

21 世纪农业科学专业英语

# 食品科学与工程英语

English Course for Food Science and Engineering

张兰威 李佳新 主 编  
李铁晶 马 丹 副主编

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## 内 容 简 介

本书是为高等院校食品科学与工程专业编写的专业英语教材。共分 18 个单元,内容包括食品营养、三大能量物质(蛋白质、脂肪、碳水化合物)的化学、食品工业涉及的主要操作、食品微生物、常见食品及加工,内容丰富,使用者可根据实际情况选取。

为了便于学习,每个单元分为精读与泛读两部分。精读部分给出了中文翻译、练习题,并附有参考答案。泛读部分与精读内容相对应,作为加深对精读的理解和补充,该部分仅给出了关键句子的解释。

本书可供大专院校食品科学与工程专业做英语教材,也可作为食品卫生等科技工作者学习专业英语的参考书。

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## 总 序

国家教育部 1999 年 9 月颁发的现行《大学英语教学大纲(修订本)》(以下简称《大纲》)规定:大学英语教学分为基础阶段(大学一、二年级)和应用提高阶段(大学三、四年级)。基础阶段的教学分为六级,或称大学英语一至六级(College English Bands 1 - 6,简称 CEB1 - 6)。应用提高阶段的教学要求包括专业英语(Subject - Based English,简称 SBE)和高级英语(Advanced English,简称 AE)两部分。学生在完成基础阶段的学习任务即达到四级或六级后,都必须修读专业英语。已达到六级要求且学有余力的学生,除修读专业英语外,还可以选修高级英语课程。《大纲》不仅对专业英语的重要性,而且对专业英语的词汇和读、听、说、写、译的能力都做了明确说明。

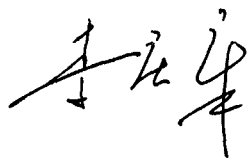
按照《大纲》要求,本套教材在选材时,既注重专业英语的文体特征,又避免使用科普文章。本书教材的 75%左右为专业基础内容,25%左右为专业前沿文献,一般从专业英语期刊中选取。主要因为学生在两年基础阶段的学习后,虽然专业基础知识已经建立,但对专业前沿内容尚知之不多。选取期刊上的内容,目的在于让学生深入了解专业英语文体特征和专业文献阅读方法,用英语来学习专业知识,同时也是向双语教学的过渡。

专业英语与公共英语中的日常英语和文学英语并无本质区别,只是文体(genre)不同。专业英语并无独立的语言系统,虽然专业英语中有大量的专业名词和术语,但是它的基本词汇都来自公共英语。除此之外,专业英语的语法有其自身特性和语法现象,但语法结构都仍遵循公共英语的一般规则,并无自己的独立语法。由此可见,公共英语是专业英语的基础,二者相互关联而具有显著

的共通性。在编写这套教材时,我们采用专业教师和英语教师结合。专业教师负责文献取材,英语教师负责练习编排,文献翻译由专业教师和英语教师共同负责。既注重语言文字的流畅,又注重内容术语的准确。

本套教材是学生完成英语从基础学习过渡到实际应用的有效教材。通过教学,从英语文献阅读、英语资料翻译到英文摘要写作,系统科学地培养学生的英语应用能力,也为日后双语教学的逐步开展铺路搭桥。

是为之序。

A handwritten signature in black ink, consisting of three stylized Chinese characters: '李庆章' (Li Qingzhang).

\* 李庆章,1953年生,博士,生物化学教授,博士研究生导师,东北农业大学校长。

2002年9月10日

# 前 言

食品业已成为世界公认的朝阳产业,随着改革开放的深入,食品业在我国也已成为第一大产业。作为世界贸易组织的成员国,我国与世界各国交往迅速加强,国家间食品科技合作日益频繁,英语作为一门主流的国际交流语言,其作用日显重要;如何学好英语,一直是人们关心的热点,但食品科技英语教材很少,因此在哈尔滨工程大学出版社组织下,我们编写了食品科学与工程专业英语。该书力求知识广泛性、科学性、新颖性,其特点是:

