ENGLISH FOR SCIENCE AND TECHNOLOGY

# 21世纪科技英语

## （下册）

主编
谢 屏 桂清扬

高等教育出版社
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## 内 容 提 要

《21 世纪科技英语》是大学英语后续课程的系列教材之一，旨在帮助大学生完成从基础英语到专业英语的过渡，从而提高其在实际生活中的英语应用能力。《21 世纪科技英语》的选材以科普文章为主，内容涵盖理、工、医、农等基础类学科，同时紧扣当前科技发展的前沿成果和科研方向，是一套为理工科大学生设计的通用性强、使用面广的专业基础英语教材。本教材分上、下两册，可供一年使用。

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# 前言

国家教育部颁发的《大学英语教学大纲》对大学英语的后续课程——专业英语提出了明确的要求。《大纲》将专业英语规定为继大学英语四级之后的一门正式课程。大学英语四、六级阶段的教学主要侧重于传授语言基础知识与培养基本的语言技能，而能否使学生的语言知识转化成较强的专业应用能力，则在很大程度上取决于英语后继课程的教学是否成功。因此，提高学生的英语应用能力，已成为各高等院校共同面对的课题。

然而，在从普通英语向专业英语的过渡阶段，当前高校学生尤其是理工科大学生仍缺乏一套可以反映近年来世界科学信息的系统教材，我们特此编写《21 世纪科技英语》，旨在提供一种通用性强、便于理工科各专业使用的教材。

本书的选材以近年来发表的英文科普文章为主，有些直接由因特网上下载。我们注重趣味性、信息性、可思性和前瞻性，同时也注重语言的规范性和文体的多样性。语言富有科技英语的语言特色，含有丰富的通用与专业科技英语词汇和科技英语语法结构。语言地道、措辞简洁，难度略高于大学英语四级水平。内容广泛，涉及领域既包括了理、工、医、农等常用的基础类学科，又紧扣当前科技最新的技术成果和未来的科研方向，如生命科学、数字电路、基因工程、纳米技术等。使用对象为理工科高年级学生或广大科研人员。

全书共分上、下册，共有 20 个单元。每单元分 Text A 和 Text B。Text A 为精读，文章后面配有练习。我们编写时尽量使其形式新颖、实用，有利于达到提高专业英语应用能力之目的。Text B 为泛读，每篇文章均有详细注解，有助于同学们课外自习。此外，本书还摘录了一些有关科技工作者如何书写科技论文、口头进行科技报告的技巧与方法以及科技英语方面文体风格的短文，语言风趣、幽默。相信研修本教程的学员定有耳目一新的感觉。

在本教材编写过程中，周海英、刘剑、雷亮华、计颖等老师在材料的搜集及文字打印等方面做了不少工作，在此一并致谢！

由于时间紧迫，加之我们水平有限，书中错误在所难免，敬请读者不吝赐教。

编　者

2002 年秋

# Contents

# Unit 1

## Text A

### *Landmarks of Modern Science (1)*

*[Computer engineering, genetic engineering and nuclear engineering are recognized as great achievements in science and technology of the 20th century. They have dramatically changed, and will continue to influence the process of human civilization]*

**Computer Engineering**

**1** Computer Engineering involves the development and application of computer system, which performs tasks, such as mathematical calculations or electronic communication, under the control of a set of instructions called a program. Programs usually reside within the computer and are retrieved and processed by the computer's electronics, and the program results are stored or routed to output devices, such as video display monitors or printers. Computers are used to perform a wide variety of activities with reliability, accuracy, and speed.

**Development of Computer System**

**2** Computer systems have been classed into three generations. The first generation consisted of vacuum-tube-based machines. They used magnetic drums for internal storage and magnetic tapes for external storage. These computers were slow compared to modern machines and, owing to their bulk, and they required data to be brought to them. Second-generation computers using transistors began to ap-

pear in 1959. The internal storage used magnetic cores, with small doughnuts of magnetic material wired into frames that were stacked into large cores. This storage represented a tremendous increase in speed and reduction in bulk over previous storage methods. The external storage also added to increased speed and greater "on-line" capability as compared to magnetic tape systems. Beginning in 1964, a third generation of computers began to emerge. These computers utilized integrated circuits to increase capability and decrease size, while integrated technology also provided improved internal storage capability.

