信息与计算科学专业英语

English for Information and Computation Science

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副主编　尹水仿　邢远秀

科学出版社

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内 容 简 介

本书是按照教育部对信息与计算科学专业的主要课程设置，综合对专业英语的要求而编写的.整本书都定位于学术与语言之间，其内容基本覆盖了数学、计算机软件、算法、信息处理等学科知识.每一个主题包括游历或闲谈式的主要知识介绍、相关学术前沿略览以及相应的 Matlab 软件操作实例，并配备与之相关的习题及谚语.全书内容严谨、新颖，风格活泼.阅读本书，既可梳理和丰富专业知识，又可提高科技英语交流水平.

本书可作为信息与计算科学专业本科生的专业英语教材，也可作为相关专业的学生、教师、科技工作者和工程技术人员的科技英语参考书.

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前　言

进入21世纪以来，WTO的痕迹已经逐步渗透到各个学科领域，各专业的国际化交流成为大势所趋.英语作为国际化交流语言的地位已是不可争议的事实，因此科技英语知识储备对于高科技人才必不可少.

科技英语不同于通用英语.通用英语用于一般用途，比如预订车票，与朋友的谈话，阅读报纸和杂志，享受英语电视节目等.而科技英语则侧重于科学研究和技术交流.

专业英语是一种科技英语.此外，专业英语的主题是与一个特定的专业相关的，例如，计算机科学、化学工程或护理.掌握科技英语有助于读者阅读相关英文学术著作和文献，出席国际学术研讨会或会议，等等.所以，科技英语中会包含更特殊的表现形式和专业术语.

信息与计算科学专业是教育部1998年颁布的新专业目录中的一个新的数学类专业，自1999年来，全国已有500多所高等院校注册开办该专业.信息与计算科学专业作为一个数学与计算机和信息学科的交叉学科，其专业英语的知识储备对个人发展和国家科技进步大有裨益.然而至今没有一本公开出版的针对信息与计算科学专业的专业英语教材.编者自2002年2月开始连续10次主讲信息与计算科学系的专业英语课程，并于2009年9月在总结自己的一线教学经验的基础上编写了信息与计算科学专业英语讲义，且连续3年在教学实践中使用该讲义.本书正是在此讲义的基础上整理扩充而成的，由龚谊承主编，尹水仿和邢远秀任副主编.

本书作为信息与计算科学专业英语教材，将提供数学、信息以及计算等相关领域的英文素材.这样做的目的是以英语为交流工具来揭示信息与计算科学专业的学术背景.因此书中的英语涉及数学、信息与计算等专业知识的基本概念、背景信息和理论等.由于每篇课文都围绕一个主题，且是相对独立的，所以不论读者选择什么顺序来阅读本书都可以理解之.但由于知识之间的关联性，编者建议读者在条件允许的情况下按教材编写顺序来阅读本书.尽管此书的稿件经过了多次的修改和校对，但由于编者学识和水平有限，疏漏和不妥之处在所难免，诚望广大读者批评指正.

编者感谢使用专业英语讲义的三届学生提出的建设性建议，并特别感谢武汉科技大学外国语学院的邹丽老师在百忙之中仔细审阅了本书的部分稿件，感谢她为本书的定位、语言表达及习题设计方案提出的宝贵意见和建议. 最后，感谢科学出版社的各位编辑对本书提供的友好帮助.

本书的一些素材来源于网络或文献，编者在此致以诚挚的谢意并在书后尽力予以了标注. 如果有个别文献被疏漏以致没有标注，编者在此对这些文献和作者致以深深的歉意和诚挚的谢意.

编　　者

2011 年 9 月于黄家湖畔

Preface

Since the advent of 21st century, the influence of WTO has been permeated into all subjects, and international academic communications in each major have become the trend. On the other hand, it has been beyond doubt that English is an international language of communication. Therefore the knowledge of Specialty English contributes to the further development for high-tech talents.

English for Science and Technology (EST) differs from English for General Purpose (EGP), or General English (GE). The latter is the English used for general purposes, such as booking a ticket, having small talks with friends, reading newspapers and magazines, enjoying English TV programs etc. On the other hand, EST focuses on the science research and technology communication.

