Main Courses Description

Course	Advances in Environmental Analytical Chemistry		
Course code	04041015		
Name of teacher	Lingyan Zhu	Title of teacher	Professor
Hours	34	Credits	2

Teaching method(teaching/discussion and time allocation)

Lecture 42 hours, seminar 6 hours.

Introduction of content

This course is aimed to introduce state of the art analytical techniques to characterize diversity of pollutants in the environment. It provides knowledge on the principles of new analytical techniques and the advancement trend related to environmental pollutants. Through learning the methods for sample collection, sample pretreatment methods and the most state of the art analytical instrumentations, students are expected to master the methods for analyzing trace levels of various pollutants in complicated environmental samples. This knowledge would help the students fulfill the tasks in environmental monitoring, environmental chemistry, pollution control and other related areas.

This course includes six parts: 1) Introduction; 2) Sampling and pretreatment; 3) Spectrum; 4) Chromatography; 5) Mass spectrometry; 6) Coupling techniques.

Examination method (open-book exam, close-book exam or literature review etc.)

- Attendance(20% of grade);
- A written exam to be convened in class, open book (80% of grade);

Textbooks

None

Reference books：

1. H.B. Mark, J. S. Mattson, Water Quality Measurement--The Modern Analytical Techniques, Marcel Dekker Inc.1981

2. D.T.E. Hunt, A.L. Wilson, The Chemical Analysis of Water--General Principles and Techniques, The Royal Society of Chemistry,1986

3. G E. Batley, Trace Element Speciation: Analytical Methods and problems, CRC Press Inc.1989

Others

Course	Ecotoxicology and Environmental Risk Assessment		
Course code	04042002		
Name of teacher	Lin Zhu	Title of teacher	Professor
Hours	34	Credits	2

Teaching method(teaching/discussion and time allocation)

Lectures an discussion in class((32 hours),and course works (5 times, 4 hours each).

Introduction of content

This course is the study of toxic and hazardous substances, as well as the adverse effectsof anthropogenic activities on differentbiological levels, from the molecular to the ecosystem, and also concerning the fate of contaminants in the ecosystem. Those reactions and adaptability of the biological systems on xenobiotics also are introducedhere. By explaining the principal of ecotoxicology and discussion during the course, the students are required to read the latest scientific literature, in order to fully understand the theoretical research and practical application of ecotoxicological instance.

Examination method (open-book exam, close-book exam or literature review etc.)

- ❑ Coursework of five exercises (30% of grade);
- ❑ A written exam to be convened in class, open book (70% of grade);

Textbooks

David A. Wright and Pamela Welbourn, Environmental Toxicology, Cambridge University Press, 2002. Chinese version by ZHU Lin, Higher Education Press, 2007.

Reference books：

Glenn W. Suter II, Ecological Risk Assessment. CRC Press 2007.

Ecotoxicology and Environmental Safety, academic journalinEnglish,Ecotoxicology, academic journalin English

Others

Course	Eco-hydrology		
Course code	04041003		
Name of teacher	Jinhui Huang	Title of teacher	Professor
Hours	34	Credits	2

Teaching method(teaching/discussion and time allocation)

- Critical review of papers in class (5 times, 1 hours each);
- Term Papers (5 times, 3 hours each);
- Finish and lecture a course report (4 times, 3 hours each).

Introduction of content

This course is the study on the relationship among hydrology, meteorology and the ecological process, including how the hydrological process effects on ecosystem and how landscape feedbacks to the ecological process under different time scale, these two core issues.

This course will introduce the law of hydrological cycle and transformation, its balance in the ecological system, and analyze the problems related to water in ecological construction, ecosystem management and protection. In this way, students will be good enlightening to understand the relationship between hydrology, meteorology and ecological process, and have a

better understanding of terrestrial ecosystem and hydrological cycle.

Examination method (open-book exam, close-book exam or literature review etc.)

- ❑ Coursework of three exercises (20% of grade);
- ❑ Report the literature reviews (20% of grade);
- ❑ Term papers (20% of grade);
- ❑ Final course design and its lecture (40% of grade).

