大学专门用途英语系列教材

English for Civil Engineering

土木工程英语

主　审／杨金才
总主编／肖　飞
主　编／李明月

外语教学与研究出版社
FOREIGN LANGUAGE TEACHING AND RESEARCH PRESS

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前言

根据《大学英语教学指南》的精神，大学英语的课程体系主要由通用英语、专门用途英语和跨文化交际三大类课程组成。

大学专门用途英语系列教材充分体现《大学英语教学指南》的精神，在大学英语教学改革实践的基础上，以培养与专业英语相关的英语能力为目标，将特定的学科内容与英语语言学习相结合，兼顾语言输入与输出训练，帮助学生实现在英语语境下对学科知识的有效输出和应用。

大学专门用途英语系列教材依据以内容为依托的教学理念编写，具有时代感、知识性和实用性。教材所选内容反映学科主线，体现相关学科的基本知识和前沿信息，兼具专业性和可读性。基于课文内容设计的阅读理解、专业词汇和学术英语词汇练习，帮助学生在理解课文的同时掌握文章中重要词汇，同时注重活学活用和适度扩展。此外，教材还提供设计灵活、注重实效的思辨训练和学术技能训练，帮助学生在实践中提高思辨能力、习得学术规范、培养学术研究能力，从而能够有效、得体地使用英语进行学业学习与学术交流。

大学专门用途英语系列教材能满足学生专业发展的需要，同时保证他们在大学期间的英语语言水平稳步提高。丰富的教学内容和多样的练习形式也为实现分类教学和因材施教提供可能，教师可根据实际需要选择教学内容，制定个性化的教学方案。

大学专门用途英语系列教材的编者们恳请使用者对本书中出现的问题提出宝贵意见和建议，以便再版时改进。

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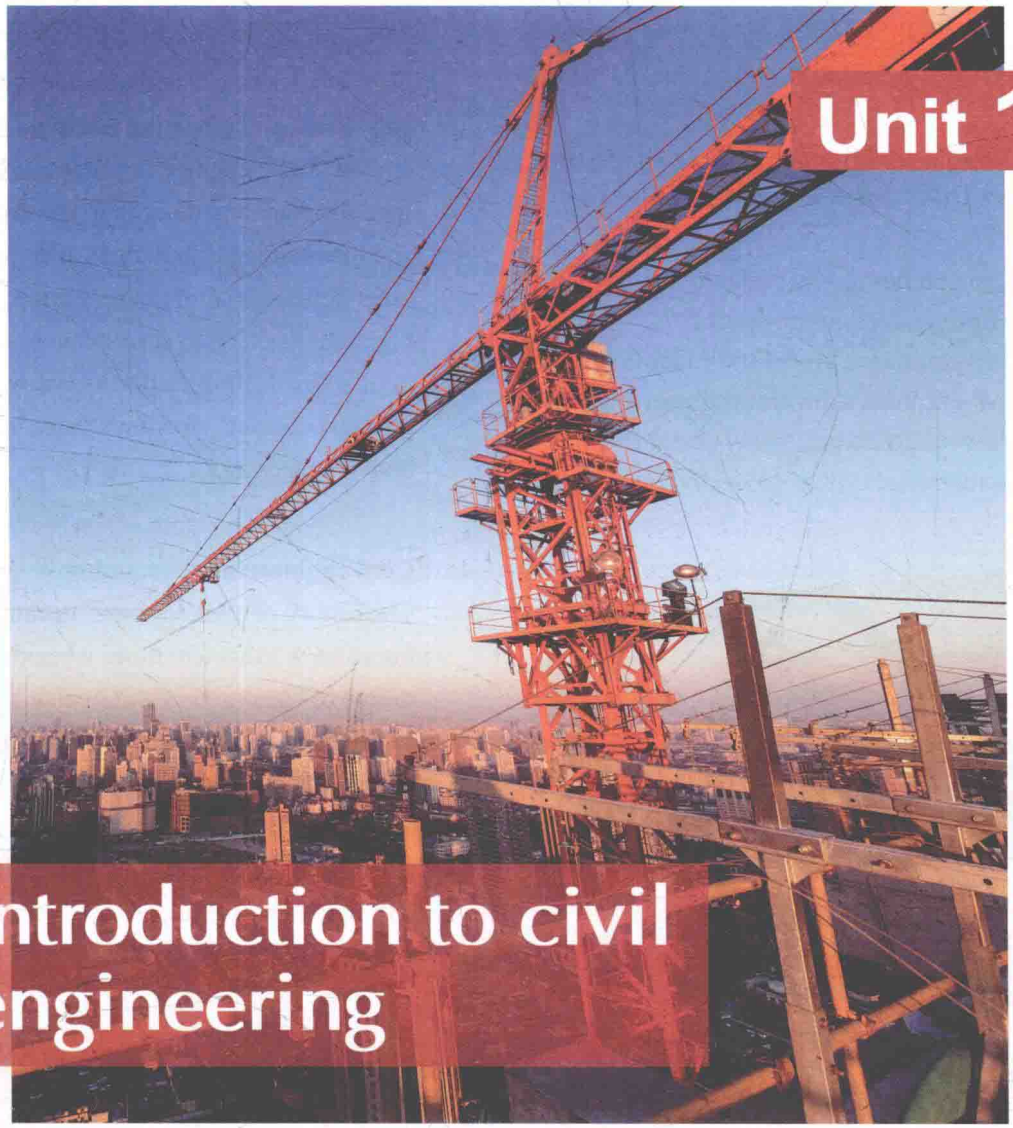
Contents



