3

Instructors, etc.

Instructors	MURAYAMA Yuji, MORIMOTO Takehiro, KUSAKA Hiroyuki
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	This class will explain specialized knowledge related to SIS, through field work.
Class objectives	To acquire specialized knowledge in SIS as well as the skills to write thesis papers based on this knowledge and conduct field work.

Class contents

Overview of the class	This class will include field and laboratory work to acquire analysis methods (acquiring and analyzing spatial information and attribute data in ecological and human geographical phenomena) that are necessary for geographical research in Spatial Information Sciences. Students will work not only indoors but also outdoors, so that they will learn techniques to monitor spatial phenomena at a site and create a database of the findings, as well as field research methods to find interrelationships of elements of ecological human geographical phenomena.
Key words	

Class plan

Requirements

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, participation in class, and reports.

Before taking the class

Lecture notes, references and handouts : The instructor will give handouts.

How to study for this class

Others

01AC311 Special Lecture in Geographical Information Science

Basic class information

Class #	01AC311
Class name	Special Lecture in Geographical Information Science
Class structure	Lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	intensive program
Credits	1

Instructors, etc.

Instructors	lecturer non-full-time
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal	The goal is to create highly skilled professional field scientists in international society in SIS.
Class objectives	To acquire skills for approaching various social problems from the perspectives of SIS.

Class contents

Overview of the class	The class consists of lectures on theory and methodology of Ethnic Geography and reading articles about Ethnic Geography from all over the world. Students will have presentations and discussions of their own unique theme.
Key words	GIS, SIS
Class plan	How to use ArcGIS for advanced research, etc
Requirements	N.A.

Evaluation methods

Evaluation methods	Grading will be based on attendance, participation in class, and

reports.

Before taking the class

Lecture notes, references and handouts : The instructor will give handouts.

How to study for this class

Others

01AC321 Remote Sensing Analysis in Hydrology

Basic class information

Class #	01AC321
Class name	Remote Sensing Analysis in Hydrology
Class structure	lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, bimonthly, University of Tsukuba, Laboratory of Advanced Research A 217B
Credits	1

Instructors, etc.

Instructors	MISUMI Ryohei
TF and TA	none
Office hours	Please contact via email.
Contact	misumi@bosai.go.jp

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring comprehensive knowledge for conducting geoscientific research”.
Class objectives	Students will learn the first and second laws of thermodynamics and the physical phenomena of clouds. Students will also learn to understand nature through the eyes of the laws of physics and know the basic characteristics of clouds and rain by remotely sensing precipitation (radar, etc.).

Class contents

Overview of the class	The class will explain rainfall processes that are fundamental to research in the system of hydrological cycles and go over research methods that utilize numerical modeling.
Key words	precipitation, rainfall, snow, cloud
Class plan	1. Guidance on topics of current cloud research 2. Dry air and thermodynamics

3. Water vapor and its thermodynamic effects

4. Characteristics found by cloud observation

5. Generation of cloud droplets

6. Development of cloud droplets by condensation

7. Rainfall generation from freeze-free clouds

8. Generation and development of ice crystal

9. Rain and snow

10. Weather control

Requirements: none

Evaluation methods

Evaluation methods: Evaluation will be based on examination (50%) and attendance (50%).

Before taking the class

Lecture notes, references and handouts:

"A Short Course in Cloud Physics", R.R. Rogers and M.K. Yau (The instructor will hand out a translated version).

How to study for this class: Students should review the exercises that they did during the class.

Others:

1. Students should be in their seats one minute before the class starts.
2. If a student will miss a class due to a conference or field work he/she should contact the instructor via email ahead of time. If it is accepted as "unavoidable" the instructor will change the absence to "attended".

01AC322 Remote Sensing Analysis in Hydrology II

Basic class information

Class #	01AC322
Class name	Remote Sensing Analysis in Hydrology II
Class structure	lecture
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester, bimonthly, University of Tsukuba, Laboratory of Advanced Research A 217B
Credits	1

Instructors, etc.

Instructors	MAKI Masayuki
TF and TA	none
Office hours	Please contact via email.
Contact	maki@bosai.go.jp

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring comprehensive knowledge for conducting geoscientific research.”
Class objectives	Students will learn principles of meteorological radar, radar equation, methods of precipitation estimation, and weekly nowcasting of precipitation, so that they will be able to understand various processes of precipitation phenomena which are found from meteorological radar observations.

Class contents

Overview of the class	The class will explain the fundamentals of radar meteorology, including radar hydrology, theory of propagation and scatter of electromagnetic wave and principles of meteorological radar, and overview of precipitation research through field observations.
Key words	radar, precipitation, remote sensing
Class plan	1. Guidance (meteorological radar and radar hydrology)

2. Radar and hydrology

3. System of meteorological radar

4. Radar equation

5. Microphysics of precipitation

6. Scatter and observation of electromagnetic waves by precipitation particles

7. Prediction of precipitation intensity by radar I

8. Prediction of precipitation intensity by radar II

9. Precipitation structure

10. Nowcasting precipitation

Requirements: none

Evaluation methods

Evaluation methods: Evaluation will be based on examinations and attendance.

Before taking the class

Lecture notes, references and handouts:

"Radar Hydrology", (YOSHINO Fumio, 2002, Morikita Publishing Co., Ltd.)

"Radar Remote Sensing of Weather and Atmosphere", (FUKAO Shoichiro, HAMAZU Kyosuke, 2005, Kyoto University Press)

The instructor will give lecture handouts.

How to study for this class: Students should review lecture contents.

