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University of Tsukuba

Graduate School of Life and Environmental Science

Doctoral Program in Geoenvironmental Sciences

2010 Syllabus

Doctoral Program in Earth Sciences Major

Geoenvironmental Sciences Field

2010 Syllabus

Required Classes

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR001	Special Seminar in Geoenvironmental Sciences	2	1~3	1~3rd Trimester · Intensive	1
02AR011	Research Work in Field and Laboratory I	3	1~3	1~3rds Trimester · Intensive	3
02AR012	Research Work in Field and Laboratory II	3	1~3	1~3rd Trimester · Intensive	5

Optional Classes (Geoenvironmental Sciences major)

Human Geography Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR021	Advanced Studies in Human Geography	3	1	1~3rd Trimester · Thur. 3	7
02AR031	Special Seminar in Human Geography I	3	1	1~3rd Trimester · Thur. 4	9
02AR032	Special Seminar in Human Geography I	3	2	1~3rd Trimester · Thur. 4	11

Regional Geography Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR041	Advanced Studies on Regional Geography	3	1	1~3rd Trimester · Thur. 2	13
02AR051	Special Seminar on Regional Geography I	3	1	1~3rd Trimester · Thur. 5	16

02AR052	Special Seminar on Regional Geography II	3	2	1~3rd Trimester · Thur.5	18

Geomorphology Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR061	Advanced Studies in Geomorphology	3	1	1~3rd Trimester · Fir. 2	20
02AR071	Special Seminar in Geomorphology I	3	1	1~3rd Trimester · Fri. 5	22
02AR072	Special Seminar in Geomorphology II	3	2	1~3rd Trimester · Fri. 5	24

Hydrological Science Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR081	Advanced Studies in Hydrological Sciences	3	1	1~3rd Trimester · Thur.5	26
02AR091	Special Seminar in Hydrological Sciences I	3	1	1~3rd Trimester · Tues. 5	28
02AR092	Special Seminar in Hydrological Sciences II	3	2	1~3rd Trimester · Tues. 5	30

Atmospheric Sciences Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR101	Advanced Studies in Atmospheric Sciences	3	1	1~3rd Trimester · Tues. 6	32
02AR111	Special Seminar in Atmospheric Sciences I	3	1	1~3rd Trimester · Thur. 6	34
02AR112	Special Seminar in Atmospheric Sciences II	3	2	1~3rd Trimester · Thur. 6	36

Geographical Information Science Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR121	Advanced Studies in Geographical Information Science	3	1	1~3rd Trimester · Wed. 1	38
02AR131	Special Seminar in Geographical Information Science I	3	1	1~3rd Trimester · Thur. 4	40
02AR132	Special Seminar in Geographical	3	2	1~3rd Trimester · Thur.	42

	Information Science II			4	

Terrestrial Water Cycle Systems Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR141	Advanced Study in Terrestrial Water Cycle System	3	1	1~3rd Trimester · Mon. 2	44
02AR151	Special Seminar in Terrestrial Water Cycle System I	3	1	1~3rd Trimester · Tues. 5	46
02AR152	Special Seminar in Terrestrial Water Cycle System II	3	2	1~3rd Trimester · Tues. 5	48

Atmosphere-Ocean Interaction System Field

Class number	Class name	Credits	Year	Trimester/day of the week/hour	Page
02AR161	Advanced Study in Atmosphere-Ocean Interaction System	3	1	1~3rd Trimester · Fri. 2	50
02AR171	Special Seminar in Atmosphere-Ocean Interaction System I	3	1	1~3rd Trimester · Thur. 2	52
02AR172	Special Seminar in Atmosphere-Ocean Interaction System II	3	2	1~3rd Trimester · Thur. 2	54

02AR001 Special Seminar in Geoenvironmental Sciences

Basic Information of the Class

Class #	02AR001
Class name	Special Seminar in Geoenvironmental Sciences
Class structure	Lectures
Standard year of taking this class:	1st, 2nd or 3rd year
Available Trimester, day and time	1~3rd Trimester, intensive program
Credits	2

Instructors, etc.