Unit 1

Introduction to civil engineering

In this unit, you will learn:

- **Subject-related knowledge:** The mission of civil engineering
  Engineering wonders of the modern world
- **Academic skill:** Searching for information
- **Reading strategy:** Dealing with unknown words (Part I)

Section A

Pre-reading

Civil engineering helps people shape the world. Discuss the following questions in groups.

1. Can you name any civil engineering wonders, ancient or modern?
2. Can you name any of the most famous civil engineers the world has ever known?
3. How much do you know about the branches of civil engineering?

[1] Civil engineering is arguably the oldest and broadest engineering discipline among all the engineering fields. It deals with the planning, designing, constructing and maintaining of buildings and various other structures. From huge dams to sky-high buildings, from suspension bridges to offshore drilling platforms, many physical concrete structures come under civil engineering.

Civil engineering then and now

[2] The history of civil engineering can be traced back to ancient times when the sole means of construction was human labor, lacking any sophisticated equipment. Ancient civil engineering projects include the Roman public baths, the Mayan ruins at Copan, Palenque and Tikal, and the cliff dwellings at Mesa Verde.

What is civil engineering?

Text A

3 Many early civilizations built monuments to their rulers or gods. These may have been simple mounds or truly remarkable achievements, such as the Pyramids of Giza whose construction by pre-industrial societies remains mysterious. The names of the engineers who designed these wonders are lost in antiquity.

4 Nowadays, we often associate civil engineering with the world's most jaw-dropping structures. These include the Brooklyn Bridge, Hoover Dam, the Panama Canal, the Golden Gate Bridge, and the Eiffel Tower.

5 But civil engineering isn't all about designing fancy buildings – it's also about maintaining and adapting the infrastructure that we depend on every day, such as roads, railways and bridges, energy and water supply, waste networks and flood defenses. Civil engineers have to keep this infrastructure running effectively and adapt it to meet challenges, such as population growth, climate change and natural disasters. They literally shape the world we live in.

Branches of civil engineering

6 Civil engineering is arguably the most diverse field of all the engineering branches. As the population of the world increases and the technology becomes more advanced, the need for better infrastructure increases around the world. In order to manage the construction process in each sector, the field of civil engineering has been divided into various sub-disciplines on the basis of applications. Some of the main branches are introduced below.

7 **Structural engineering:** It is the field of engineering particularly concerned with the design of load-bearing structures. The load acting on a structure is ultimately transferred to ground. In doing so, various components of the structure are subjected to internal stresses. For example, in a building, the load acting on a slab is transferred by the slab to ground through beams, columns and footings. Structural engineers identify the loads that act on the structures as well as stresses that are created by the loads, and then design structures that can withstand the loads. Structures should remain stable and secure throughout their use and at the same time, be economical and fulfill the desired functions.