Specialty English (SE) is a kind of EST. Furthermore, the topics of Specialty English are related to a specific major, for instance, computer science, chemical engineering or nursing. A good command of EST makes possible the following activities, reading academic works and documents, attending international academic seminars or meetings, and so on. So there will be more special expressions and terminologies in EST.

Information and computation science is a new specialty which is set up by the Chinese educational department in 1998. It is an interdisciplinary science which is a mutual penetration of information science, computation science, operation research and control theory. Since 1999, there have been more than 500 Chinese universities or colleges which successively open the major. Therefore English for Information and Computation Science is helpful for both personal development and progress of national science and technology. However, there has been no any such book published so far. Since February of 2002, the editors have consecutively lectured the course for 10 times in the department of Information and Computational Science. Based on the teaching experience, in 2009 September, Gong Yicheng prepared a teaching handout which has been in the teaching practice for 3 years. Associated by Professor Yin Shuifang and Xing Yuanxiu, this book is chiefly prepared by Gong Yicheng

based on the handout.

In the case of this book, Specialty English for Information and Computation Science will provide English in the field of mathematics, information, computation, and the correlative fields as well. This means to expose the Information and Computation majors to an academic context with the English language as the communication tool. It involves such subject matters as English for the basic concepts, background information and theories in mathematics, information and computation.

Each text focused on one topic and is self-closed, so the reader can understand it no matter which lesson he chooses to read at first. But it is encouraged to read the book lesson by lesson, because of the relevance of the knowledge.

Although the manuscript has been revised and proofread for several times, improper place is hardly to be avoided due to the editor's limited knowledge and level. Readers are welcome to give us strict criticism and constructive suggestions.

Acknowledgement

We should like to record our specific thanks to the following: Professor Zou Li who carefully examined many parts of the manuscript and offered precious opinions and proposals on the book's orientation and exercise designs, even though she was pretty busy; the students who use the handout and put forward constructive suggestions. Last but not the least, we wish to express our appreciation of the helpfulness of the staff at Science Press during the production of this book.

Some materials of the book originated in the network or literatures, we wish to express our sincere gratitude to them here and we have tried to mark them at the end of the book. If we have failed to reference some individual documents, here we express our sincere apologies and thanks to the literature and authors.