1. 从权威性刊物和经典著作中选取了语言生动、内容新颖、形式多样、涵盖面广,又能较全面反映食品科学的原文。

2. 从组织上,全书共有 18 单元,每单元精泛读结合,为了更好地巩固内容,精读设有翻译、习题,并配泛读作为补充。

3. 该书是公共英语的延伸,在选材和习题上注重食品科技专业内容。

本书由李铁晶、张兰威负责内容的选编,并组织整理、翻译,李佳新、马丹负责书后习题编写,焦世耀、李春、周艳、郑丽娜、冯镇、张英春、杜阿楠、韩雪、李真顺在资料整理、翻译中作了大量工作,最后由张兰威统稿。由于编者能力有限,时间仓促,难免有许多缺点和错误,敬请批评。

张兰威

2002.9

## Preface

The bright future of food industry has been recognized by the world. Food industry has been the largest industry in China with open policy and reform deepened. The relationship and communication of China and other countries in the world are more and more close and lively since China is the member country of WTO. The technological cooperation between countries become frequent. As the main international communicative tool, English learning has been more and more prominent. How to study English well is always people's main concern. But the textbooks about food is few. So organized by Harbin Engineering University Press, we compiled food technology English. The book is typical of its extension of knowledge, scientific system and originality.

Its features are:

1. Original articles from authoritative magazines and classic works are lively, original and full of various forms which fully reveal food industry.

2. There are 18 units in the textbook. Intensive reading and extensive reading are combined together in each unit. There are Chinese translation for intensive reading and exercises in order to reinforce what the students have learned.

3. This textbook is the extension of college English. The content and materials of this textbook put emphasis on the technology of food industry.

Li Tiejing and Zhang Lanwei selected, compiled, organized and translated the materials. Li Jiabin and Ma Dan compiled exercises. Jiao Shiyao, Li Chun, Zhou Yan, Zheng Lina, Feng Zhen, Zhang Yingchun, Du A'nan, Han Xue and Li Zhenshun did a lot in compiling and translating the materials. In the end Zhang Lanwei organized the whole textbook. Owing to limited ability and haste of time maybe there are many mistakes. Welcome to point out them.

**Dr. Lanwei Zhang**

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# Unit 1

## *Part A*

### Food Nutrition

Dynamic is an appropriate adjective to describe the science of nutrition today! A tremendous amount of media coverage and much public attention are focused on nutrition and its importance in life. Research laboratories, governmental agencies, the news media, the popular press, legislative bodies, educational institutions, and private business are all involved in the many facets of nutrition. As a result, the general public is receiving impressive amounts of information about what, why, and when to eat. Some of this information is helpful and healthful. Unfortunately, some is inaccurate and even dangerous.

Just what is this fascinating science that is the center of so much activity? Specifically, nutrition is the study of the food we eat and the use of this food in our bodies. This definition implies the need to explore a wide range of topics that combine to determine the food a person actually eats. Psychology, sociology, anthropology, geography, and education are all influential in determining the diets of people as groups and as individuals. Beyond these determinants of food preferences, agriculture, economics, and commerce further define food that is available. Nutritionists and dietitians work with people to help shape healthful food patterns that supply the nutrients the human body needs to reach and maintain the best of health permitted by one's genetic potential. Biochemistry, microbiology, physiology, and physics all contribute to the knowledge of how the body uses this food.

The fact that nutrition is a fascinating field to many people is not surprising. Everybody likes to eat. In fact, eating is one of the pleasures of life. Food is not only a source of a good deal of pleasure while it is being eaten, but it also is recognized by consumers as being essential to life itself. The tragic examples of political fasts in Northern Ireland and elsewhere illustrate poignantly and all too realistically the dependency of human life on food. Starvation is at one extreme of the spectrum of food intake; obesity is at the other.

The goal of learning the basics of nutrition and of eating according to these principles is of value throughout life in promoting optimal health. As the basics of nutrition are studied, the remarkable and complex nature of the body's need and use of food components becomes clear. Carbohydrates and fats are the main nutrients in foods that provide energy. Proteins can provide energy, but they also perform other vital functions. Minerals, vitamins, and water are other nutrients in foods. Nutrients are chemical substances found in foods that the body requires and uses for growth and maintaining life. There are some 50 known nutrients.

One of the exciting benefits of studying nutrition is that the mystique of various nutrients is removed when individual vitamins, minerals, proteins, carbohydrates, fats, and water are examined in some details. Although present knowledge of nutrition is not complete, a considerable amount of information already has been acquired through extensive research efforts in the field. Certainly, enough knowledge is known to enable concerned individuals to eat diets that insure good nutrition.