**Range of Computer Ability**

3 Computers exist in a wide range of sizes and power. The smallest are embedded within the circuitry of appliances, such as televisions and wrist watches. These computers are typically preprogrammed for a specific task, such as tuning to a particular television frequency or keeping accurate time.

4 Programmable computers vary enormously in their computational power, speed, memory, and physical size. The smallest of these computers can be held in one hand are PDAs[①]. They are used as notepads, scheduling systems, and address books. If equipped with a cellular phone, they can connect to worldwide computer networks to exchange information regardless of location.

5 Laptop computers and PCs are typically used in businesses and laptop at home to communicate on computer networks, for word processing, to track finances, and to play games. They have large amounts of internal memory to store hundreds of programs and documents. They are equipped with a keyboard; a mouse, trackball, or other pointing device; and a video display monitor or LCD[②] to display information. Laptop computers usually have similar hardware and software as PCs, but they are more compact and have flat, lightweight LCDs instead of video display monitors.

6 Workstations are similar to personal computers but have greater memory and more extensive mathematical abilities, and they are connected to other workstations or personal computers to exchange

data. They are typically found in scientific, industrial, and business environments that require high levels of computational abilities.

7 Mainframe computers have more memory, speed, and capabilities than workstations and are usually shared by multiple users through a series of interconnected computers. They control businesses and industrial facilities and are used for scientific research. The most powerful mainframe computers, called supercomputers, process complex and time-consuming calculations, such as those used to create weather predictions. They are used by the largest businesses, scientific institutions, and the military. Some supercomputers have many sets of CPUs③. These computers break a task into small pieces, and each CPU processes a portion of the task to increase overall speed and efficiency. Such computers are called parallel processors.

**Future Development**

8 With their increasing power and versatility, computers simplify day-to-day life. Unfortunately, as computer use becomes more widespread, so do the opportunities for misuse. Computer hackers—people who illegally gain access to computer systems—often violate privacy and can tamper with or destroy records. Programs called viruses or worms can replicate and spread from computer to computer, erasing information or causing computer malfunctions. Other individuals have used computers to electronically embezzle funds and alter credit histories. New ethical issues also have arisen, such as how to regulate material on the Internet and the'World Wide Web④. Individuals, companies, and governments are working to solve these problems by developing better computer security and enacting regulatory legislation.

9 Computers will become more advanced and they will also become easier to use. Reliable speech recognition will make the operation of a computer easier. Virtual reality, the technology of interacting with a computer using all of the human senses, will also contribute to better human and computer interfaces. Standards for virtual-reality program languages, called Virtual Reality Modeling

Language (VRML), currently are being developed for the World Wide Web.

**10** Communications between computer users and networks will benefit from new technologies such as broadband communication systems that can carry significantly more data and carry it faster, to and from the vast interconnected databases that continue to grow in number and type.

**Genetic Engineering**

**11** Genetic Engineering is the alteration of an organism's genetic, or hereditary, material to eliminate undesirable characteristics or to produce desirable new ones. Genetic engineering is used to increase plant and animal food production; to diagnose disease, improve medical treatment, and produce vaccines and other useful drugs; and to help dispose of industrial wastes. Included in genetic engineering techniques are the selective breeding of plants and animals, hybridization (reproduction between different strains or species), and recombinant DNA.⑤

**Selective Breeding and Hybridim**

**12** Selective breeding and hybridization are genetic engineering techniques that have been used for thousands of years. Selective breeding of plants and animals is used for increased food production. Examples are the selection of corn for increased kernel size and number and the selection of cattle and pigs for milk and meat yields. Hybridization involves crossing different strains or species in an effort to combine the most desirable characteristics of both, as in the crossing of horses and donkeys to produce mules.