Editors

September, 2011

In Huangjiahu University City

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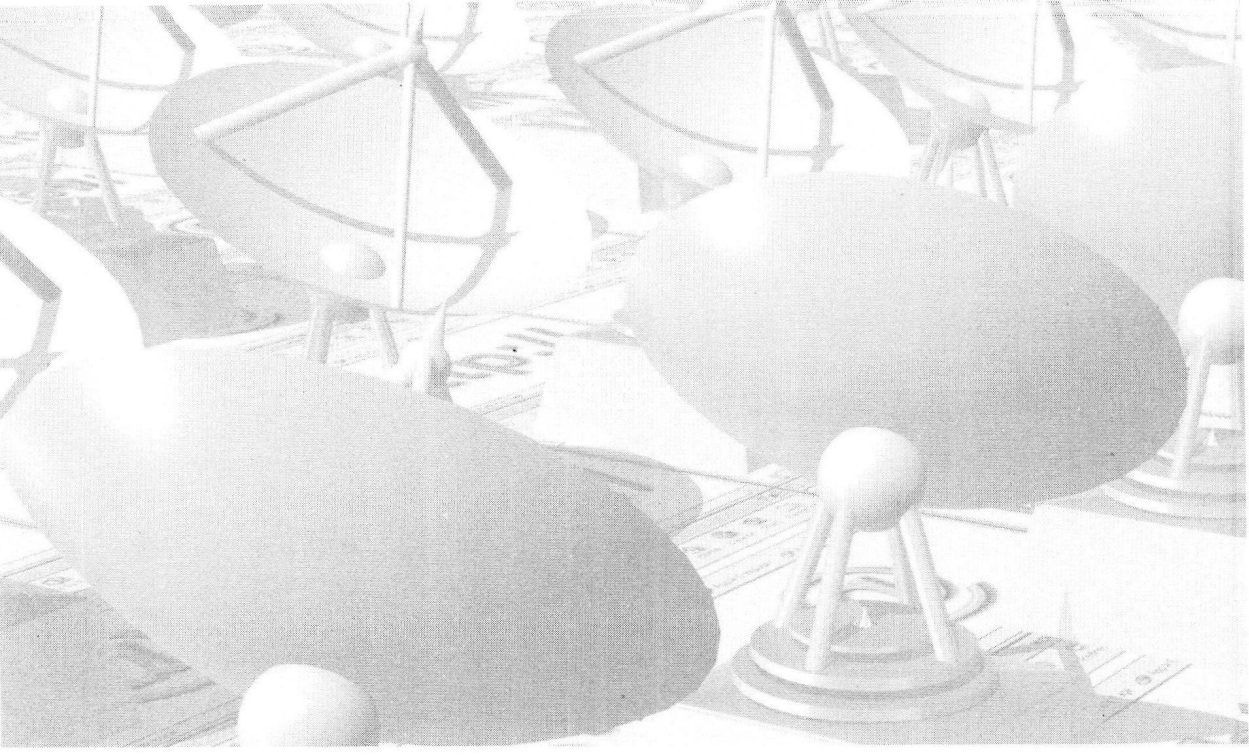
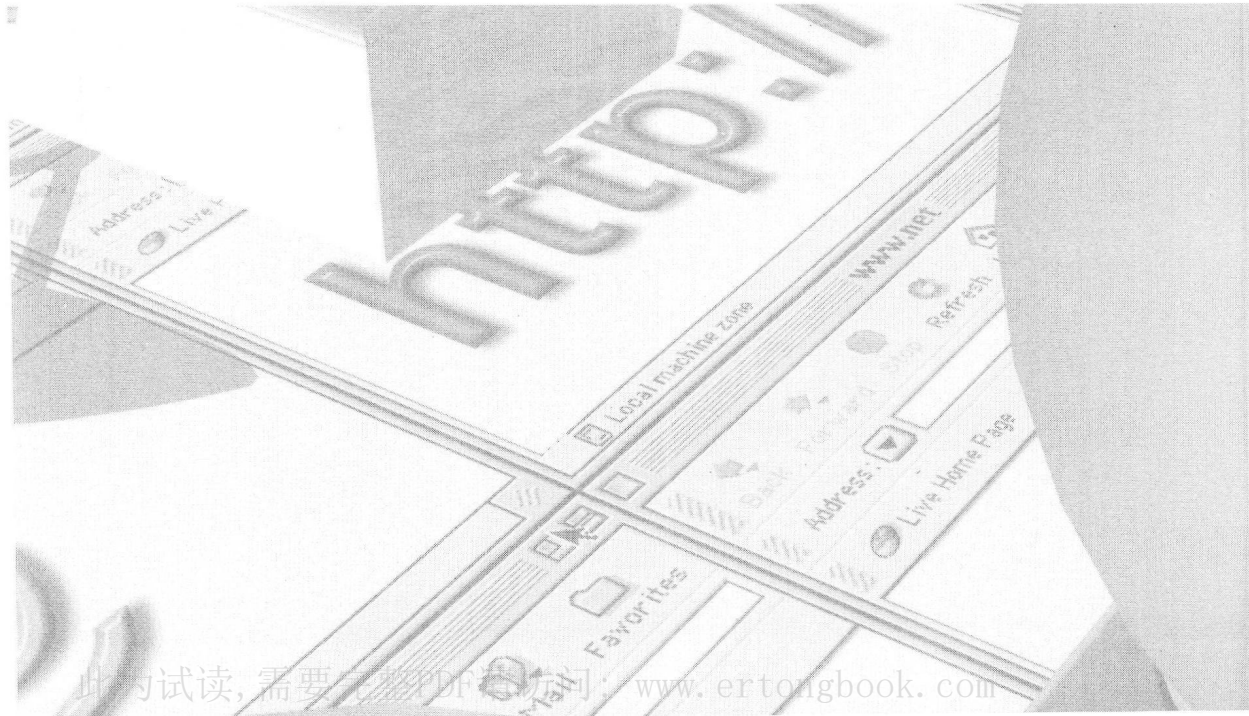


Chapter 1
Preparation



Lesson 1 Some Elementary Expressions

As the saying goes: "it is only when you are using what you have learned from books that you wish you had read more books than you have." When you are reading academic works and documents, or attending international academic seminars, you will frequently encounter to express some terminology. And some commonly used elementary expressions are our topic here.