Instructors	faculty from the Geoenvironmental Sciences department
TF, TA	
Office hours	
Contact	

Knowledge and skills students 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 Doctoral thesis in the Geoenvironmental Sciences program. Students should report progress on the thesis in the mid and final phases, and the instructor will guide them through setting research themes, selecting analytical methods, explaining the results of analysis, etc.
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

02AR011 Research Works in Field and Laboratory I

Basic Information of the Class

Class #	02AR011
Class name	Research Works in Field and Laboratory I
Class structure	
Standard year of taking this class:	1st, 2nd or 3rd year
Available Trimester, day and time	1~3rd Trimester, intensive program
Credits	3

Instructors, etc.

Instructors	faculty from the Geoenvironmental Sciences department
TF, TA	
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal

Class objectives

Class contents

Overview of the class	Students will set their research themes in Geoenvironmental Sciences, and the class training will help them become independent research scientists through planning and carrying out their research schedule. The instructor will give guidance to students throughout this process.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods

Before taking the class

Learning materials, references, and handouts

How to study for this class

Other

02AR012 Research Works in Field and Laboratory II

Basic Information of the Class

Class #	02AR012
Class name	Research Works in Field and Laboratory II
Class structure	
Standard year of taking this class:	1st, 2nd or 3rd year
Available Trimester, day and time	1~3rd Trimester, intensive program
Credits	3

Instructors, etc.

Instructors	faculty of the Geoenvironmental Sciences major
TF, TA	Not yet decided
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	Students will set their research themes in Geoenvironmental Sciences, and the class training will help them become independent research scientists through planning and carrying out their research schedule. The instructor will give guidance to students on how to plan and carry out a research schedule and deriving conclusions of research findings together.
Key Words	English, presentation skills
Class Plan	
Requirements	

Evaluation methods

Evaluation methods	

Before taking the class

Learning materials, references, and handouts

How to study outside of this class

Others

02AR021 Advanced Studies on Human Geography

Basic Information of the Class

Class #	02AR021
Class name	Advanced Studies in Human Geography
Class structure	Lectures and seminars
Standard year of taking this class:	1st year
Available Trimester, day and time	1~3rd Trimester, Thursday, 3rd class hour
Credits	3

Instructors, etc.

Instructors	TABAYASHI Akira, YAMASHITA Kiyomi, MATSUI Keisuke
TF and TA	to be announced
Office hours	Please contact the instructor for an appointment.
Contact	Please refer to the University Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	Students will acquire specialized knowledge and methods of Human Geography from a "broad-range of specialized knowledge in earth, environment, resources, energy and human activities," and become highly skilled field scientists.
Class objectives	Students will learn the Human Geographic way of thinking, methods and concepts as well as research processes. In addition, students will acquire skills to resolve social phenomena with the perspectives of Human Geography.

Class contents

Overview of the class	This class will explain perspectives and methods as well as academic and social meanings of Human Geography. In addition, class will explain concepts and research processes in Human Geography through case studies in Rural and Agricultural Geography, Social Geography (mainly in Ethnic Geography), and Religion and Recreational Geography. This class will focus on field surveys which are crucial to Human Geography. Also, there will be discussions on current research trends by reading theses and students' presentations in class.

Key words	Human Geography, Rural and Agricultural Geography, Ethnic Geography, Religious and Recreational Geography, field survey
Class Plan	First Trimester 1. Perspectives and methods of Human Geography 2~3 Rural landscapes 4~5 Employment structure of rural communities 6~7 Possibility of successors for agriculture and rural communities 8~9 Commodification of rural space 10. New trends in Human Geography Second Trimester 1 Perspectives and methods of Human Geography 1~2 Theory and methods of Ethnic Geography 3~5 Reading thesis in Ethnic Geography 6~9 Presentation in Ethnic Geographical thoughts 10 Conclusion: discussion Third Trimester 1 Perspectives of Religious and Tourism Geography 2~4 Research and trends in “Pilgrimage” and “Religious Tourism” 5~9 Reading thesis on Religious and Tourism Geography 10 Conclusion
Requirements	It is recommended to take “Methodology on Regional Geography” class before taking this class.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance 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 do preparation and review work for the class, such as reading papers and references given during class. Also, students should prepare thoroughly for their presentations.
Others	1. Students should have an interest in various Human Geographical phenomena. 2. Students should contact the instructor ahead of time if he/she will miss a class for unavoidable reasons.