8 **Geotechnical engineering:** Geotechnical engineering is the branch of engineering dealing with the analysis, design and construction of foundations, slopes, retaining structures and other systems that are made of or are supported by soil or rock. Technical information obtained from the sciences of geology, material testing, and hydraulics is applied in the design of foundations and structures to ensure safety and economy of construction.

9 **Water resources engineering:** This discipline involves the design and operation of systems to control and utilize water, the design of urban storm-sewer systems, dams and breakwaters, the management of water supplies and waterways, erosion and flood protection. The fields of hydrology, geology, and environmental science are included in this discipline of civil engineering.

10 **Transportation engineering:** It provides for the safe, efficient and convenient movement of people, goods and services by planning, constructing, and maintaining road, rail, air and public transit systems. The transportation

infrastructure should ensure mobility and accessibility for all segments of society while promoting socially desirable land use.

11 **Environmental engineering:** Environmental engineering aims to improve the environment and deals with constructing structures that have a low impact on the environment. Some of its applications include purifying the contaminated air and water, managing the waste, and protecting the marine environment.

12 **Other disciplines:** Some of the other disciplines included in civil engineering are coastal engineering, construction engineering, earthquake engineering, materials science, and surveying.

The role of civil engineers

13 Civil engineers can be involved in nearly every stage of a construction project, which includes site selection, writing specifications for processes and materials, reviewing bids from subcontractors, ensuring compliance with building codes, supervising all phases of construction from grading and earthmoving to painting and finishing, as well as the maintenance of the finished projects.

14 All civil engineers are required to be innovative and logical individuals. Other essential attributes civil engineers need include: creativity, versatility, a problem-solving mind, and the ability to understand the bigger picture and to collaborate with a number of other professionals.

The future of civil engineering

15 From the ancient simple mounds to the skyscrapers today, the world has witnessed immense advancement in the field of civil engineering. The future of civil engineering is expected to be further revolutionized by the new technologies including design software, GPS, GIS and other latest technical expertise in varied fields.

New words and expressions

sophisticated /səˈfɪstɪkeɪtɪd/ *adj.*
complicated and refined 精良的

mound /maʊnd/ *n.*
a structure consisting of an artificial heap usually of earth or stones 土（石）堆

antiquity /ænˈtɪkwətɪ/ *n.*
the state of being very old 年代久远

jaw-dropping /ˈdʒɔːˌdrɒpɪŋ/ *adj.*
extremely surprising 极度令人惊讶的

load-bearing /ˈləʊdˈbeərɪŋ/ *adj.* 承重的

slab /slæb/ *n.*
a thick flat piece of a hard material 厚板

beam /biːm/ *n.*
a long heavy piece of wood or metal used in building houses, bridges, etc. 梁

column /ˈkɒləm/ *n.*
a tall solid upright stone post used to support a building or as a decoration 柱

footing /ˈfʊtɪŋ/ *n.*
(usually plural) the solid base of bricks, stone, etc. that is under a building to support it and fasten it to the ground（一般用复数）地基；底脚

geotechnical /ˌdʒiːəʊˈteknɪkəl/ *adj.* 土地工程学的

geology /dʒɪˈɒlədʒɪ/ *n.*
a science that deals with rock, soil, etc. and the way they have changed since the Earth was formed 地质学

hydraulics /haɪˈdrɔːlɪks/ *n.* 水力学

breakwater /ˈbreɪkˌwɔːtə(r)/ *n.* 防波堤

waterway /ˈwɔːtəweɪ/ *n.*
a river or canal that boats travel on 水路；航道

hydrology /haɪˈdrɒlədʒɪ/ *n.* 水文学

transit /ˈtrænsɪt/ *n.*
the process of moving passengers or goods 运输

accessibility /əkˌsesəˈbɪlətɪ/ *n.*
the quality of being at hand when needed 可达性

segment /ˈsegmənt/ *n.*
one of several parts or pieces that fit with others to constitute a whole object 部分

specification /ˌspesɪfɪˈkeɪʃən/ *n.*
(usually plural) a detailed description of how something should be made（一般用复数）规格说明；明细规范

bid /bɪd/ *n.*
an offer to do work or provide services for a specific price 投标

compliance /kəmˈplaɪəns/ *n.*
action in accordance with certain accepted standards 遵守

