

MODULE DESCRIPTION

Common Block

Module 1

1. Mathematical Methods in Data Analysis

Lecture course + lab/ practical; 2hours/week; 2 credit points; autumn semester

Lecturers

A/ Prof Shi Xinhui

Description

- Review of some elementary statistics concepts
- Classical regression and correlation
- Analysis of variance
- Nonparametric tests
- Samples from the multivariate normal population
- Tests on population parameters of multivariate normal distribution
- Analysis of multivariate regression
- Principle component analysis
- Discriminatory analysis
- Cluster analysis

Aim

To provide marine science students with the basic univariate and multivariate statistical data analysis techniques which meet their needs for future research.

Assessment

Assignment (20%), Project (30%), Written Exam (50%)

Literature

Irwin Miller, Marylees Miller. John E. Freund's mathematical statistics with applications, 7th edition, 618pp, Tsinghua University Press, Beijing, 2005

Richard A Johnson, Dean W Wichern. Applied multivariate statistical analysis, 4th edition, 799pp, NJ: Prentice-Hill, Englewood, 1998.

2. Introduction to Chinese Culture

Lecture course + Group Presentation; 1CP; 2 hpw; autumn term;

Lecturers

Description

Dos and Don'ts; Chinese Cuisine; Chinese Languages; Chinese Dynasties and Historical Events; Great Thinkers and Philosophers; New China and Influencing Figures; Chinese Festivals; Chinese Education; Chinese; Religion; Chinese Customs; Chinese Literature and Art; Chinese Medicine and Massage, Qigong.

Aim

To provide students with the basic knowledge on the above-mentioned aspects of Chinese culture.

Assessment

Essays and oral presentations.

Literature

A Passage to China, Ning Aihua, Li Zhonghua et al, China Ocean University Press

3. Chinese Language

Lecture course; 2 CP; 4 hpw; autumn term

Lecturers

Ms. LIN Yu

Description

Introduction to Chinese Language;

Practical, easy-to-command phrases and commonly used vocabulary are introduced;

Lesson 1-10 teaches Pinyin, to help new learners with tones and rules for pronunciation;

Focus on the communication function.

Aim

Students can master 800-900 Chinese words and phrases, 1000-1500 Chinese characters after fulfillment of elementary Chinese learning task.

Assessment

Written Exam and oral presentations.

Literature

Fangming, Liusongjiang , and Zhongzhemin , New Standard Chinese, Elementary Level ,Book 1,183pp, Peking University Press, 2004.

Module 2

4. Physical Oceanography

Lecture + Seminar; 3 CP; 4 hpw; autumn term

Lecturers

Prof. WU Lixin

Description

Introduction to physical property of seawater, distribution of water characteristics in the oceans, heat and salt budgets, large-scale circulation and water masses, measurement, coastal oceanography and air-sea interaction.

Aim

To introduce physical processes and underlying basic principles in the ocean

Assessment

Written test

Literature

Descriptive physical oceanography: An introduction, Groege L. Pickard, William J. Emery

And Lecture Notes

5. Marine Chemistry

Lecture course; 3 CP; 3 hpw; autumn semester

Lecturers

Prof. Dr. YANG Guipeng

Description

This course is the basic course of marine chemistry. It focuses on basic chemical reaction and process in ocean. The content includes: 1) descriptive chemical oceanography, 2) composition of the major components of seawater, 3) minor

components of seawater, 4) ionic interaction in seawater, 5) atmospheric chemistry, 6) dissolved gases other than CO₂, 7) the carbonate system in seawater, 8) micronutrients in the oceans, 9) primary production in the oceans, 10) organic matter in seawater.

Aim

Students will become familiar with the basic concepts of marine chemistry.

Assessment

Written Exam and oral presentations.

Literature

Millero F. J , Chemical Oceanography 2nd ed.,1996, CRC Press Inc, 469pp.

6. Marine Biology and Fisheries

Lecture course + practical; 3 hpw; 3 CP; autumn term

Lecturers

Prof. GONG Xiangzhong

Prof. Dr. CHI Zhenming

Prof. LIU Yun

Description

This course deals mainly with marine microorganisms, marine micro- and macro-algae, and the major taxonomical groups in invertebrates and vertebrates. The biology, morphology, anatomy, the life cycle of representative species of each kingdom, the ecology and the systematic biology will be introduced. The potential the actual use in aquaculture of some economically important species will also be provided.