02AR031 Special Seminar on Human Geography I

Basic Information of the Class

Class #	02AR031
Class name	Special Seminar on Human Geography I
Class structure	Seminars
Standard year of taking this class:	1st year
Available Trimester, day and time	1~3rd Trimester, Thursday, 4th class hour
Credits	1

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 Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	The class will explain specialized concepts related to Human Geography such as cultural landscape, cultural ecology and regional analysis, through seminars.
Class objectives	To acquire specialized knowledge in Human Geography and skills to write a thesis based on this knowledge, as well as 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 Doctoral thesis. The instructors will teach specific thesis writing skills, such as setting a research topic, conducting research such as collecting documents, as well as the framework, methods and conclusion derivation of analysis, by referring to domestic and international articles and through discussions.
Key words	Human geography, research study, thesis writing, space planning
Class plan	The class will consist of students' presentations and question-and-answer sessions with the instructor. Instructors will make the presentation schedule after the number of students in class has been determined.

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

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: Instructions will be given during class.

How to study for this class	Students should prepare well for the presentations.
Others	

02AR032 Special Seminar on Human Geography II

Basic information of the class

Class #	02AR032
Class name	Special Seminar on Human Geography II
Class structure	Seminars
Standard year of taking this class:	1st year
Available Trimester, day and time	1~3rd Trimester, Thursday, 4th class hour
Credits	1

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 Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	The class will explain specialized concepts related to Human Geography, such as cultural landscape, cultural ecology and regional analysis, through seminars.
Class objectives	To acquire specialized knowledge in Human Geography and skills to write a thesis based on this knowledge, as well as 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 Doctoral thesis. The instructors will teach specific processes of thesis writing, such as setting research topic, conducting research such as collecting documents, as well as the framework, methods and conclusion derivation of analysis, by referring to domestic and international documents and through discussions.
Key words	Human geography, research study, thesis creation, space planning
Class plan	The class consists of students' presentations and question-and-answer sessions with the instructor. The instructors will make a presentation schedule after number of students in class has been determined.

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

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: Instructions will be given during a class.

How to study for this class	Students should prepare well for the presentations.
Others	

02AR041 Advanced Studies on Regional Geography

Basic information of the class

Class #	02AR041
Class name	Advanced Studies on Regional Geography
Class structure	Lectures
Standard year of taking this class:	1st or 2nd year
Available Trimester, day and time	1~3rd Trimester, Thursday, 2nd class hour
Credits	1

Instructors, etc.

Instructors	TEZUKA Akira, KUREHA Masaaki, NIHEI Takaaki
TF and TA	Not available
Office hours	Please contact the instructor for an appointment.
Contact	Please contact the instructor.

Knowledge and skills students receive

Relation to our educational goal	It is related to “acquiring a broad-range of specialized knowledge in earth, environment, resources etc.”
Class objectives	To learn and understand various paradigms of regional understandings and their transitions, through trends in geographical thought.

Class contents

Overview of the class	The class explains trends in modern Geography and introduces mainstream geographical thoughts. In addition, the class will introduce the current research trends in modern Geography and various research topics that look at changes in regions, by referring to domestic and international research findings.
Key words	Geographical thoughts, methodology, regional structure, human activity, tourism region
Class plan	1st Trimester 1. Trends in modern Geography 2. Humboldt and Ritter 3. Ratzel and Vidal 4. Hettner and Schluter

5. Modern Geographical thoughts

2nd Trimester

Students will have presentations during seminars by using an English textbook on tourism regions. Further, instructors will give lectures for students to increase their understanding on reality and models of changing regions due to integrating tourism to the area.

3rd Trimester

The class will explain various research topics on changing regional structures through domestic and international research findings. Main topics are listed below.

1. Changes in space planning in suburban areas
2. Restructuring and functionality changes in common farm forest
3. Integration of horticulture
4. Development of industry linkage and subcontracting system
5. Changing farmland businesses in historic Geography
6. Integrating tourism in Sagami bay and Tokyo bay
7. Development of welfare services for seniors
8. Woodland management in typhoon-damaged area
9. Family division of labor in Yuki Tsumugi production region
10. Changes in religious believers' distribution pattern

Requirements: It is recommended to take "Methodology in Human Geography" class before taking this class.

Evaluation methods

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

Before taking the class

Lecture notes, references and handouts

1st ~2nd Trimester

Instructor will give instructions during class.

3rd Trimester

"Dawning of Area Survey -Walking, Seeing, Writing- (Chiiki Chosa Kotohajime-Aruku, Miru, Kaku-)" (KajitaSin , Nihei Takaaki , Kato Masahiro 2007. Nakanishiya Shuppan)

How to study for this class: Students should do preparation and review work using the articles and references which were given during class.