grading /ˈgreɪdɪŋ/ *n.* 级配

attribute /əˈtrɪbjuːt/ *n.*
a quality regarded as a natural or typical part of sb. / sth. 特质

versatility /ˌvɜːsəˈtɪlətɪ/ *n.*
the state of having a wide variety of skills 多才多艺

expertise /ˌekspɜːˈtiːz/ *n.*
special skills or knowledge that you get from experience, training, or study 专门知识或技能

suspension bridge 悬索桥

flood defense 防洪设施

storm sewer 雨水道

building code 建筑规范

GIS (Geographic Information System) 地理信息系统

Reading comprehension

Fill in the blanks based on the information from Text A.

Civil engineering has a long history, and can be 1) _____ back to the ancient times when human beings lacked the 2) _____ equipment for construction. Civil engineering is not only about designing and constructing, but also about 3) _____ and 4) _____ the infrastructure. As a 5) _____ field of the engineering branches, civil engineering can be divided into various sub-disciplines: 6) _____ engineering is a civil engineering branch focusing on the framework of structures. 7) _____ engineering is a branch of civil engineering concerned with the engineering behavior of earth materials. And water resources engineering deals with the design and operation of systems to control and 8) _____ water. Civil engineers 9) _____ all phases of construction and the 10) _____ of the finished projects.

Language focus

1 **Match the English words with their Chinese equivalents in Column B and C. Compare the general and specialized meanings of the words, and then choose the appropriate words to complete the following sentences. Change the form if necessary.**

Column A	Column B	Column C
___ 1. process	A. 出价	a. 级配
___ 2. discipline	B. 专栏	b. 地基
___ 3. column	C. 过程	c. 投标
___ 4. beam	D. 光线	d. 荷载
___ 5. foundation	E. 基础	e. 工序
___ 6. bid	F. 纪律	f. 学科
___ 7. grading	G. 负担	g. 支柱
___ 8. load	H. 分级	h. 横梁

1. Without a construction _____ proposal, there would be no way to establish the overall cost of a project, which would throw the project and the contractor-client relationship into chaos.
2. The effort spent on careful _____, mixing and compaction of concrete will be largely wasted if the concrete is badly cured (养护).
3. Every construction _____ is unique and depends on the scope and complexity of the project.
4. Engineers in the _____ of water resources engineering are concerned with sustainable water resources management, systems of water supply and distribution, water quality, etc.
5. A _____ or pillar in architecture and structural engineering is a structural element that transmits, through compression, the weight of the structure above to other structural elements below.
6. There are different types of _____ for building construction and their uses depend on soil condition and loads from the structure.
7. The primary function of a bridge is to carry traffic _____: heavy trucks, cars, and trains.
8. The condition of this major supporting _____ put the top four floors of the building at risk.

2 Study the meaning of the underlined words in the following sentences and choose their synonyms from the words in brackets.

1. The history of civil engineering can be traced back to ancient times when the sole means of construction was human labor, lacking any sophisticated (prominent, advanced, significant, elegant) equipment.
2. Ancient civil engineering projects include the Roman public baths, the Mayan ruins (exhaust, remains, surplus, allowances) at Copan, Palenque and Tikal, and the cliff dwellings at Mesa Verde.
3. The names of the engineers who designed these wonders are lost in antiquity (exhibition, transportation, ancientness, exploration).
4. Nowadays, we often associate civil engineering with the world's most jaw-dropping (surprising, elegant, luxurious, glorious) structures.
5. Civil engineering is arguably the most diverse (prosperous, distinctive, diplomatic, varied) field of all the engineering branches.

6. The transportation infrastructure should ensure mobility and accessibility for all segments (parts, proportions, criteria, phases) of society while promoting socially desirable land use.
7. Other essential attributes (qualities, contributions, inspirations, talents) civil engineers need include: creativity, versatility, a problem-solving mind, and the ability to understand the bigger picture and to collaborate with a number of other professionals.
8. Environmental engineering is related to the science of waste management of all types: purification of water, cleaning of contaminated (congested, contagious, polluted, epidemic) areas, and reduction of pollution.