Aim

Provide general concepts in morphology, anatomy, reproductive biology of representative species of marine invertebrate and vertebrate animals, micro- and macro-algae and microorganisms.

Assessment

Written Exam and Practical Reports.

Literature

Peter Castro, Michael E. Huber, Bill Ober: Marine Biology, 5th ed. 2004.

7. Marine Geology

Lecture course + Group Presentation; 3CP; 3 hpw; autumn term;

Lecturers

Prof. Dr. YANG Zuosheng

Prof. Dr. LI Guangxue

Prof. Dr. LI Sanzhong

Prof. Dr. Tim Kusky

Prof. Dr. FAN Dejiang

Description

Introduction to the concepts of ocean basins; overview of marine environment; the roles of mid-ocean ridges; structure and geological processes at continental margins; sedimentary processes within the basins; and resources in the Marine Realm, etc. **A** week cruise practical.

This module provides: 1) a broad outline of the geological evolution of the ocean basins; 2) an introduction to the application of tectonics and structural geology for the reconstruction of the history of eastern Euro-Asian plate and west Pacific Ocean plate; 3) basic knowledge of the Earth's history. 4) sedimentary records and resources in Ocean.

Aim

To provide students with the basic knowledge on marine geology.

Assessment

Written test

Literature

Scripts are provided by the lecturers based on their power point presentations; Recent series paper in Deep-Sea Research Part II, Earth and Planetary Science Letters, Earth Science Reviews, Estuarine, Coastal and Shelf Science, Sedimentary Geology, Continental Shelf Research, Geomorphology, Global and Planetary Change, Journal of Asian Earth Sciences, Journal of Marine Systems, Journal of Petroleum Science and Engineering, Marine and Petroleum Geology, Marine Geology, Quaternary International, Quaternary Research, Quaternary Science Reviews.

Module 3

8. Climate changes

Lecture course + seminar; 2 hpw; 2 CP; spring term;

Lecturers

Prof. WU Lixin

Prof. FU Gang

Prof. GAO Huiwang

Prof. WEI Hao

Description

This comprehensive course concentrates on the phenomena and processes of climate change on global and regional scale on the aspects of ENSO, Monsoon and so on. Some special weather phenomena such as sea fog, meso-scale cyclones in the eastern Asian region and some key scientific questions in the domain of IGBP, especially related to marine ecosystem will be introduced. This course includes a group of presentations from different professors.

Aim

Students will become familiar with the evidence of climate changes in coastal and open seas from observations and related climate modeling results to further understand the impacts of human being on their environment.

Assessment

20 min oral presentation with discussion

- using PowerPoint

- based on a selected recent published article

Literature

Recent published papers appeared in the international top journals such as Journal of Physical Oceanography, Monthly Weather Review, Journal of Marine Research etc.

Presentation files (PPT or PDF) are available

9. Geographical Information System and Remote Sensing

Lecture course +practical; 4 hours/week; 4 Credit Points; spring term

Lecturer

To be determined.

Description

GIS and Remote Sensing is a required course of geographical science and relevant specialty. As an important technical means for earth data collection and processing, it has been widely applied to many fields such as oceanography, meteorology, topography and so on. The main contents of this course are:

1) The basic theory of GIS;

Introduce to concept of GIS, spatial data model and map projection.

2) The realization of function

-The collection and processing of spatial data;

-The construction and conversion of vector and raster data structure;

-Spatial analysis;

-DEM;

-Data mining.

3) The application technology;

Introduce to distributed GIS, web GIS, the standards of GIS and digital earth.

4) Imaging theory of remote sensing;

5) The methods of image manipulation.

-Pretreatment of image;

-Intensification of image;

-Classification of image.

Aim

By familiarizing students with the basic concepts, theory and method of GIS and RS, this course aims at enhancing students' research ability in geographical science and technology.

Assessment

Written Exam and oral presentations.

Literature

P. A. Burrough, and R. A. McDonnell, Principles of Geographical Information Systems, Oxford University Press, Oxford, U.K., 1998.

10. Introduction to Environmental Science

Lecture + exercise; 2 CP; 2 hpw; spring term;

Lecturers

Prof. GAO Huiwang

Dr. LI Zhengyan

Dr. ZOU Li

Description

This comprehensive course gives introduction to the structure and functions of ecosystems, atmospheric, water and soil pollution, methodology for environmental quality assessment and environmental monitoring. It provides basic concepts of food-web and ecosystem, sustainable development, chemical pollution and human

health risks. It also provides ideas of environmental management for persistent organic pollutants.