Textbooks

N/A

Reference books：

Derek Eamus and Tom Hatton. Ecohydrology: Vegetation Function, Water and Resource Management. CSIRO Publishing.

Others

Course	Environmental Management		
Course code	04042006		
Name of teacher	Jing Wu	Title of teacher	Associate Professor
Hours	34	Credits	2

Teaching method(teaching/discussion and time allocation)

Lecture 26 hours, seminar 6 hours

Introduction of content

This course combines macroscopic strategy of sustainable development, middle regional environmental planning/management, and microcosmic ecological protection/pollution control technology. From a macro point of view, this course enables students to master the basic contents and procedures of environmental management. By combining with cases, this course enables students to understand and master the basic principles and ideas of environmental management. Through case simulation, the course could be closer to the practice needs of the country. From a micro point of view, this course enables students to understand the development strategy of environment protection, such as recycling economy, green economy, ecological restoration, atmospheric joint prevention and control strategy.

Examination method (open-book exam, close-book exam or literature review etc.)

- ✓ Written Assignment, including essay 60%
- ✓ Oral Assessment & Presentation 40%

Textbooks

- ✓ teaching materials and handouts

Reference books：

- ✓ C.J. Barrow. Environmental Management for Sustainable Development. Second edition 2006, Routledge.
- ✓ Scott J. Callan, Janet M. Thomas. Environmental Economics & Management: Theory, Policy, and Application. Sixth edition 2013, South-Western, Cengage Learning

✓ Jin Min. Environmental Management. 2014. China Environmental Press
Others

Course	Environmental Engineering		
Course code	04042005		
Name of teacher	XiaoyanGuo	Title of teacher	Professor
Hours	34	Credits	2
Teaching method(teaching/discussion and time allocation) Lecture and discussion 24 hours, Seminar 8 hours			
Introduction of content This course, which main task is to prevent environment from polluting by using the theories and methods of engineering technology for the purpose of rationally utilizing natural resources, protecting and improving environmental quality for coordinated sustainable development of mankind and environment, is not only a branch of environmental science, but also an essential part of engineering. This course focus on the following subjects: (1) water pollution control engineering; (2) air pollution control engineering; (3) treatment and disposal of solid waste and so on.			
Examination method (open-book exam, close-book exam or literature review etc.) ✓ Written Assignment, including essay 60% ✓ Oral Assessment & Presentation 40%			
Textbooks ✓ teaching materials and handouts			
Reference books： ✓ Mackenzie L.Davis，David A. Cornwell， Introduction to Environmental Engineering，Tsinghua University Press, 2007. ✓ Zhanpeng Jiang, Hongwei Yang, Environmental Engineering, Higher Education Press, 2013 ✓ Zijie Zhang, Drainage Engineering, China Construction Industry Press, 2000			
Others			

Course	Introduction to Environmental Impacts Assessment		
Course code	04042003		
Name of teacher	HeXu	Title of teacher	Professor
Hours	34	Credits	2
Teaching method(teaching/discussion and time allocation) Lecture 18 hours, seminar 14 hours			
Introduction of content This course serves as an overall introduction of environmental impact assessment (EIA) for the masters in grade one who studied environmental management as well as other related majors.			

The focus will be on the EIA's development history, current situation, major regulations, differences between China and Europe. At last, how to complete EIA process and what is a successful EIA case. The key concepts will be illustrated with case studies which will be examined to highlight the complex nature of EIA as well as the need for a solution.

Examination method (open-book exam, close-book exam or literature review etc.)

- Written Assignment, including Essay: 60%
- Oral Assessment & Presentation: 40%

Textbooks

John Glasson, RikiTherival, Andrew Chadwick. Introduction to Environmental Impact Assessment (Fourth Edition). Routledge. 2012.