1.1 Four Fundamental Operations

Addition. The expression "$a + b$" can be read "a plus b". Here "a" is the summand and "b" the addend.

Subtraction. The expression "$a - b$" can be read "a minus b". Here "a" is the minuend and "b" the subtrahend.

Multiplication. The expression "$a \times b$" can be read "a times b". Here "a" is the multiplicand and "b" the multiplier.

Division. The expression "$a \div b$" can be read "a divided by b" or "a over b". Here "a" is the dividend and "b" the divisor.

The results of addition, subtraction, multiplication and division are the sum, the difference, the product and the quotient respectively.

1.2 Signs of Equality and Inequality

"$a = b$" can be read "a is equal to b" or "a equals b".

"$a \equiv b$" can be read "a is identically equal to b" or "a identically equals b".

"$a \approx b$" can be read "a is approximately equal to b" or "a approximately equals b".

"$a \neq b$" can be read "a is not equal to b" or "a doesn't equals to b".

"$a > b$" can be read "a is greater (larger) than b".

"$a < b$" can be read "a is smaller (less) than b".

"$a \geqslant b$" can be read "a is greater than or equal to b".

For example, the expression "$a + b = c$" can be read "a plus b equals (is, is

equal to) c"; the expression "$(a+b-c\times d)\div e=f$" can be read "a plus b minus the production of c times d, all over e equals f". The expression "$2<7/3$"can be read "2 is less than 7 divided by 3".

1.3 Ratio and Proportion

"$a:b$" can be read "the ratio of a to b". When two ratios are equal, e.g., "$a:b=c:d$", we say that a, b, c, d are in proportion.

The expression "$a:b=c:d$" can be read "the ratio of a to b is equal to the ratio of c to d".

1.4 Fractions and Decimals

Proper fractions can be expressed as the following:

$\frac{1}{2}$ can be read "one half"or "a half" or "one over two";

$\frac{1}{3}$ can be read "one third"or "a third" or "one over three";

$\frac{1}{4}$ can be read "one fourth"or "a quarter" or "one over four";

$\frac{2}{3}$ can be read "two thirds"or "two over three";

$\frac{4}{5}$ can be read "four fifths" or "four over five".

Improper fractions can be expressed as the following:

$\frac{13}{8}$ can be read "thirteen over eight".

Mixed fractions can be expressed as the following:

$2\frac{3}{5}$ can be read "two and three fifths";

$3\frac{1}{2}$ can be read "three and one half".

Decimals can be expressed as the following:

0.1 can be read "zero point one" or "nought point one" or "point one";

0.01 can be read "zero point zero one" or "nought point nought one" or "point zero one";

1.36 can be read "one point three six";

21.94 can be read "twenty-one point nine four";

1.583333 ··· can be read "one point five eight three recurring";

$4.25\dot{7}\dot{6}$ can be read "four point two five seven six, seven six recurring".

1.5 Involution and Evolution

"a^2" can be read "a squared" or "the square of a" or "a (raised) to the second power";

"a^3" can be read "a cubed" or "the cube of a" or "a (raised) to the third power";

"a^n" can be read "a (raised) to the n-th power", here "a" is the base and "n" the index or power or exponent.

"$\sqrt{a}$" can be read "the square root of a";

"$\sqrt[3]{a}$" can be read "the cube root of a";

"$\sqrt[n]{a}$" can be read "the n-th root of a". Here the symbol "$\sqrt[n]{\ }$" is the radical sign, and the expression under the radical sign is the radicand.

For example, the expression "$2\cos^2 x - \cos(2x) \equiv 1$" can be read "2 times the square of cosine of x, all subtracted by the cosine of 2 times x is identically equal to 1".