For maximum benefit from the study of nutrition, sound nutrition principles must be put into practice. This may require a combination of some creative menu plannings and self-discipline at first. The foundation knowledge of nutrition explains why nutrients are needed and where they may be found in the food supply. This makes it possible to write menus planned to provide appropriate amounts of all the necessary nutrients. Then comes the challenge! The benefits of these healthful menus are only

realized if the food is eaten according to the plan. This is likely to mean a change in usual eating habits, and such changes are very hard for many people to make permanently.

## Food Plans

Pretests are popular devices for measuring knowledge or behaviors before formal educational presentations have been made. Since the goal of studying nutrition ultimately is to know the principles of nutrition and then to apply them, a pretest to determine how adequate your diet is at the beginning of your study of nutrition provides a baseline against which to measure your progress at the end of the course. A careful record of food eaten during a three-day period can be checked against a suggested food plan to provide a pretest of the adequacy of your present dietary pattern. Both the food and the amount eaten need to be recorded.

A list of the foods eaten in a day may make interesting reading, but it provides limited information about nutrient content until it is analyzed. Nutritionists and dietitians can analyze a person's diet in detail by using tables of food composition. This requires a considerable effort and may be more than a person wishes to do. To meet this objection, several different plans for analyzing diets have been suggested. One of the first of these was suggested by the U. S. Department of Agriculture almost four decades ago. This plan was called the "Basic Seven" and was based on seven food groups: milk, meats, citrus fruits, green and yellow vegetables, other fruits and vegetables, breads and cereals, and butter or margarine.

## Basic Four

Harvard's Department of Nutrition, and the U. S. Department of Agriculture about a year later, suggested using four food groups. This plan is referred to as the Basic Four or the Four Food Group Plan. The groups in the Basic Four are: milk and milk products, meats and meat alternates, fruits and vegetables, and grains (breads and cereals).

## Daily Food Guide

How does the Daily Food Guide differ from the Basic Four?

When reporting food intake using the Basic Four as a guide, there are certain foods that do not fit into the guide. For example, butter and margarine are not indicated in the guide. Neither are salad dressings, sour cream, candies, jams, jellies, and other foods that may be high in fat or sugar. To provide a place for reporting these items, the Daily Food Guide has been proposed. This guide is comparable to the Basic Four, but a fifth group has been added. The fifth group is sometimes referred to simply as other and sometimes as the fat-sweets group.

People need to have some fat in their diets each day, but the intake should be reduced below the amount the typical American eats. The Daily Food Guide acknowledges this by identifying the fat-sweets group. However, no recommendation is made for a minimum number of servings. Unlike the other groups, the recommendation for this group is to keep the intake low. The Basic Four does not include the fats-sweet group because the assumption is made that some fat will be eaten in the course of eating the recommended servings of breads, meats, and vegetables. By making this assumption, the plan is able to be comparatively useful with only four groups, rather than with the five categories of the Daily Food Guide. The simplicity of only four categories has made the Basic Four a useful tool for educating the general public about healthful eating patterns, and we much prefer it.

With the exception of the inclusion of the fifth group, the Daily Food Guide and the Basic Four follow the same format, although the titles of the groups are different. The titles in the Daily Food Guide are milk-cheese group, bread-cereal group, meat-poultry-fish-beans group, and fruits-vegetable group. The serving recommendations are the same as the Basic Four, and the foods grouped in each category are also the same. Thus, either of these guides can be used to assess a daily diet easily and quickly.

### The Exchange System

Some people have criticized the use of the Basic Four because it does not insure that all nutrients necessary for good health will be eaten. The

expectation is that people following the Basic Four will eat a variety of foods in each of the categories, enabling them to obtain most of the nutrients needed. Various critiques of the Basic Four have revealed possible inadequacies. Comparatively complex recommendations have been made for alternative systems. To overcome these problems one of the systems that has been adopted is the Exchange System, a system borrowed from the approach to diet planning that is used to plan diets for diabetics.

### Dietary Standards and Recommendations

The food plans described above are designed to obtain a practical approach to planning nutritionally adequate meals and snacks. None of these is very precise because each one indicates categories of foods, rather than specific items. Such an approach is very useful to individuals, but people responsible for the nutritional status of national groups need much more specific information if nutritional planning is to be effective. Various standards have been developed around the world to evaluate nutritional adequacy.