Others	1. It is important for the students to be familiar with many mainstream articles. 2. Students should contact the instructor via email before or after absences.

02AR051 Special Seminar on Regional Geography I

Basic information of the class

Class #	02AR051
Class name	Special Seminar on Regional Geography I
Class structure	Seminars
Standard year of taking this class:	1st year
Available Trimester, day and time	1st ~3rd Trimester, Thursday, 4th class hour
Credits	1

Instructors, etc.

Instructors	TEZUKA Akira, KUREHA Masaaki, NIHEI Takaaki, KANEKO Jun
TF and TA	To be announced
Office hours	Please consult the instructor for an appointment.
Contact	Please refer to the University Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	The class will explain specialized concepts related to regional human activities and environmental change, through seminars.
Class objectives	To acquire specialized knowledge in regional geography, skills to write a thesis based on this knowledge, as well as 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 Doctoral thesis. The instructors will teach specific processes of thesis writing, such as setting a research topic, research methods, analysis methods, conclusion derivation of analysis, by referring to domestic and international articles and through field research reports.
Key words	regional geography, research methods, Doctoral thesis, human activity
Class plan	The class consists of students' presentations and question-and-answer sessions with the instructor. Instructors will make a presentation schedule after the number of students in class has been determined.

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

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 : Instructor will give instructions during the class.

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

02AR052 Special Seminar on Regional Geography II

Basic information of the class

Class #	02AR052
Class name	Special Seminar in Regional Geography II
Class structure	Seminars
Standard year of taking this class:	1st year
Available Trimester, day and time	1st ~3rd Trimester, Thursday, 4th class hour
Credits	1

Instructors, etc.

Instructors	TEZUKA Akira, KUREHA Masaaki, NIHEI Takaaki, KANEKO Jun
TF and TA	To be announced
Office hours	Please consult the instructor for an appointment.
Contact	Please refer to the University Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	This class will explain specialized concepts related to regional human activities and environmental change.
Class objectives	To acquire specialized knowledge in regional geography and skills to write a thesis based on this knowledge, as well as 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 Doctoral thesis. The instructors will teach specific techniques in thesis writing, such as setting a research theme, conducting research , and analyzing and deriving conclusions, by referring to domestic and international articles and through field research reports.
Key words	regional geography, research methods, Doctoral thesis, human activity
Class plan	The class consists of students' presentations and question-and-answer sessions with the instructor. Instructors will make a presentation schedule after the number of students in class has been determined.

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

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 : Instructor will give instructions during class.

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

02AR061 Advanced Studies on Geomorphology

Basic information of the class

Class #	02AR061
Class name	Advanced Studies in Geomorphology
Class structure	Lectures and seminars
Standard year of taking this class:	1st year
Available Trimester, day and time	1st~ 3rd Trimester, Friday 2nd class hour
Credits	3

Instructors, etc.

Instructors	MATSUOKA Norikazu, SEKIGUCHI Tomohiro, HATTANJI Tsuyoshi
TF and TA	
Office hours	Please consult the instructor for an appointment.
Contact	Please refer to the University Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	In this class, students will review current trends in research topics and methods from various research fields in Geomorphology, through domestic and international research papers and cases studies.
Key words	Geomorphology, geomorphic processes
Class plan	Requirements: It is required that students have taken classes in Geomorphology at the undergraduate or Master's level.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and reports.

Before taking the class

Class materials and references	Instructors will give instructions in class.

How to study for this class

Others

02AR071 Special Seminar on Geomorphology I

Basic information of the class

Class #	02AR071
Class name	Special Seminar on Geomorphology I
Class structure	Seminars
Standard year of taking this class:	1st 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	
Contact	Please refer to the University Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	In this class, students acquire a higher level of specialized knowledge in Geomorphology and its formation processes, as well as higher skills of the field scientist, through research presentation.
Class objectives	Students will increase their skills in the process of writing a thesis, such as setting a research topic, making a research plan, analyzing the findings and writing conclusions. Ultimately, students will have skills to set their own research theme and solve research topics.

Class contents

Overview of the class	Students will learn specific techniques in thesis writing, such as setting a research topic, conducting research study, analyzing and deriving conclusions, through domestic and international articles and analysis findings reports in similar research topics.
Key words	Geomorphology, geomorphic process, academic paper, presentation, discussion
Requirements	It is required that students have taken classes in Geomorphology at the undergraduate or Master's level.