1.6 Elementary Fundamental Functions

A random power function and exponential function can respectively be read as the following:

"x^μ" can be read "the μth power of x" or "x raised to the μth power";

"a^x" can be read "the exponential function to the base a of x".

There are three typical logarithm functions. Respectively they can be read as the following:

"$\log_a x$" can be read "the logarithm of x to the base a" or "the logarithm to the base a of x";

"$\log\ x$" can be read "the (common) logarithm of x" or "the logarithm of x to the base ten";

"$\ln\ x$" can be read "the nature logarithm of x" or "the logarithm of x to the base e".

There are 6 types of trigonometric functions. Respectively they can be read as the following:

"$\sin x$" can be read "sine of x";

"$\cos x$" can be read "cosine of x";

"$\tan x$" can be read "tangent of x";

"$\cot x$" can be read "cotangent of x";

"$\sec x$" can be read "secant of x";

"$\csc x$" can be read "cosecant of x".

There are 6 types of inverse trigonometric functions. Respectively they can be read in the following way:

"$\arcsin x$" can be read "arc sine of x";

"$\arccos x$" can be read "arc cosine of x";

"$\arctan x$" can be read "arc tangent of x";

"$\operatorname{arccot} x$" can be read "arc cotangent of x";

"$\operatorname{arcsec} x$" can be read "arc secant of x";

"$\operatorname{arccsc} x$" can be read "arc cosecant of x".

For example, the expression "$\arcsin x+\arccos x\equiv\frac{\pi}{2}$" can be read "the sum of arc sine of x and arc cosine of x identically equals π over 2".

1.7 Limit, Differentiation and Integration

"$\lim f(x)$" can be read "the limit of f of x";

"$\lim\limits_{x\to a}f(x)$" can be read "the limit of f of x as x tends to a" or "the limit of f of x as x approaches a";

"$\lim\limits_{x\to a^+}f(x)$" can be read "the limit of f of x as x tends to a from the right hand" or "the limit of f of x as x approaches a from the right hand";

"$\lim\limits_{x\to a^-}f(x)$" can be read "the limit of f of x as x tends to a from the left hand" or "the limit of f of x as x approaches a from the left hand";

"$\frac{dy}{dx}$" can be read "dy by dx" or "the first derivative of y with respect to x". This notation is introduced by the famous mathematician Leibniz (1646～1716);

"$\left.\frac{dy}{dx}\right|_{x=a}$" can be read "the value at a of dy by dx" or "the value at a of the derivative of y with respect to x";

"$\frac{d^2y}{dx^2}$" can be read "d second y by dx second" or "the second derivative of y

with respect to x";

"$f'(x)$" can be read "f prime of x" ,or "derivative of the function f with respect to x". This notation is introduced by the famous mathematician Lagrange (1936～1813);

"$f''(x)$" can be read "f double prime of x";

"$f^{(n)}(x)$ and $\frac{\mathrm{d}^n f}{\mathrm{d}x^n}$" can both be read as "the nth derivative of the function f with respect to x";

"$\frac{\partial f}{\partial x}$" can be read "partial derivative of the function f with respect to x" , where f is a function of x and another variable (variables);

"Δf" can be read "difference of the function f with respect to x";

"$\int f(x)\mathrm{d}x$" can be read "an indefinite integral of f" or "the set of indefinite integrals of f";

"$\int_a^b f(x)\mathrm{d}x$" can be read "the definite integral of the function f of x , $\mathrm{d}x$ from a to b".

1.8 Set Notation

"$a \in A$" can be read "the element a belongs to the set A" or "a is an element of A";

"$A \subseteq B$" can be read "A is a subset of B";

"$A \subset B$" can be read "A is a proper subset of B";

"$A \cup B$" can be read "A unites B", or "the union of A and B";

"$A \cap B$" can be read "A intersects B", or "the intersection of A and B";

"$\varnothing$" can be read "the empty set". This is a set which is devoid of any members;

"$\overline{A}$" can be read "the complement of A". This denotes a set of those elements which are not in the set A relative to a universal set I .

1.9 Some other Symbols

a_1 can be read "a sub one";

a_n can be read "a sub n";

a' can be read "a prime";