In the United States, standards have been developed, and these standards have undergone frequent reviews and modifications. The first approach in the United States was the establishment of the minimum daily requirements (MDR) by the Food and Drug Administration. The MDR were developed to provide a legally accepted standard for labeling the amounts of nutrients in foods. These values have not been used for many years, having been replaced by the U.S. RDA.

The standard that nutritionists use in assessing adequacy of nutrient intake in the United States is the RDA (recommended dietary allowances). These values were first established and published by the Food and Nutrition Board of the National Research Council in 1943, and they have been revised about every five years. A standard that is very similar to the RDA is the U. S. RDA. The U. S. RDA concept and values were established in 1974 by the Food and Drug Administration to serve as the basis on which nutrition labeling of foods would be done. These have not been revised since they were formulated.

Other nations and the Food and Agricultural Organization of the United Nations have also developed recommended dietary standards. Each of these is somewhat different from the others. Differences are explained partially by the rationale underlying the various standards. Some are based on the minimum level considered necessary for good health. Others include a margin of safety so that the recommendations provide maximum nutritional health for a very large segment of the population. Specific information is contained in the appropriate references.

### Nutrient Density

Nutrient density is a useful concept in selecting foods because it clearly relates the caloric contribution with specific nutrient contributions of a food in terms of daily requirements. Calculations for nutrient density are based on the percentage of the day's total caloric needs that will be provided by a serving of the food and the percentages of the daily need for a nutrient or nutrients that will be provided by this same serving of food. Foods with a high nutrient density are foods that contribute a high percentage of the nutrients in relation to the calories provided. Such foods are useful in meeting the day's nutrient needs without exceeding the caloric requirement. On the other hand, some foods provide a high caloric intake with only a small contribution toward nutrient requirements. By examining foods on the basis of nutrient density, the relative nutritional merits of a food can be seen easily.

The expression of the nutrient density of a food is presented as the index of nutrient quality (INQ). The INQ is calculated for individual nutrients (protein, calcium, iron, vitamin A, thiamin, riboflavin, and vitamin C). This calculation reveals the nutritional strengths of the food.

The INQ for a nutrient ideally is a value of at least 1, for the value of 1 indicates that this food contributes as much toward meeting the day's need for that nutrient as it does calories toward the day's total. In fact, some foods will have INQ values well in excess of 1 for one or more of the nutrients, making these foods good choices. No one food provides all of the nutrients at INQ values greater than 1. Even nonfat milk is low in one

of the seven nutrients calculated.

Two terms that are bandied about by the concerned consumer are 'empty calories' and 'junk foods'. Both of these terms, although not formally defined, are attached with varying degrees of accuracy to a wide assortment of foods. The public outcries about empty-calorie and junk foods have been loud and frequent. In essence, these voices have been pointing out that some foods fail to carry their weight nutritionally. Soft drinks and honey are two clear examples. Of course, a number of other foods can also be cited in this category, including candies and rich desserts. When emotion is removed from the use of the terms junk foods and empty calories, the public basically is saying that it is concerned about wise investment of calories for nutritional dividends. Nutrient density and INQ are scientific ways of presenting sound information about the actual merits of foods.

Actually, we deplore the use of the terms junk foods and empty calories. Why? Because we seldom eat a single food. We eat groups of foods called meals, and groups of meals called diets. We may have a junk diet, but all foods, when used as part of a balanced diet, contribute to good nutrition. Hence, there really are no junk foods. The term empty calories frequently is applied to sugar, yet 70 to 80 percent of sugar is consumed as a part of other foods. For example, ice cream is essentially a mixture of milk, fat and sugar, and clearly ice cream is not an empty-calorie food.

Public interest in the nutrient quality of various foods has triggered an active attempt to define a nutritious food. One useful approach is to say that a nutritious food has an INQ of at least 2 for two or more nutrients. Another possibility is that it would provide at least four nutrients with an INQ of 1 or higher. Such suggestions are helpful in focusing attention on the importance of nutrient density.

Some foods are particularly outstanding sources of a specific nutrient. For example, milk is a vital source of calcium and many other nutrients, and citrus fruits are recognized for their content of vitamin C.