Reference books：

- DoE (Department of the Environment). Environmental assessment: a guide to the procedures.London: HMSO. 1989.
- DETR. Environmental impact assessment: a guide to the procedures. London: DETR. 2000.
- Morris, P. and Therivel, R. (eds). Methods of environmental impact assessment, 3rd edn.London: Routledge.Morrison-Saunders, A. 2009.
- Wood, C. Environmental impact assessment: a comparative review, 2nd edn. Harlow: PrenticeHall.Wood, C. 2003.

Others

Course	Research Methods (Environmental Science)		
Course code	04042011		
Name of teacher	Natalie Welden	Title	Lecturer
Hours	51	Credits	3

Teaching method (teaching/discussion and time allocation)

- Lectures: 20 hours
- Seminar: 22 hours

Introduction of content

This course outlines the core concepts of the research process in Environmental Sciences, covering research design, comparative methods, quantitative and qualitative methodological approaches, strategies for data collection and interpretation (including data management), and the conventions of structure and content in environmental publications and reports. In developing an overview of the research process, this course aims to provide students with a framework into which subject specific techniques learned throughout the wider degree programme may be placed. The course will also cover key preparatory aspects of the dissertation project, building the skills required to systematically review and evaluate existing literature, identify gaps in existing fields, and develop appropriate research questions.

Aims:

- To introduce students to the core concepts of research design and provide an opportunity to apply these concepts in preparing for a research proposal;

- To highlight the importance of ethical standards in environmental research and introduce processes for compliance to said standards;
- To provide students with the necessary tools and approaches to analyse environmental problems;
- To enable students to think critically about environmental issues they are addressing and develop solutions to mitigate these problems;
- To strengthen students' skills in systematic literature review (key word choice, information sorting, interrogation of the literature and critical analysis).
- To develop key collaborative research skills (including task apportionment, group management, writing joint reports) through undertaking a group project in the context of an environmental problem;
- Provide students with the necessary skills in and knowledge of research methods to develop their independent research and dissertations.

Examination method (open-book exam, close-book exam or literature review etc.)

- Research Proposal: 35%
- Impact Statement: 30%
- Meta-analysis: 35%
- Set Exercise: 10%

Textbooks

Reference books

Others

Course	Environmental Policy		
Course code	04042007		
Name of teacher	Cecilia Tortajada	Title	Professor
Hours	51	Credits	3

Teaching method (teaching/discussion and time allocation)

- Lectures: 14 hours
- Seminar: 14 hours

Introduction of content

The course explores causes and consequences of environmental problems both in developed and developing countries; policies that have been formulated to address them; constraints in their implementation and related impacts from the social, economic and cultural aspects; institutional limitations and lessons learned. It examines multi-dimensional issues related to environment, water, food, and energy security in the context of overall development, how the perspectives to addressing them have changed over time, and what the outlook is for the next 50 years. The course takes an application-oriented approach through specific case studies that explore solutions. It brings student teams together to conduct studies on environmental topics of current relevance and policy alternatives using examples from around the world.

Course Aims:

- Enable students to identify and analyse the processes of policy making and implementation, and review examples of policies and practices at international and national levels.
- Develop students' knowledge and understanding of the complexity of environmental degradation under the current development frameworks.
- Enhance the students´ knowledge of the roles of public, private, and civil organisations at the national and sub-national levels in addressing environmental problems, as well as constraints for policy implementation.
- Further develop students´ knowledge for the opportunities and limitations of environmentally friendly and responsible decisions.
- Promote learning about global environmental movements, how they have evolved over time, and how they have informed policies.

Examination method (open-book exam, close-book exam or literature review etc.)

- Individual essay of 3000 words (60%): Case study that considers implementation of policies in the field of environment, water resources or food, and their impacts on other sectors as well as on society.
- Group presentation (2 or 3 students per group) (20%): Discussion of an environmental problem, and policies developed and implemented to addressed it.
- Individual oral assessment & presentations (20%): Students will compare similar environmental policies in different countries.

Textbooks

H.G. Brauch, U.O. Spring, J. Grin and J. Scheffran (Eds.) 2016. Handbook on Sustainable Transition and Sustainable Peace. Berlin: Springer.