**Recombinant DNA**

**13** A new technique known as recombinant deoxyribonucleic acid (DNA), or gene splicing, allows scientists to alter an organism's genes directly by joining its DNA to the DNA of a second organism. When introduced into another organism, the resultant recombinant DNA permanently changes the genetic makeup of that organism and

alters the proteins that its cells produce. The change is passed on to descendants of the genetically altered organism.

**14** Recombinant DNA technique usually involves recombining the donor's desirable genes with DNA from a vector (an organism that can carry the donor DNA into the host). A typical host is a harmless bacterium, which, by reproducing, multiplies the recombinant DNA and produces large quantities of the desired protein. Naked DNA can sometimes be introduced directly into an organism by injection into reproductive cells. Plants and animals containing recombinant DNA are called transgenic organisms.

**15** Recombinant DNA has been used to give crops immunity to plant viruses, to make them resistant to frost, and to cause a delay in fruit ripening so spoilage can be slowed. In fish, pith hormone of trout has been genetically transferred to carp to make the carp larger. Recombinant DNA is used to produce bovine somatotropin, and genetically altered bacteria can be used to decompose garbage or petroleum products.

**16** Gene cloning ranks as one of the most significant accomplishments involving recombinant DNA. This procedure has enable researchers to produce virtually limitless copies of donor genes from other organisms, including human beings. To perform gene cloning, researchers first use a class of bacterial enzymes called restriction endonucleases to remove from the donor cell a fragment of double-stranded DNA that contains the genes of interest. Restriction endonucleases can be thought of as "biological scissors".

## Controversies

**17** Critics of recombinant DNA fear the accidental production of harmful disease organisms, the incorporation of allergens in food, and the displacement of natural plant populations with transgenic species. Regulations have established to restrict recombinant DNA research. Questions remain as to the morality of producing transgenic organisms, the appropriateness of patenting organisms, and the effectiveness of gene therapy.

(1,500 words)

## New Words and Expressions

| | | |
|---|---|---|
| doughnut ['dəʊnʌt] | *n.* | 线圈 |
| stack [stæk] | *vt.* | 堆砌,堆积 |
| embed [ɪm'bed] | *v.* | 嵌入 |
| malfunction ['mælfʌnkfən] | *n.* | 失灵 |
| embezzle [ɪm'bezl] | *vt.* | 盗用 |
| regulatory ['regjʊlətərɪ] | *a.* | 管理的 |
| virtual ['vɜːtjʊəl] | *a.* | 虚拟的 |
| diagnose ['daɪəgnəʊz] | *v.* | 诊断 |
| hybridization ['haɪbrɪdaɪ'zeɪʃən] | *n.* | 杂交 |
| stain [steɪn] | *n.* | 种系,族系 |
| kernel ['kɜːnəl] | *n.* | 谷物粒 |
| donor ['dəʊnə] | *n.* | 捐献者 |
| vector ['vektə] | *n.* | 媒介者 |
| transgenic [træns'dʒenɪk] | *a.* | 转基因的 |
| ripen ['raɪpən] | *v.* | (使)成熟 |
| spoilage ['spɒɪlɪdʒ] | *n.* | 损坏,腐败 |
| trout [traʊt] | *n.* | 鳟鱼 |
| carp [kɑːp] | *n.* | 鲤鱼 |
| bovine ['bəʊvaɪn] | *a.* | 似牛的 |
| cloning ['kləʊnɪŋ] | *n.* | 克隆 |
| enzyme ['enzaɪm] | *n.* | 酶 |
| endonuclease [endə'njuːklɪːs] | *n.* | 内切核酸酶 |
| cleave [kliːv] | *vt.* | 分开,使裂开 |
| nucleotide ['njuːklɪətaɪd] | *n.* | 核苷酸 |
| allergen ['ælədʒən] | *n.* | 应变原 |
| therapy ['θerəpɪ] | *n.* | 疗法 |
| encompass [ɪn'kʌmpəs] | *vt.* | 包括 |

