普通高等教育“十二五”规划教材

Professional English for
Environmental Science and Engineering

环境科学与工程专业英语

《环境科学与工程专业英语》编委会 编

中国石化出版社
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内 容 提 要

本教材是普通高校环境科学和工程专业英语“十二五”规划教材。全书共分为10部分30个单元，每个单元又分为课文和辅助材料两个部分，课文部分为精读材料，辅助部分为泛读材料，并且每5个单元后安排了专业英语读写技巧发展的内容，旨在发展学生环境科学与工程专业英语的使用能力与技巧。技巧发展和附录介绍了与环境科学和工程相关方面的科技词汇的扩展、复杂句子的阅读、论文和设计说明书英文摘要的写作、产品说明书的写作与翻译、参加国际会议的准备与写作、化学元素周期表、环境监测常用仪器设备、环境工程主要设备、练习题参考答案等。教材内容全面涵盖了环境科学与工程的相关领域理论、技术与应用的进展。教材编写秉承系统性、完整性和循序渐进的原则，由浅入深、由表及里的原则。

本教材可作为高等院校高年级本、专科生环境科学与工程专业英语教材，也可供研究生、科研人员和相关工程技术人员参考使用。

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前　言

随着社会经济的发展，人们对其生存环境的改善更加重视，它已经成为新技术的推动力和绿色环境进步的主题。环境的可持续发展是人类共同目标，其目的是保护人们赖以生存的环境。面对不断恶化的生存环境，人们已经清醒地认识到环境可持续发展的重要性，解决环境问题和实施可持续发展战略是人类的共同责任和义务，需要世界各国人们的合作。环境科学与工程专业英语教材，是高等院校环境专业教育的重要组成部分，是提高学生环境意识和责任及国际交流的基础，也是培养社会急需的面向国际化的环境科学与工程专业人才的重要信息平台。目前高等院校对学生基本素质和实际工作能力的培养十分重视，把环境科学与工程专业学生的英语水平和能力，作为学生综合素质培养的重要内容，通过专业英语的学习，可以使学生对环境科技信息挖掘和使用方面的能力得到补充和延伸。

本教材的编写，希望能够反映当前国际环境科学与工程发展的最新前沿内容和研究成果，同时也希望提高学生阅读与专业有关的文献和获取信息的能力，使环境科学与工程专业以及非环境专业学生能掌握环境保护的一些基础知识和基本原理，能顺利阅读英文版环境科技读物，熟悉环境科学与工程专业英语交流表达方式，能从多层次、多角度了解全球环境科学与工程方面的信息，把握国内外环境科技进展动态，更大程度地丰富学生的专业知识，改变目前学生对专业英语使用的陌生，特别是专业领域英语的应用能力存在的问题。同时编者考虑到目前环境国际合作的日益广泛，增加了环境响应评价、环境产品说明书编写、环境工程设计说明书编写、国际交流与合作文件编写和国际会议讲演报告编写等内容。通过本教材的学习，提升学生专业英语交流能力、专业论文摘要与论文撰写能力和环境专业科学技术的国际交流能力。

本教材围绕环境科学和工程相关方面内容组织材料。全书共分为 10 部分 30 个单元，每个单元又分为课文和辅助材料两个部分，课文部分为精读材料，辅助部分为泛读材料，并且每 5 个单元后安排了专业英语读写技巧发展的内容，旨在拓展学生环境科学与工程专业英语的使用能力与技巧。技巧发展和附录介绍了与环境科学和工程相关方面的科技词汇的扩展、复杂句子的阅读、论文和设计说明书英文摘要的写作、产品说明书的写作与翻译、参加国际会议的准备与写作、化

学元素周期表与元素读音、环境优先污染物的英文表述、环境监测常用仪器设备、环境工程主要设备、练习题参考答案等。根据每个单元均配有与课文相对应的注释、练习和阅读材料，供读者进行自学、自我测试使用。

本教材是高等院校石油化工专业外语系列教材之一，参加编写的院校有沈阳化工大学，北京石油化工学院，常州大学，武汉科技大学，广东石油化工学院，仲恺农业工程学院等，编写过程中得到了环境科学与工程专业英语教材编写组所涉及的高等院校、中国石化出版社和全体参编人员的大力支持和帮助，为本教材编写提供了保障，在此深表感谢。教材内容涵盖了环境科学与工程的相关领域进展情况；教材秉承系统性、完整性和循序渐进的原则，由浅入深、由表及里。本教材可作为高等院校高年级本、专科生环境科学与工程专业英语教材，也可供研究生、科研人员和相关的工程技术人员参考使用。

由于编者水平和时间有限，书中还存在一些不当和疏漏之处，恳请同行专家、学者和广大读者斧正。

编　者

2012 年 6 月

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PART 1 GENERAL INTRODUCTION TO ENVIRONMENTAL SCIENCE AND ENGINEERING

Unit 1

Unit Goals:

- describing what environmental science is
- giving profiles of environmental engineering
- vocabulary building: words and terms of environmental science & engineering

Text

General Introduction to Environmental Science and Engineering I

Environmental Science and Engineering program: In general, environment refers to the surroundings of an object, or the natural environment, all living and non-living things that occur naturally on earth.