Reference books

Others

Course	Environmental Remote Sensing		
Course code	04041012		
Name of teacher	Brian Barrett	Title of teacher	Lecturer
Hours	51	Credits	3

Teaching method(teaching/discussion and time allocation)

- Lectures: 14 hours
- Practical classes: 15 hours

Introduction of content

The course will introduce students to the principles of optical remote sensing and digital image processing, and will include an introduction to active and thermal remote sensing systems, applying the concepts covered in lectures to example environmental management scenarios.

Course aims:

- To introduce the principles of optical remote sensing

- To introduce the concepts of digital image processing approaches that are commonly used in environmental management
- To explore the most commonly used image clustering and image classification methods
- To introduce students to industry standard Remote sensing software
- To introduce a range of active remote sensing approaches, and to explore their application in environmental management
- To outline the concepts and applications of thermal sensing in environmental management

Examination method (open-book exam, close-book exam or literature review etc.)

- Written exam 40%
- Essay 20%
- Report on practical work 20%
- Remote sensing project 20%

Textbooks

- Lillesand, T. M., Kiefer, R. W., &Chipman, J. W. (2015). Remote sensing and image interpretation (No. Ed. 6). Wiley

Reference books：

- Barrett, E. C. (2013). Introduction to environmental remote sensing. Routledge.
- Mather, P. (2010). Computer processing of remotely-sensed images: an introduction. Wiley.
- Richards, J. A. (2013). Remote sensing digital image analysis: an introduction. Springer.
- Purkis, S. J., &Klemas, V. V. (2011). Remote sensing and global environmental change. Wiley.

Others

Course	Principles of GIS for Environmental Science		
Course code	04041011		
Name of teacher	John Xiaogang Shi	Title	Senior Lecturer
Hours	51	Credits	3

Teaching method (teaching/discussion and time allocation)

- Lectures 12 hours
- Tutorial 2 hours
- Seminar: 1 hour
- Practical classes 16 hours
- Directed practical project 50 hours

Introduction of content

This course introduces the principles and practices of Geographic Information Systems (GIS) and gives practical experience in their use in addressing environmental issues. Practical exercises will use common GIS software.

Aims:

- To describe the principles of GIS
- To introduce concepts of co-ordinate systems, datums and map projections
- To explain 2 & 3D vector data structures and concepts, including point, line and polygon entities, attributes and topology
- To explain 2 & 3D raster data structures and concepts
- To introduce several well-known GIS analytical tools
- To introduce spatial interpolation and digital terrain modelling
- To introduce several applications of GIS
- To explain how to design an efficient geospatial database
- To build confidence in the use of one particular GIS package
- To encourage the use of help files and relevant web pages, etc., to develop the initiative and creativity which contribute to the transferable skill of problem solving in information technology

Examination method (open-book exam, close-book exam or literature review etc.)

Four forms of assessment contribute to your final grade in this course:

- Database building exercise and report (10%)
- DTM application exercise and report (20%)
- GIS analysis project and report (30%)
- Final Examination (40%)

Textbooks

- Longley, P., Goodchild, M.F., Maguire, D.J., Rhind, D.W. (2015) Geographic Information Systems and Science (Fourth Edition). John Wiley. ISBN 978-1118676950

Reference books：

- Brimicombe, A. (2009) GIS, Environmental Modeling and Engineering (Second Edition). Boca Raton: CRC Press.
- Clemmer, G. (2013) The GIS 20: Essential Skills (2nd Edition) Redlands, Ca.: ESRI Press.
- Demers, M.N. (2009) Fundamentals of Geographic Information Systems (4th Edition). New jersey: John Wiley.
- Heywood, I., Cornelius, S., Carver, S. (2006) An introduction to Geographical Information Systems (3rd Edition). Harlow: Pearson.
- Kraak, M-J. &Ormeling, F. (2010) Cartography: Visualisation of spatial data (3rd Edition). Harlow: Peason.
- Li, Z., Zhu, Q., Gold, C. (2005) Digital Terrain Modeling: Principles and Methodology. Boca Raton: CRC Press.
- O'Sulivan, D., Unwin, D.J. (2003) Geographic Information Analysis. New Jersey: John Wiley.
- Pickles, J. (2004) A History of Spaces; Cartographic Reason, Mapping and the Geo-coded World. Taylor & Francis.
- Worboys, M.F., Duckham, M.J. (2005) GIS: A computing perspective (Second Edition). London: Taylor & Francis