Evaluation methods

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

Before taking the class

Lecture notes, references and handouts: none

How to study for this class

Others

1. If a student misses a class due to an unavoidable reason, such as attending a conference or conducting field work for a thesis, he/she should write a notification of absence and turn in the assigned report. Then, status will be changed to “attended”.

02AR072 Special Seminar in Geomorphology II

Basic information of the class

Class #	02AR072
Class name	Special Seminar in Geomorphology II
Class structure	Seminars
Standard year of taking this class:	1st 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	
Contact	Please refer to the University Tsukuba Graduate Course Websites

Knowledge and skills students receive

Relation to our educational goal	In this class, students will acquire a higher level of specialized knowledge in Geomorphology and its formation processes, as well as higher skills of field scientists, through research presentation.
Class objectives	Students will increase their skills in writing a thesis, such as setting a research topic, making a research plan, analyzing the findings and writing conclusions. Ultimately, students will have skills to set their own research topics and solve their research questions.

Class contents

Overview of the class	Students will learn specific techniques in thesis writing, such as setting a research topic, conducting research study, analyzing and deriving conclusions, through domestic and international articles and analysis findings reports in similar research topics, etc.
Key words	Geomorphology, geomorphic process, academic paper, presentation, discussion
Requirements	It is required that students have taken classes in Geomorphology at the undergraduate or Master's level.

Evaluation methods

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

Before taking the class

Lecture notes, references and handouts: none

How to study for this class

Others

1. If a student misses a class due to an unavoidable reason, such as attending a conference or conducting field work for a thesis, he/she should write a notification of absence and turn in the assigned report. Then, the status will be changed to “attended”.

02AR081 Advanced Studies in Hydrological Sciences

Basic class information

Class #	02AR081
Class name	Advanced Studies in Hydrological Sciences
Class structure	
Standard year for taking this class:	1_{st} year
Available Trimester, day and time	1~3_{rd} Trimester, Thursday, 5_{th} class hour
Credits	3

Instructors, etc

Instructors	TASE Norio, and SUGITA Michiaki
TF, TA	
Office hours	
Contact	

Knowledge and Skills students will receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	In this class, students will review current trends in research topics and methods from various research fields in relation to Hydrological Sciences, through domestic and international research papers and case studies of various regions.
Key words	
Class plan	
Requirements	

Evaluation methods

Evaluation methods	Evaluation will be based on presentation, discussion, and attendance, etc.

Before taking the class

Learning materials, references, and handouts

There are no textbooks for this class, but instructors will give handouts of references and articles. The instructors' recommendation on references is listed below.

"Hydrological Sciences (Suimon Kagaku) ", SUGITA Michiaki, TANAKA Tadashi, 2009, Kyoritsu Shuppan

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

"Hydrology (Suimongaku)", KAYANE Isamu, 1980, Taimeido

Also, we will introduce articles from scientific journals in the class. We recommend using them as references. Such journals are listed below.

Journal of Japan Society of Hydrology and Water Resources by Japan Society of Water Resources

Journal of Japanese Association of Hydrological Sciences by Japanese Association of Hydrological Sciences

Journal of Japanese Association of Groundwater Hydrology by Japanese Association of Groundwater Hydrology

Journal of Hydrology by Elsevier

Water Resources Research by American Geophysical Union
Hydrological Processes by Wiley

How to study for this class

Others

02AR091 Special Seminar in Hydrological Sciences I

Basic class information

Class #	02AR091
Class name	Special Seminar in Hydrological Sciences I
Class structure	Seminars
Standard year for taking this class:	1_{st} year
Available Trimester, day and time	1~3_{rd} Trimester, Tuesday, 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 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	It is related to “acquiring a broad-range of specialized knowledge in earth, environment, resources etc. and research skills of field scientists.”
Class objectives	To acquire skills in Doctoral thesis writing, such as setting a research topic, research study methods, analysis methods and derivation of conclusions.

Class contents

Overview of the class	The purpose of this class is to give guidance to students on how to write a Doctoral thesis. The instructors will teach specific methods of thesis writing, such as setting a research theme, conducting research study, and analyzing and deriving conclusions, by referring to domestic and international articles and through research findings reports in the similar topics.
Key words	hydrological cycle, geochemical cycle, water balance, energy balance

Class plan	The class will have presentations and discussions in Hydrological Sciences 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

	“Hydrological Sciences (Suimon Kagaku) ”, SUGITA Michiaki, TANAKA Tadashi, 2009, Kyoritsu Shuppan
	“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 their understanding. Also, they should make a presentation of their research findings at a conference.
Others	1. Students should actively participate in discussions.
	2. Students should come to instructor for questions.