3 **Match the English expressions in the field of civil engineering listed in Column A with their definitions in Column B, and then translate the expressions into Chinese in Column C.**

Column A	Column B	Column C
___ 1. building code	A. a structure that bears a load resting upon it by transferring its weight to a foundation structure	_____
___ 2. earth moving	B. a professional discipline dealing with the designing, planning, constructing, and managing of facilities and infrastructures	_____
___ 3. construction project	C. a set of rules that specify the standards for constructing objects such as buildings and non-building structures	_____
___ 4. load-bearing structure	D. the process of excavating, transporting, or pushing earth	_____
___ 5. construction engineering	E. a bridge that has no supports under it, but is hung from strong steel ropes fixed to towers	_____
___ 6. suspension bridge	F. the project of constructing a building or infrastructure	_____

4 Translate the following paragraph into English.

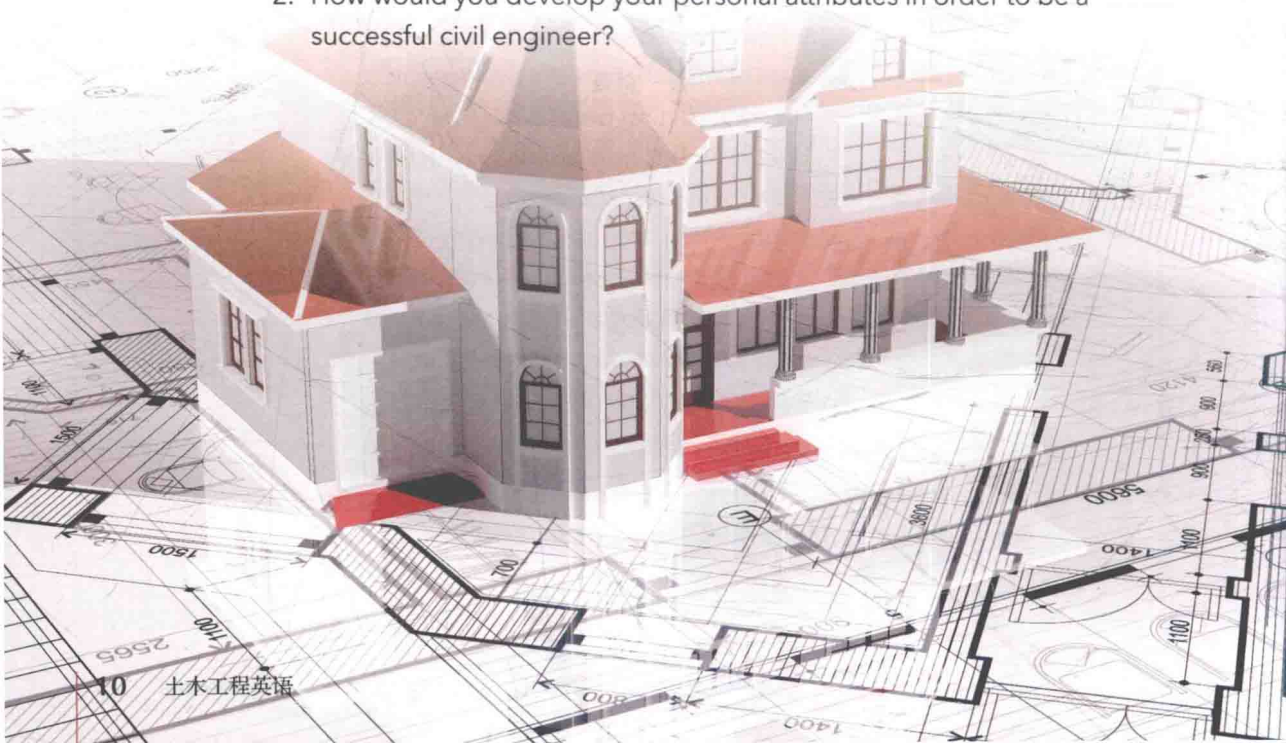
土木工程是工程学的一个分支，主要研究建筑物的设计和建造。根据工程的类型，土木工程被细分（subdivide）为许多技术专业。它们是结构工程、水资源工程、岩土工程、环境工程、运输工程等。每个专业都有特殊的用途。但是为了完成一项工程，必须把它们协调在一起。土木工程学科特别具有挑战性，这是由于工程师设计和建造的每一幢建筑物或每一个系统几乎都是独一无二的，一种结构几乎不可能与另一种结构完全相同。

Critical thinking

As is mentioned in Text A, civil engineers play different roles and shoulder many duties from the inception of a project right to its completion. Civil engineers are required to be knowledgeable, logical, creative and versatile. And they also need to have a problem-solving mind, and the ability to understand a big picture and to collaborate with a number of other professionals.