Others

Course	Understanding Environmental Change		
Course code	04041014		
Name of teacher	Fabrice Renaud	Title of teacher	Professor
Hours	51	Credits	3

Teaching method(teaching/discussion and time allocation)

- Lectures: 20 hours
- Seminar: 8 hours
- Practical classes: 8 hours
- Fieldwork: 6 hours

Introduction of content

This course provides an introduction to issues that arise when managing natural environments in the face of mounting physical and human pressures, and the impacts of climate change. Conceptual approaches and methods for assessing how landscapes have changed over time are introduced, along with conceptual and legal frameworks, an understanding of new environmental risks and how they can be mitigated, and case studies from different settings worldwide.

Aims:

- To provide a process-based overview of processes of change in selected environments in order to understand ways in which they may be managed sustainably;
- To introduce examples of policies and practices for sustainable environmental management, climate change adaptation and disaster risk reduction;
- To consider the impact of climate change on the environment, and the consequences for societies.

By the end of this course students will be able to:

- Explain how environmental change happens at a range of scales;
- Explain the key processes operating within selected environments and how these produce change;
- Discuss policies and strategies for sustainable environmental management over long and short timescales;
- Discuss the significance of climate change as a cause of selected environmental changes;
- Critically assess the literature on the impacts of climate change on the landscape;
- Explain the role of legal frameworks in constraining environmental management;
- Explain the links between ecosystems, development, climate change adaptation and disaster risk reduction;
- Assess ecosystem services.

Examination method (open-book exam, close-book exam or literature review etc.)

- Essay 50%

- Report on field trip activity – group work (30%)
- Student presentation 20%

Textbooks

Hagenlocher M., Schneiderbauer S., Sebesvari Z., Bertram M., Renner K., Renaud F., Wiley H. and Zebisch M. (2018): Climate Risk Assessment for Ecosystem-based Adaptation: A guidebook for planners and practitioners. Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ) GmbH, Bonn. Available at: https://www.adaptationcommunity.net/wp-content/uploads/2018/06/giz-eurac-unu-2018-en-guidebook-climate-risk-asessment-eba.pdf

Reference books：

- Renaud F.G., Sudmeier-Rieux K., Estrella M. and Nehren U., Editors (2016): Ecosystem-Based Disaster Risk Reduction and Adaptation in Practice. Springer Advances in Natural and Technological Hazards Research, Dordrecht, 598p.
- Renaud F.G., Sudmeier-Rieux K. and Estrella M., Editors (2013): The role of ecosystems in disaster risk reduction. UNU-Press, Tokyo, 520p.Available at: https://collections.unu.edu/view/UNU:1995#viewAttachments
- Valiela, I. (2006) Global coastal change. Malden, Mass.; Oxford : Blackwell Publishing.

Others:

- Sendai Framework for Disaster Risk Reduction 2015-2030 (focus on priorities for action): https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf
- Paris Agreement on Climate Change: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf
- Sustainable Development Goals. See: https://sustainabledevelopment.un.org/?menu=1300. See where the environment is mentioned.
- Cohen-Shacham E, Walters G, Janzen C, Maginnis S (Eds.) (2016) Nature-based solutions to address global societal challenges. Gland, Switzerland: IUCN. xiii + 97pp. Available at: https://portals.iucn.org/library/sites/library/files/documents/2016-036.pdf (Chapters 1-2 in particular)
- Hagenlocher M., Renaud F.G., Haas S., Sebesvari Z. (2018): Vulnerability and risk of deltaic social-ecological systems exposed to multiple hazards. *Science of the Total Environment 631-632:71-80*.