Aim

This course provides the basic knowledge of environmental problem and environmental protection. It provides understanding of food-web and ecosystem, as well as atmospheric, water and soil pollution.

Assessment

Written Exam and Practical Reports

Literature

Introduction to Environmental Science (Cunningham W.P. & Saigo B.W.)

(Scripts are provided by the lecturers based on their power point presentations.)

11. Introduction to Submarine Exploration Methodology

Lecture course + Group Presentation; 1CP; 2 hpw; spring term;

Lecturers

Prof. Dr. YANG Guipeng

Prof. Dr. GUO Zhigang

Prof. Dr. DONG Ping

Dr. YANG Shaoli

Dr. WANG Yonghong

Description

Introduction to sea bottom measurement technology (echo-sounder, side-scan sonar systems and multi-beam Sonar system), submarine sampling methods, and sediment analyses methods.

This module provides: 1) the outline of survey methods of the submarine exploration; 2) grained size analysis method; 3) X-ray powder diffraction method; 4) Basic geochemical analyses methods.

Aim

To provide students with the basic knowledge on the submarine exploration and sediment analysis method.

Assessment

Written test

Literature

Scripts are provided by the lecturers based on their power point presentations; Recent series paper in Deep-Sea Research Part II, Earth and Planetary Science Letters, Earth Science Reviews, Estuarine, Coastal and Shelf Science, Sedimentary Geology, Continental Shelf Research, Global and Planetary Change, Journal of Marine Systems, Journal of Petroleum Science and Engineering, Marine and Petroleum Geology, Marine Geology, Marine Chemistry, Geochimica et Cosmochimica Acta, Chemical Geology.

12. Law of Sea

Lecture course; 3 hours/week; 1 Credit Points; spring term

Lecturer

Dr./Professor XUE Guifang

Description

The course provides a comprehensive analysis of the UN Convention on the Law of the Sea (LOS Convention) from a legal and policy perspective. It sets:

- the historical development of the law of the sea and a framework for understanding the LOS Convention;
- baselines under the LOS Convention and maritime zones under the jurisdiction of the coastal state;
- the high seas; the deep seabed;
- maritime boundary delimitation and China's maritime boundary issues;
- protection of the marine environment under the LOS Convention;
- the legal regime for managing marine living resources in the exclusive economic zone, continental shelf and on the high seas;
- practical aspects and emerging issues of the exclusive economic zone and continental shelf; and
- dispute settlement under the LOS Convention.

Aim

To familiarise students with the basic regimes on the law of sea and state practice to this respect

Assessment

Written Exam and oral presentations.

Literature

Churchill, R. R., and A. V. Lowe. *The Law of the Sea*. 3rd ed, (Manchester: Manchester University Press, 1999).

Davis, E. V. W. *China and the Law of the Sea Convention: Follow the Sea*, (Lewiston: The Edwin Mellen Press, 1995).

Xue, G. *China and International Fisheries Law and Policy*, (Leiden/Boston: Martinus Nijhoff Publishers, 2005).

Major Block

Major Module 1 Physical and Environmental Oceanography

■ Introduction to Marine Biogeochemistry

Lecture + seminar; 3 CP; 4 hpw; spring term;

Lecturers

Dr. ZOU Li

Description

To introduce to the salinity tracer and Re-dox condition in the oceanic environment as well as boundary processes between the air-sea, river-sea and sediment-sea. The biogeochemical cycling of nitrogen and iron in the ocean. Introduction to JGOFS, new production and lipid biomarkers. Basic concepts on isotope chemistry and the application in marine environment

Aim

This course provides the basic knowledge on distribution, transportation and

transformation of bio-elements in the ocean, refers the effects of geochemical environment to the marine organisms, and explores the relationship and feedback of chemical compositions to the marine organisms. Assessment

Written test (50%) + presentation (30%) + activity in class (20%)

Literature

Libes, Susan M. An Introduction to marine biogeochemistry. New York [etc.] : John Wiley & Sons, 1992. 734 p.

Fasham, M.J.R. (ed.) 2003. Ocean biogeochemistry: The role of the ocean carbon cycle in global change. Springer-Verlag, Berlin, 297 pp.

■ **Ocean General Circulation**

Lectures+seminar; 2 hpw; 2 CP; spring term

Lecturers

Prof. LAN Jian

Dr. LIN Xiaopei

Description

Introduction of ocean circulation. Basic backgrounds of Ocean dynamic process. Ocean wave theory. Wind driven ocean circulation theory. Introduction of thermalhaline theory.