02AR092 Special Seminar in Hydrological Sciences II

Basic class information

Class #	02AR092
Class name	Special Seminar in Hydrological Sciences II
Class structure	Seminars
Standard year for taking this class:	2st year
Available Trimester, day and time	1~3rd Trimester, Tuesday, 5th 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 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	It is related to “acquiring a broad-range of specialized knowledge in earth, environment, resources etc. and research skills of a field scientist.”
Class objectives	To acquire skills in Doctoral thesis writing, such as setting a research topic, conducting research study, and analyzing and deriving conclusions.

Class contents

Overview of the class	The purpose of this class is to give guidance to students on how to write a Doctoral thesis. The instructors will teach specific methods of thesis writing, such as setting a research topic, conducting research study, and analyzing and deriving conclusions, by referring to domestic and international documents and through their own fields’ research reports.
Key words	hydrological cycle, geochemical cycle, water balance, energy balance

Class plan	The class will consist of presentations and discussions in Hydrological Sciences 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

"Hydrological Sciences (Suimon Kagaku) ", SUGITA Michiaki, TANAKA Tadashi, 2009, Kyoritsu Shuppan

"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 their understanding. Also, students should make a presentation of their research findings at a conference.
Others	1. Students should actively participate in discussions. 2. Students should come to instructor for questions.

02AR101 Advanced Studies in Atmospheric Sciences

Basic information of the class

Class #	02AR101
Class name	Advanced Studies in Atmospheric Sciences
Class structure	
Standard year of taking this class:	1st year
Available Trimester, day and time	1~3rd Trimester, Tuesday, 6th class hour
Credits	3

Instructors, etc.

Instructors	UEDA Hiroaki, TANAKA Hiroshi, KUSAKA Hiroyuki
TF and TA	
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal	This class will review current trends of research topics and research methods in various fields of research in Atmospheric Sciences, through domestic and international research papers.
Class objectives	

Class contents

Overview of the class

Key words

Class plan

Requirements

Evaluation methods

Evaluation methods	Evaluation will be done comprehensively and be based on presentations and discussions in class.

Before taking the class

Lecture notes, references and handouts: Handouts of instructors' research activities.

How to study for this class

Others

02AR111 Special Seminar in Atmospheric Sciences I

Basic class information

Class #	02AR111
Class name	Special Seminar in Atmospheric Sciences I
Class structure	seminar
Standard year for taking this class:	1st year
Available Trimester, day and time	1~3rd Trimester, Thursday, 6th class hour
Credits	3

Instructors, etc

Instructors	HAYASHI Yousay, TANAKA Hiroshi, UENO Kenichi, UEDA Hiroaki, KUSAKA Hiroyuki
TF, TA	
Office hours	
Contact	

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 to students on how to write a Doctoral thesis. The instructors will teach specific methods of thesis writing, such as setting a research theme, conducting research study, and analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in their own fields.
Key words	Atmospheric science, Meteorology, Climatology
Class plan	
Requirements	

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and presentations.

Before taking the class

Learning materials, references, and handouts

How to study for this class

Others

02AR112 Special Seminar in Atmospheric Sciences I

Basic class information

Class #	02AR112
Class name	Special Seminar in Atmospheric Sciences II
Class structure	seminar
Standard year for taking this class:	2nd year
Available Trimester, day and time	1~3rd Trimester, Thursday, 6th class hour
Credits	3

Instructors, etc

Instructors	HAYASHI Yousay, TANAKA Hiroshi, UENO Kenichi, UEDA Hiroaki, KUSAKA Hiroyuki
TF, TA	
Office hours	
Contact	

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 to students on how to write a Doctoral thesis. The instructors will teach specific methods of thesis writing, such as setting a research theme, conducting research study, and analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in their own fields.
Key words	Atmospheric science, Meteorology, Climatology
Class plan	
Requirements	

Evaluation methods

Evaluation methods	Evaluation will be based on attendance and presentations.

