海洋资源学概论课程教学大纲

课程代码：74120600

课程中文名称：海洋资源学概论

课程英文名称：Introduction to Marine Resources

学分：1.5　　周学时：1.5-0.0

面向对象：

预修要求：

一、课程介绍

（一）中文简介

海洋资源学概论是海洋科学专业的专业学位课程，在具有海洋地质、海洋生物、海洋化学等专业知识背景后，深化、综合的一门专业课程。海洋资源学主要研究海洋资源的成因、分布变化规律和开发、利用、保护及其与人类社会和自然环境相互关系等。海洋资源根据不同的对象、特点可划分的各种类型。按其属性分为海洋生物资源、海底矿产资源、海水资源、海洋能资源和海洋空间资源；按其有无生命分为海洋生物资源和海洋非生物资源；按其能否再生分又可分为海洋可再生资源和海洋不可再生资源。本课程内容包括：1）海洋资源的分类与空间分布，2）海底固体矿产资源，3）海底油气资源，4）海洋化学资源，5）海洋可再生能源，6）海洋资源开发与人类环境等。

（二）英文简介

Introduction to Marine Resources is Marine science professional degree course, adeepening and comprehensive course on the basis of professional background of marine geology, marine life, marine chemistry and so on.Marine Resources mainly study the causes of marine resources, the distribution law of marine resources, the development, utilization, and protection of marine resources as well as its relationship with human society and the natural environment.Marine resources can be divided into various types according to different objects and features. According to their attributes, it is divided into marine living resources, seabed mineral

resources, seawater resources, marine energy resources and marine space resources. It is divided into marine living resources and marine non-living resourcesaccording to whether they have life. Also, it can divided into marine renewable resources and marine non-renewable resources. The course is prepared to introduce the following contents: 1) classification and spatial distribution of marine resources, 2) seabed solid mineral resources, 3) submarine oil and gas resources, 4) marine chemical resources, 5) marine renewable energy, 6) marine resources development and human environment

2. 目标与结果

(1) 学习目的

海洋资源学是海洋科学的一个重要分支。本课程通过授课与讨论等方式，介绍海洋资源的分类与分布、海洋资源的成因与影响因素、海洋资源的开发及与环境的关系等。辅以课外阅读资料的讲解，使学生掌握海洋资源的基本知识，培养学生的文献阅读能力并使其形成对海洋专业资源研究的兴趣，为其今后在海洋资源学研究、海洋资源勘探与开发、国土海域评价等领域的工作打下基础。

(2) 关键技能获得

1. 掌握海洋资源的基本分类方法和分类特征。

2.掌握各类海洋资源的基本概念，了解各类资源的基本特征。

3. 熟悉海洋资源学常用词汇。能够查找、阅读、回顾海洋资源资料，尤其是英文文献资料。

4.了解海底矿产资源主要类型、成因特征和研究方法。

5. 通过课外阅读和小组讨论拓宽知识面，培养团队合作精神。

3. 方法

(1) 授课与学习方法

A.课堂讲授关键知识点，课堂问答与讨论

B. 通过阅读参考文献拓宽知识面，小组讨论阅读体会，根据文献阅读写出课程作业

C. 安排一次课堂演讲（以组为单位）

(2) 评估方法

Open-book examination (50%); In-class performance including attendance and activity

(10%); Class assignment including extracurricular reading and course project (40%).
期末开卷考试（50%）；上课表现包括出勤和积极性（10%）；课外作业包括课外阅读和课堂演讲（40%）。

4. 教学内容

Chapter 1：Seafloor division and distribution of mineral resources 1

1) The basic concepts of the marine division and the seabed topography

2) Continental shelf and continental margin

3) The island arc and back arc basin

4) The continental slope and deep sea fan (abyssal)

5) Ocean basins and mid Middle Ocean Ridge

6) Seamount and mantle hotspot seamount chain

Chapter 1：Seafloor division and distribution of mineral resources 2

1) The basic concepts of the marine division related with maritime right

2) ISA, enterprise, cost countries and international marine law

3) The Arctic and relevant countries: Norway and Russian

4) Continental Sea and relict Tethys Ocean: rich in oil and gas

5) The Red Sea, hot brine and metal rich sediments

Chapter 2：Marine renewable energy

1) Problems with fossil energy: resource depletion, price increase and green house effect

2) Solar energy and wind energy

3) Tidal energy and tidal current energy

4) Wave energy

Chapter 3：Energy security and sea-floor oil/gas

1）Fossil Eng. Vs Renewable Eng.

2）Formation and distribution of oil/gas

3) Exploration and exploitation of oil/gas

4) Current situation of energy consumption and energy security

Chapter 4: Gas hydrate

1) What it is: Molecular structure and phase diagram

2) Where to find and global distribution

3) Resource significance and environment effect

4) Technology for exploration and drilling

Chapter 5: Mn-nodules and Co-rich crust

1)Major composition and valuable elements

2) Wide distribution and focused exploration on CC Area

3) Huge amount with important economic significance

4) Formation mechanism 1: reaction between pore-water and bottom sea-water.

5) Formation mechanism 2: up-welling caused by AABW

6) Formation mechanism 3: Pore water driven by hydrothermal activity

7) Mineral phases and potential functional materials

8) Mining technology

Chapter 6: Seafloor hydrothermal systems and associated resources

1) What is hydrothermal systems/fluids

2) Hydrothermal systems on seafloor: tectonic settings and relation with magma

3) Physical/chemical properties of hydrothermal fluid

4) Massive sulfide deposits formed by present and ancient hydrothermal activities

5) Bio-communities in associate with hydrothermal systems

6) Lost City: another type of hydrothermal system

7) Hydrothermal systems and Cu-Au deposits in active continental margin and Tethys: multi-stage enrichment

Chapter 7: Evolution of seawater chemistry and formation of large Fe deposits

1) Eh-pH relations in nature environment

2) Atmosphere and ocean changes in geology history and their records

3) Fe-pH-Eh phase diagram and precipitation of Fe-O-OH in geological history

4) Super-scale iron deposits and theirs relation with seawater evolution

5. 参考书和教材

References:

1. 海洋资源概论，高等教育出版社，朱小东等，2005

2. 海洋地质学概论，同济大学出版社，吕炳全编著，2008

3. Marine Geology - Exploring the new frontiers of the Ocean，Facts on File，Jon Erickson，2009

4. Earth Science - An illustrated guide to science，Chelsea House Publishers，2006

5. The sea floor: an introduction to marine geology, Springer, Eugen Seibold and Wolfgang H. Berger, 1996

6. 海洋可再生能源发展现状与展望，中国海洋大学出版社，于华明等编著，2012