The Environmental Science and Engineering (ESE) program reaches across traditional disciplinary boundaries in its aim to provide a comprehensive understanding of our complex environment and offer efficient and effective engineering solutions to environmental problems. Students in ESE receive a broad education and carry out research addressing some of the grand science and engineering challenges of our times:

- How has Earth's climate varied in the past and how will it change in the future?
- How does pollution affect air quality locally and far from its sources, and how does it affect cloud cover and climate change?
- How do microorganisms drive nutrient cycles in oceans and on land, and how

can they be used to produce biofuels or remediate toxic waste?

By uniting scientists and engineers from a variety of disciplines and focusing on fundamental questions with long reach, the ESE program strives to have an outsize influence on the field.

Research and teaching in Environmental Science and Engineering (ESE) span the large scales of global climate variations, the local scales of urban air pollution, and the microscales of microbial ecosystems. Reflecting the interdisciplinary nature of the ESE program, it unites scientists and engineers from Caltech's Division of Geological and Planetary Sciences, Division of Engineering and Applied Science, and Division of Chemistry and Chemical Engineering, as well as from NASA's Jet Propulsion Laboratory. Jointly they address, for example, how climate has varied in the past and how it may change in the future, how biogeochemical cycles and chemical reactions control the composition of the global atmosphere and local air quality as well as the Earth's global energy balance, and how efficient and effective ways of producing biofuels or remediating toxic waste can be found. The methods employed in research projects include laboratory studies of fundamental chemical and biological processes; field studies of microbial ecology and of atmospheric chemistry; and computational and theoretical studies of chemical and physical processes on molecular to global scales. ①

Students enter the ESE program with diverse backgrounds, from the basic sciences of physics, chemistry, and biology to applied science and engineering fields. The curriculum emphasizes interdisciplinary knowledge and is broad, yet it is flexible so that different backgrounds and focus areas can be accommodated.

Environmental science: Environmental science is an interdisciplinary academic field that integrates physical and biological sciences, (including but not limited to Ecology, Physics, Chemistry, Biology, Soil Science, Geology, Atmospheric Science and Geography) to the study of the environment, and the solution of environmental problems. Environmental science provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems.

Related areas of study include environmental studies and environmental engineering. Environmental studies incorporates more of the social sciences for understanding human relationships, perceptions and policies towards the environment. Environmental engineering focuses on design and technology for improving environmental quality.

Environmental scientists work on subjects like the understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource

management, and the effects of global climate change. Environmental issues almost always include an interaction of physical, chemical, and biological processes. Environmental scientists bring a systems approach to the analysis of environmental problems. Key elements of an effective environmental scientist include the ability to relate space, and time relationships as well as quantitative analysis.

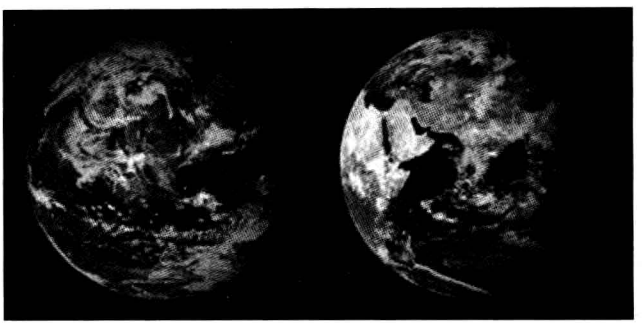

Fig. 1 Blue Marble composite images generated by NASA in 2001 (left) and 2002 (right).

Environmental science came alive as a substantive, active field of scientific investigation in the 1960s and 1970s driven by (a) the need for a multi-disciplinary approach to analyze complex environmental problems, (b) the arrival of substantive environmental laws requiring specific environmental protocols of investigation and (c) the growing public awareness of a need for action in addressing environmental problems. Events that spurred this development included the publication of Rachel Carson's landmark environmental book *Silent Spring* along with major environmental issues becoming very public, such as the 1969 Santa Barbara oil spill, and the Cuyahoga River of Cleveland, Ohio, "catching fire" (also in 1969), and helped increase the visibility of environmental issues and create this new field of study.