## Notes

1. PDAs 是 personal digital assistants 的缩写,意为"个人数码助手"。
2. LCD 是 liquid crystal display 的缩写,意为"液晶显示器"。

3. CPUs是central processing units的缩写，意为“中央处理器”。
4. World Wide Web 万维网
5. DNA是deoxyribonucleic acid的缩写，意为“脱氧核糖核酸”。

## Exercises

### I. Building Up Your Word Power.

#### Section 1 Testing Your Use of Words

Directions: In this section there are 10 phrases, each of which paraphrases a word you have learned in the text of this lesson. Read each of them and then write the word it represents on the line provided.

1. very small living things, some of which may cause disease: _____
2. pass on from parent to child, from one generation to the following generations: _____
3. the amount that is produced: _____
4. the treatment of illnesses: _____
5. a fault in operation: _____
6. most powerful, noticeable, or important: _____
7. the largest and most powerful type of computer: _____
8. to steal: _____
9. able to be carried out or done: _____
10. a place where things are stored: _____

#### Section 2 Using the Words or Phrases in a Context

Directions: In this section there are 10 sentences, and in each of them one word or phrase is missing. Fill the blanks with words or phrases, preferably those that appear in the text of this lesson, according to the Chinese prompt given. You should use the right form of the word or the phrase in the context of each sentence.

1. He _____ a lot of pleasure _____ (从……得到) meeting new people.
2. This advertising campaign has _____ significantly _____ (对……作贡献) the success of the new car.
3. Let us now _____ (转到) the next subject.
4. In our daily life, we must keep out expenditure _____ (与……保持平衡)

our income

5 He gradually _____ (积累) an impressive collection of paintings

6 Nuclear wastes must _____ (处理) in a safe way

7 His document has been _____ (篡改)

8 The whole process of disarmament was well _____ (在……控制下) the United Nations Security Council

9 The argument on the small details _____ (耗掉) a lot of time of the conference

10 This result can _____ (列为) one of their most successful election performances of the last ten years

## II. How Much Do You Understand?

### Section 1 Short-answer Questions

Directions: Provide short answers to the following 5 questions based on your understanding of the text in this lesson Your answers can be given in the form of simple sentences or short phrases

1 What's the main feature of the development of computers?

2 What examples are given for the genetic engineering techniques such as selective breeding and hybridization?

3 Which type of nuclear reactor has a promising prospect in future nuclear power plant? And why?

4 How are nuclear wastes classified? How should they be handled?

5 There is an opinion that the advanced science and technology might bring about disaster beyond imagination Do you agree with it? Please give your reasons

### Section 2 Reading Comprehension

Directions: In this section there are 10 questions based on Text A and Text B Each question is followed by four choices marked A, B, C, or D Choose the ONE that best answers the question according to what you've read in the text

1 According to the text, the computer systems have been classified into three generations in terms of _____

A its speed, capability and size

B its bulkiness, technology and storage

C its function, size and circuits

D its technology, disk and bulkiness

2. It can be inferred from the text that _____
   A. internal storage
   B. transistors
   C. integrated circuits
   D. magnetic tape
3. Supercomputer is a kind of _____
   A. workstation
   B. laptop computer
   C. mainframe computer
   D. PC
4. Which of the following statements is about the application of in the text?
   A. Improvement of medical treatment
   B. Curing of various cancers.
   C. Increase of food production
   D. Disposal of industrial wastes
5. The predominant development in nuclear industry has been in _____
   A. the production of radioisotopes
   B. the development of naval-propulsion reactors
   C. the development of nuclear power plant
   D. the application of radioisotopes in medicine and industry
6. According to the text, regulations have been established to restrict _____.
   A. the research of recombinant DNA
   B. the development of nuclear power plant
   C. the material on the Internet and WWW
   D. the development of nuclear weapons
7. Which of the following statements about recombinant DNA is true?
   A. It is the combination of selective breeding and hybridization
   B. It is more traditional and less advanced than gene cloning
   C. Gene splicing is different hum recombinant DNA
   D. All transgenic organisms contain recombinant DNA
8. Which of the following is associated with a fusion reaction?
   A. LWR. B Atomic bomb
   C. Hychogen bomb. D. LMFBR
9. Which of the following is excluded from nuclear engineering?