Before taking the class

Learning materials, references, and handouts

How to study for this class

Others

02AR121 Advanced Studies in Geographical Information Science

Basic information of the class

Class #	02AR121
Class name	Advanced Studies in Geographical Information Science
Class structure	Discussion
Standard year of taking this class:	1st year
Available Trimester, day and time	1~3rd Trimester, Thursday, 1st class hour
Credits	3

Instructors, etc.

Instructors	MURAYAMA Yuji, MORIMOTO Takehiro, KUSAKA Hiroyuki
TF and TA	
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal	Students will acquire specialized knowledge and methods of SIS from a "broad-range of specialized knowledge in earth, environment, resources, energy and human activities," and become highly skilled field scientists.
Class objectives	Students will learn the SIS's way of thinking, methods and concepts as well as research processes. In addition, students will acquire skills to resolve social phenomena with the perspectives of SIS.

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 information science
Class plan	1st Trimester 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. 1. Gathering GIS related information 2. Development of GIS 3. Access of spatial information 4. Analysis of spatial data 5. Spatial data modeling 2nd Trimester The class will explain how to access, analyze, map, and visualize spatial data, as well as applications of that knowledge, primarily through Agricultural Geography and research in space planning. In addition, how to access GPS data will be explained. 3rd Trimester The class will explain how to access, analyze, and visualize spatial data and applications of that knowledge, primarily through research on Climatology. In addition, how to access meteorological observation data and how to create data from meteorological model will be explained.
Requirements	N.A.

Evaluation methods

Evaluation methods	Presentation, Report, Attendance

Before taking the class

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

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.

02AR131 Special Seminar in Geographical Information Science I

Basic information of the class

Class #	02AR131
Class name	Special Seminar in Geographical Information Science I
Class structure	Seminar
Standard year of taking this class:	1st 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	

Knowledge and skills students receive

Relation to our educational goal	The class will explain specialized concepts related to spatial information science and environmental change, through seminars.
Class objectives	To acquire specialized knowledge in spatial information science, skills to write a thesis based on this knowledge, as well as 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 Doctoral thesis. The instructors will teach specific techniques in thesis writing, such as setting a research topic, conducting research study, analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in their own fields.
Key words	GIS, spatial information science
Class plan	Presentation, Discussion
Requirements	N.A.

Evaluation methods

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

question-answer sessions, etc.

Before taking the class

Lecture notes, references and handouts: none

How to study for this class

Others

02AR132 Special Seminar in Geographical Information Science II

Basic information of the class

Class #	02AR132
Class name	Special Seminar in Geographical Information Science II
Class structure	Seminar
Standard year of taking this class:	2nd year
Available Trimester, day and time	1~3rd Trimester, Thursday, 5th class hour
Credits	3

Instructors, etc.

Instructors	MURAYAMA Yuji, MORIMOTO Takehiro, KUSAKA Hiroyuki
TF and TA	
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal	The class will explain specialized concepts related to spatial information science and environmental change, through seminars.
Class objectives	To acquire specialized knowledge in spatial information science, skills to write a thesis based on this knowledge, as well as 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 Doctoral thesis. The instructors will teach specific techniques in thesis writing, such as setting a research theme, conducting research study, analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in their own fields.
Key words	GIS, spatial information science
Class plan	Presentation, Discussion
Requirements	N.A.

Evaluation methods

Evaluation methods	Evaluation will be based on attendance, quality of presentations,

question-answer sessions, etc.

Before taking the class

Lecture notes, references and handouts: none

How to study for this class

Others

02AR141 Advanced Study in Terrestrial Water Cycle System

Basic Information of the Class

Class #	02AR141
Class name	Advanced Study in Terrestrial Water Cycle System
Class structure	Discussion
Standard year of taking this class:	1st 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 receive

Relation to our educational goal	It is related to “acquiring specialized knowledge for conducting geoscientific research and comprehensive knowledge to apply to society.”
Class objectives	To acquire specialized knowledge and thesis writing skills in relation to terrestrial water cycle processes.

Class Contents

Overview of the class	This class will review current trends of research topics and methods in various research fields related to terrestrial water cycle processes through domestic and international research papers and case studies in various locations.
Key Words	radar, precipitation, rainfall, hydrological cycle
Class Plan	The class consists of reading thesis papers of students’ specialized field followed by class discussions about the paper, and guidance on thesis writing techniques.
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 attending a conference or conducting field work he/she should contact the instructor via email ahead of time. If it is accepted as an “unavoidable absence” the instructor will change the status to “attended”.