Main Components of Environmental science: Atmospheric sciences focuses on the Earth's atmosphere, with an emphasis upon its interrelation to other systems. Atmospheric sciences can include studies of meteorology, greenhouse gas phenomena, atmospheric dispersion modeling of airborne contaminants, sound propagation phenomena related to noise pollution, and even light pollution.

Taking the example of the global warming phenomena, physicists create computer models of atmospheric circulation and infra-red radiation transmission, chemists examine the inventory of atmospheric chemicals and their reactions, biologists analyze the plant and animal contributions to carbon dioxide fluxes, and specialists such as

meteorologists and oceanographers add additional breadth in understanding the atmospheric dynamics.

Ecology is the study of the interactions between organisms and their environment. Ecologists might investigate the relationship between a population of organisms and some physical characteristic of their environment, such as concentration of a chemical; or they might investigate the interaction between two populations of different organisms through some symbiotic or competitive relationship. For example, an interdisciplinary analysis of an ecological system which is being impacted by one or more stressors might include several related environmental science fields. In an estuarine setting where a proposed industrial development could impact certain species by water and air pollution, biologists would describe the flora and fauna, chemists would analyze the transport of water pollutants to the marsh, physicists would calculate air pollution emissions and geologists would assist in understanding the marsh soils and bay muds.

Environmental chemistry is the study of chemical alterations in the environment. Principal areas of study include soil contamination and water pollution. The topics of analysis include chemical degradation in the environment, multi-phase transport of chemicals (for example, evaporation of a solvent containing lake to yield solvent as an air pollutant), and chemical effects upon biota. ②

As an example study, consider the case of a leaking solvent tank which has entered the habitat soil of an endangered species of amphibian. As a method to resolve or understand the extent of soil contamination and subsurface transport of solvent, a computer model would be implemented. Chemists would then characterize the molecular bonding of the solvent to the specific soil type, and biologists would study the impacts upon soil arthropods, plants, and ultimately pond-dwelling organisms that are the food of the endangered amphibian. ③

Geosciences include environmental geology, environmental soil science, volcanic phenomena and evolution of the Earth's crust. In some classification systems this can also include hydrology, including oceanography.

As an example study of soils erosion, calculations would be made of surface runoff by soil scientists. Fluvial geomorphologists would assist in examining sediment transport in overland flow. Physicists would contribute by assessing the changes in light transmission in the receiving waters. Biologists would analyze subsequent impacts to aquatic flora and fauna from increases in water turbidity.

Regulations driving the studies: In the U. S. the National Environmental Policy Act

(NEPA) of 1969 set forth requirements for analysis of major projects in terms of specific environmental criteria. Numerous state laws have echoed these mandates, applying the principles to local-scale actions. The upshot has been an explosion of documentation and study of environmental consequences before the fact of development actions.

One can examine the specifics of environmental science by reading examples of Environmental Impact Statements prepared under NEPA such as: Wastewater treatment expansion options discharging into the San Diego/Tijuana Estuary, Expansion of the San Francisco International Airport, Development of the Houston, Metro Transportation system, Expansion of the metropolitan Boston MBTA transit system, and Construction of Interstate 66 through Arlington, Virginia.

In England and Wales the Environment Agency (EA), formed in 1996, is a public body for protecting and improving the environment and enforces the regulations listed on the communities and local government site (formerly the office of the deputy prime minister). The agency was set up under the Environment Act 1995 as an independent body and works closely with UK Government to enforce the regulations.

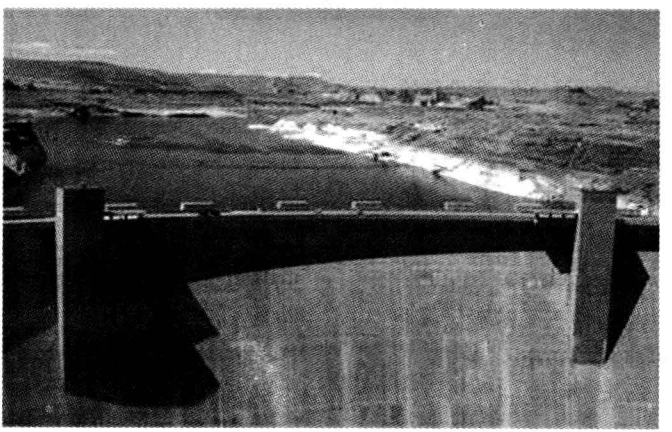

Fig. 2 Environmental science examines the effects of humans on nature (Glen Canyon Dam in the U. S.)

Terminology: In common usage, "environmental science" and "ecology" are often used interchangeably, but technically, ecology refers only to the study of organisms and their interactions with each other and their environment. Ecology could be considered a subset of environmental science, which also could involve purely chemical or public health issues (for example) ecologists would be unlikely to study. In practice, there is considerable overlap between the work of ecologists and other environmental scientists.

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