Others:

1. Students should be in their seats at least one minute before class starts.
2. If a student will miss a class due to a conference or field work he/she should contact the instructor via email ahead of time. If it is accepted us "unavoidable" the instructor will change the absence to "attended".

01AC323 Remote Sensing Analysis in Hydrology III

Basic class information

Class #	01AC323
Class name	Remote Sensing Analysis in Hydrology III
Class structure	Thesis introduction by students
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	3rd Trimester, bimonthly, University of Tsukuba, Laboratory of Advanced Research A 217B
Credits	1

Instructors, etc.

Instructors	MAKI Masayuki, MISUMI Ryohei
TF and TA	none
Office hours	Please contact via email.
Contact	misumi@bosai.go.jp

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring comprehensive knowledge in conducting geoscientific research”.
Class objectives	To understand current domestic and international research trends in hydrological phenomena, including precipitation processes and climate change.

Class contents

Overview of the class	In this class, students will discuss research of precipitation processes and research of remotely sensed precipitation with current domestic and international research findings, by presenting articles and documents.
Key words	precipitation, rainfall, snow, cloud
Class plan	Each student will choose 2~3 theses from current domestic and international articles, mainly from letters journals in Hydrology, Meteorology and Remote Sensing, and give weekly presentations

	using Power Point.
Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on quality of presentations and quality of question-answer sessions.

Before taking the class

Lecture notes, references and handouts:

At the first day of class, the instructor will hand out a list of major theses which were published the year of the class. Students should pick a thesis from the list to present during the class. After the first class, students who are going to introduce a thesis will have to make copies of the thesis for the class.

How to study for this class: Students should review the theses which were introduced in class and considered to be important.

Others:

1. Students should have an interest in studying a field outside their own. Also, students who are introducing the thesis should make the presentation easy to understand for other students who are not in the same field.
2. If a student will miss a class due to a conference or field work he/she should contact the instructor via email. If it is accepted as “unavoidable” the instructor will change the absence to “attended”.

01AC331 Seminar in the Terrestrial Water Cycle System

Basic class information

Class #	01AC331
Name of the class	Seminar in the Terrestrial Water Cycle System
Class structure	Thesis introduction by students
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1~3rd Trimester, non-regular, National Research Institute for Earth Science and Disaster Prevention
Credits	3

Instructors, etc.

Instructors	MAKI Masayuki, MISUMI Ryohei
TF and TA	none
Office hours	Please contact via email.
Contact	misumi@bosai.go.jp

Knowledge and skills students will receive

Relation to our educational goal	Relates to “acquiring comprehensive knowledge for conducting geoscientific research and the ability to use this knowledge in the real world.”
Class objectives	To learn specialized knowledge and thesis writing skills about terrestrial water cycle processes.

Class contents

Overview of the class	In this class, students will choose topics in terrestrial water cycle processes and introduce domestic and international articles in relation to the chosen topic. The class will discuss methodology, data analysis, and problems according to the presentation. The instructor will also give guidance in writing a thesis.
Key words	radar, precipitation, rainfall, hydrological cycle
Class plan	The class consists of reading thesis papers of students’ specialized field followed by class discussion about the paper, and guidance on

	the methods of writing a thesis.
Requirements	none

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and participation in class.

Before taking the class

Lecture notes, references and handouts : The instructor will give instructions as needed.

How to study for this class	Students should review the articles before class.
Others:	1. If a student will miss a class due to conference or field work he/she should contact the instructor via email ahead of time. If it is accepted us “unavoidable” the instructor will change the absence to “attended”.

01AC341 Lecture on Atmosphere-Ocean Interaction Systems I

Basic class information

Class #	01AC341
Class name	Lecture on Atmosphere- Ocean Interaction Systems I
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st Trimester, Friday 2nd class hour
Credits	1

Instructors, etc.

Instructors	KITOH Akio
TF and TA	none
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class	This class will explain fundamental characteristics of air-sea interactions.
Key words	
Class plan	
Requirements	none

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC342　Lecture on Atmosphere-Ocean Interaction Systems Ⅱ

Basic class information

Class #	01AC342
Class name	Lecture on Atmosphere-Ocean Interaction System Ⅱ
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	2nd Trimester, Friday 2nd class hour
Credits	1

Instructors, etc.

Instructors	KITOH Akio, FUJIBE, Fumiaki
TF and TA	none
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class	This class will go over leading research of air-sea interactions, from small-scale to global scale.
Key words	
Class plan	
Requirements	none

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC343 Lecture on Atmosphere-Ocean Interaction Systems III

Basic class information

Class #	01AC343
Class name	Lecture on Atmosphere-Ocean Interaction Systems III
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	3rd Trimester, Friday 2nd class hour
Credits	1

Instructors, etc.

Instructors	FUJIBE, Fumiaki
TF and TA	
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class	This class will teach research methods for various phenomena in atmospheric-ocean interactions.
Key words	
Class plan	
Requirements	none

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others

01AC351 Seminar on Atmosphere-Ocean Interaction Systems

Basic class information

Class #	01AC351
Class name	Seminar on Atmosphere-Ocean Interaction Systems
Class structure	
Standard year for taking this class:	1st or 2nd year
Available Trimester, day and time	1st ~3rd Trimester, Thursday, 2nd class hour
Credits	3

Instructors, etc.

Instructors	KITOH Akio, FUJIBE Fumiaki
TF and TA	none
Office hours	
Contact	Please refer to the University of Tsukuba graduate course websites.

Knowledge and skills students will receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class

Key words

Class plan

Requirements none

Evaluation methods

Evaluation methods

Before taking the class

Lecture notes, references and handouts

How to study for this class

Others