A. The production of hydmgen bombs.
B. The disposal of radioactive waste.
C. The production of radioisotopes.
D. The disarmament of nuclear weapons.

10. Which of the following statement is NOT true?
A. Advanced technology will make future computers harder to operate.
B. Genetically-altered organism can pass the change to its descendants.
C. Nuclear power plants can meet our electric energy need for centuries.
D. The effectiveness of gene therapy remains questionable.

## III. Getting It Across to the Other Language.

### Section 1 From English into Chinese

Directions: In this section there is an article in which five sentences are underlined. First read the article and then translate the underlined sentences into Chinese. You can use a dictionary to help you if necessary.

### The 20th Century Revolution

Words to study

| | | | | | |
|---|---|---|---|---|---|
| verge | 边界 | amelioration | 改良 | savant | 专家 |
| decimal | 十进位的 | hypothetical | 假设的 | stubbornly | 顽固地 |
| elude | 躲避 | crumble | 消失 | thermodynamics | 热力学 |
| enunciation | 发表 | assimilate | 吸收 | suffice | 足够 |
| probe | 试探 | dimly | 模糊的 | hitherto | 迄今 |
| intervention | 干涉 | subatomic | 亚原子的 | | |

1. ① By the end of the 19th century, the dream of the mastery of nature for the benefit of mankind, first expressed in all its richness by Sir Francis Bacon, seemed on the verge of realization. Science was moving ahead on all fonts, reducing ignorance and producing new tools for the amelioration of the human condition. A comprehensible, rational view of the world was gradually emerging from laboratories and universities. ② One savant went so far as to express pity for those who would follow him and his colleagues, for they, he thought, would have nothing more to do than to measure things to the next decimal place.
2. But this sunny confidence did not last long. One annoying problem was that the radiation emitted by atoms proved increasingly difficult to reduce to

known mechanical principles. More importantly, physics found itself relying more and more upon the hypothetical properties of a substance, the ether, that stubbornly eluded detection. Within a span of 10 short years, 1895 - 1905, these and related problems came to a head and wrecked the mechanistic system the 19th century had so laboriously built. The discovery of X rays and radioactivity revealed an un-expected new complexity in the structure of atoms. Max Planck's solution to the problem of thermal radiation introduced a discontinuity into the concept of energy that was inexplicable in terms of classical thermodynamics. ③ Most disturbing of all, the enunciation of the special theory of relativity by Albert Einstein in 1905 not only destroyed the ether and all the physics that depended on it but also redefined physics as the study of relations between observers and events, rather than of the events themselves. What was observed, and therefore what happened, was now said to be a function of the observer's location and motion relative to other events. Absolute space was a fiction. The very foundations of physics threatened to crumble.

3. This modern revolution in physics has not yet been fully assimilated by historians of science. ④ Suffice it to say that scientists managed to come to terms with all of the upsetting results of early 20th-century physics but in ways that made the new physics utterly different from the old. Mechanical models were no longer acceptable, because there were processes (like light) for which no consistent model could be constructed. No longer could physicists speak with confidence of physical reality, but only of the probability of making certain measurements.
4. There is still no doubt that science in the 20th century has worked wonders. new physics—relativity, quantum mechanics, particle physics—may outrage common sense, but it enables physicists to probe to the very limits of physical reality. Their instruments and mathematics permit modern scientists to manipulate subatomic particles with relative ease, to reconstruct the first moment of creation, and to glimpse dimly the grand structure and ultimate fate of the universe.
5. ⑤ The revolution in physics has spilled over into chemistry and biology and led to hitherto undreamed of capabilities for the manipulation of atoms and molecules and of cells and their genetic structures. Chemists perform molecular tailoring today as a matter of course, cutting and shaping molecules