02AR151 Special Seminar in Terrestrial Water Cycle Systems I

Basic Information of the Class

Class #	02AR151
Class name	Special Seminar in Terrestrial Water Cycle Systems I
Class structure	Research presentation and discussion
Standard year of taking this class:	1st year
Available Trimester, day and time	1~3rd Trimester, Tuesday, 2nd class hour, University of Tsukuba Laboratory of Advanced Research A 217B
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 receive

Relation to our educational goal	It is related to “acquiring specialized knowledge for conducting geoscientific research and comprehensive knowledge to apply to society.”
Class objectives	To acquire specialized knowledge in terrestrial water cycle processes and thesis writing techniques.

Class contents

Overview of the class	This class will focus on giving guidance on how to write a Doctoral thesis. The instructors will teach specific techniques in thesis writing, such as setting a research topic, conducting research studies, analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in the similar research topic.
Key words	radar, precipitation, rainfall, hydrological cycle
Class plan	The class will consist of research presentations or introduction of articles in related fields, discussion of the articles, and guidance on thesis writing techniques.
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: none

How to study for this class	Students should review the related articles before class.
Others	1. Students should actively participate in discussions of research presentation. 2. If a student will miss a class due to attending a conference or conducting field work he/she should contact the instructor via email ahead of time. If it is accepted as an “unavoidable absence” the instructor will change the status to “attended”.

02AR152 Special Seminar in Terrestrial Water Cycle System II

Basic Information of the Class

Class #	02AR152
Class name	Special Seminar in Terrestrial Water Cycle System II
Class structure	Research presentation and discussion
Standard year of taking this class:	2nd year
Available Trimester, day and time	1~3rd Trimester, Tuesday, 2nd class hour, University of Tsukuba Laboratory of Advanced Research A 217B
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 receive

Relation to our educational goal	It is related to “acquiring specialized knowledge for conducting geoscientific research and comprehensive knowledge to apply to society”.
Class objectives	To acquire specialized knowledge in terrestrial water cycle processes and thesis writing skills.

Class contents

Overview of the class	This class will focus on giving guidance on how to write a Doctoral thesis. The instructors will teach specific methods of thesis writing, such as setting a research topic, conducting research study, analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in similar research topics.
Key words	radar, precipitation, rainfall, hydrological cycle
Class plan	The class will consist of research presentations or introduction of articles in related fields, discussion of the articles, and guidance on thesis writing methods.
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: none

How to study for this class	Students should review the related articles before class.
Others	1. Students should actively participate in discussions of research presentation. 2. If a student will miss a class due to attending a conference or conducting field work he/she should contact the instructor via email ahead of time. If it is accepted as an “unavoidable absence” the instructor will change the status to “attended”.

02AR161 Advanced Study in Atmosphere-Ocean Interaction System

Basic Information of the Class

Class #	02AR161
Class name	Advanced Study in Atmosphere-Ocean Interaction System
Class structure	
Standard year of taking this class:	1st year
Available Trimester, day and time	1st ~3rd Trimester, Friday, 2nd class hour
Credits	3

Instructors, etc.

Instructors	KITOH Akio, FUJIBE Fumiaki
TF and TA	
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	This class will review the current trends in topics and techniques in various research fields related to air-sea interactions, through study of domestic and international research and case studies in various locations.
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

02AR171 Special Seminar in Atmosphere-Ocean Interaction Systems I

Basic information of the class

Class #	02AR171
Class name	Special Seminar in Atmosphere-Ocean Interaction Systems I
Class structure	
Standard year of taking this class:	1st 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	
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	This class will focus on giving guidance on how to write a Doctoral thesis. The instructors will teach specific methods of thesis writing, such as setting a research topic, conducting research study, analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in the similar research topic.
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

02AR172 Special Seminar in Atmosphere-Ocean Interaction Systems II

Basic information of the class

Class #	02AR172
Class name	Special Seminar in Atmosphere-Ocean Interaction Systems II
Class structure	
Standard year of taking this class:	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	
Office hours	
Contact	

Knowledge and skills students receive

Relation to our educational goal	
Class objectives	

Class contents

Overview of the class	This class will focus on giving guidance on how to write a Doctoral thesis. The instructors will teach specific methods of thesis writing, such as setting a research topic, conducting research study, analyzing and deriving conclusions, by referring to domestic and international documents and research findings reports in similar research topics.
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

Other