Discuss the following questions in groups:

1. Why do you think civil engineers should possess the above-mentioned attributes?
2. How would you develop your personal attributes in order to be a successful civil engineer?



Research task

Academic skill: Searching for information

Information can come from virtually anywhere – media, blogs, personal experiences, books, journal and magazine articles, expert opinions, encyclopedias, and web pages, etc.

1. Types of information

Type	Use
Magazine	• To find information or opinions about popular culture. • To find up-to-date information about current events. • To find non-scholarly articles about topics of interest within the subject of the magazine.
Academic journal	• To get help for your scholarly research. • To find out what has been studied on your topic. • To find bibliographies that point to other relevant research.
Database	• To find articles on specific topics. • To find online journals or news articles.
Newspaper	• To find editorials, commentaries, expert or popular opinions. • To find current local, national or world news.
Library catalog	• To find virtually any topic. • To find hard copies of current or back issue of journals, books, newspapers or magazines.
Website	• To find information from all levels of government – central to local. • To find expert or popular opinions. • To find information of various types of media, e.g. illustrations, audio and video information.

2. Searching for information

Author / Title search

Searching by author and / or title obviously assumes that you are searching for a particular author, book or article, probably in either a database or a library catalog. Here are some tips:

- When searching by author, put the author's last name first, e.g. "Kotler, Philip", not "Philip Kotler", if he is from an English-speaking country. Search the author's full name in Chinese order if he is a Chinese. Sometimes, the

author could be an organization, so give the full name of the organization as it commonly appears, e.g. "World Bank".

- When searching by title, it helps if you enter the title as precisely as possible.

Keyword search

It is basically a way of searching through subject or topic. Most library catalogs and databases will include an option to search by keyword as an alternative to author and title. The first step of keyword search is to decide the key word(s) or phrase(s). Normally, the word(s) or phrase(s) which can cover the topic you search can be selected as keyword(s). A good research topic usually contains two or three concepts. For example, you need to write a paper on "The Impact of Cognitive Styles on Design Students' Spatial Knowledge". We can break the topic into concepts, like "cognitive styles" and "spatial knowledge", which can be used as keywords. Then type them in a search bar in a database, EBSCOhost for instance. In a database, there are usually two ways of search, i.e. basic search and advanced search.

Basic search (see Fig. 1) generates a large number of sources for you to differentiate, which is an exhausting task. But advanced search (see Fig. 2), which provides more choices for further conditioning, can make the work lighter. There are many variables that can be chosen to refine the search. And you can define the relationship between the keywords by choosing "and", "or" or "not" based on the results you intend to obtain.

Fig. 1 Basic search

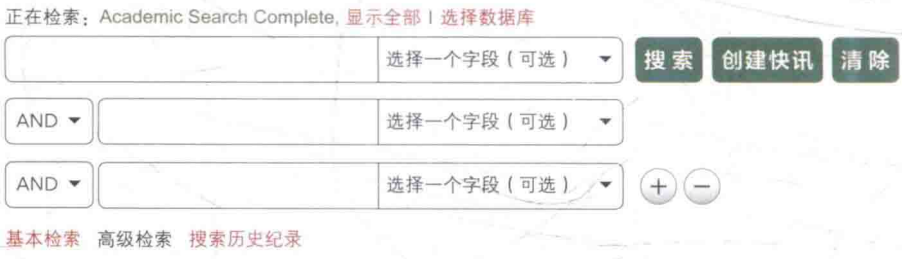


Fig. 2 Advanced search

As "cognitive styles" is a broader topic and "spatial knowledge" is more specific, they can be typed in the upper and middle search bars respectively. More relevant results will appear. You can then refine the search by selecting a specific variable. In