Aim

To provide the basic knowledge of the Ocean circulation and understanding of Ocean dynamic process

Assessment

Written test

Literature

Regional Oceanography (Tomczak & Godfrey); Geophysical Fluid Dynamics (Pedlosky); Ocean Circulation Theory (Pedlosky); Atmosphere-Ocean Dynamics (Adrian E. Gill)

■ **Waves in the Ocean**

Lecture + seminar; 2CP; 2hpw; spring term;

Lecturers

Prof. GUAN Changlong

Description

General properties of waves; surface gravity, capillary, inertia-gravity, internal, Kelvin, Rossby, Poincare waves; Laplace tidal equations and the vertical structure equation; Equatorial beta-plane and equatorial waves; Stratified quasi-geophysic motion and instability waves; Wave-mean flow interaction.

Aim

To understand properties, behavior of waves that occur in the ocean, and how to include them in the overall picture of the ocean

Assessment

Written test

Literature

Waves in the Ocean and Atmosphere, by J. Pedlosky, 2003, Springer, 260 PP.

■ **Analytical Chemistry of Seawater**

Lecture + seminar; 2 CP; 2 hpw; spring term;

Lecturers

Dr. LI Tie

Description

The course includes the brief introduction and the sampling and pretreatment methods, and the determination of normal parameters of marine chemistry, such as salinity, chlorinity, dissolved oxygen, pH, total alkalinity, CO₂ system and nutrients, dissolved and particulate organic carbon and some parameters of pollutant such as COD and trace metal as well. Purification of water and reagents, clean room technique, instrumental technology, data processing and analysis, and quality control are also involved.

Aim

This course provides the basic knowledge of Analysis of Seawater

Assessment

Written test

Literature

Grasshoff, K, et.al, .Methods of Seawater Analysis 3rd ed. 1999, WILEY-VCH
(Scripts are provided by the lecturer based on the PowerPoint presentations.)

Major Module 2 Marine Biology

■ **Marine Microbiology**

Lecture course + lab practical + seminars; 3 CP; 3 hpw; autumn term;

Lecturers

Dr. Prof. CHI Zhenming,

Dr. Prof. ZHANG Xiaohua

Description

Introduction to Marine Microbiology, Microorganisms in extreme marine environments, role of marine microorganisms in marine environments, Interaction between marine microorganisms, bioactive substances from marine microorganisms, marine animal disease and its control, marine yeasts and their applications, molecular biology of marine bacteria.

Aim

This course deals mainly with ecology of marine microorganisms, potential uses of marine microorganisms in maricultural industry and other fields and methods in molecular marine bacteriology

Assessment

Written Exam and oral presentations.

Literature

C. B. MUNN, Marine Microbiology; Ecology & Applications (Advanced Texts S.), 2003

■ **Marine Ecology and Benthic ecosystem**

Lecture course + field practical + paper view; 3 CP; 3hpw; spring term;

Lecturers

Prof. ZHANG Zhinan

Prof. Dr. TANG Xuexi

Description

To introduce concepts in marine ecology (Tang), general understanding of the characteristics of marine ecosystem, the bottom of the sea, the characteristics sea floor, interactions between the floor and the water layers, the interactions between environmental and biological factors in marine ecosystem, function of organisms in maintenance of the marine benthic ecosystem, the energy flow in marine ecosystem from primary production to food chains.

Aim

Familiar with concepts and methods in marine ecology.

Assessment

Written Exam and oral presentations.

Literature

Michel Kaiser, Martin Attrill, Simon Jennings, and David N. Thomas, Marine Ecology: Processes, Systems, and Impacts. 2006

R. S. K. Barnes, Introduction to Marine Ecology. 1999

■ **Molecular Ecology**

Lecture course + lab practical + paper view and/or seminars; 3 CP; 3 hpw; spring term;

Lecturers

Prof. Dr. YANG Guanpin

Description

Basic molecular ecological knowledge and methods, cloning of environmental genes, further analytical techniques: DGGE, ELISA, hybridization used to analyze molecular diversities of organisms in marine habitats, molecular cytogenetic methods for visualization and identification of organisms, cells, organelle and chromosomes.

Aim

Ability to use molecular methods to solve ecological problems

Assessment

Written Exam and practical reports.

Literature

Trevor J.C.Beebee, Graham Rowe: An Introduction to Molecular Ecology, 2004.

Joanna Freeland: Molecular Ecology, 2006