

UNIT 1

FOOD IS MORE THAN SOMETHING TO EAT

OVERVIEW

In Unit 1, students will learn about the importance of nutrition, the six classes of nutrients, and the general roles of nutrients in the body. Such roles include the regulation of growth, repair, and maintenance of cells. Essential nutrients, which must be consumed to support good health, are discussed as well as nonnutrients, such as phytochemicals, which are not essential but may have certain health benefits. This unit introduces students to some basic terminology and fundamental mathematics of nutrition, such as metric measurements and caloric values of macronutrients and alcohol. Key nutrition concepts promote the importance of eating a variety of minimally processed, nutrient-dense foods to support good health rather than relying on dietary supplements to meet nutrient needs. Balance, variety, moderation, and some degree of individualization in diet planning are emphasized throughout the discussion of basic nutrition. In this unit, causes for, consequences of, and possible solutions to the problem of worldwide malnutrition are examined briefly.

Instructors should introduce students to the basic features of this textbook, including the division of each unit into modules with learning outcomes, and unit features that include *Essential Concept (E.C.)*, *What is That?!*, *Nutrition Fact or Fiction?*, *Answer This*, *Tasty Tidbits*, *In a Nutshell* (unit summary), *Consider This...*, and *Practice Test*.

LEARNING OUTCOMES

Module 1.1

1. Define all of the key terms in this module.
2. Identify the leading causes of death in the United States and lifestyle factors that contribute to the risk of these diseases.

Module 1.2

1. Define all of the key terms in this module.
2. List the six classes of nutrients and identify a major role of each class of nutrient in the body.
3. Calculate the caloric value of a serving of food based on its macronutrient (and alcohol) contents.
4. Provide examples of essential nutrients, nonnutrients, phytochemicals, and dietary supplements.
5. Explain the importance of supplying the body with antioxidants.

Module 1.3

1. Define all of the key terms in this module.
2. Classify foods as nutrient-dense, energy-dense, or high in empty calories.

3. Identify key basic nutrition concepts, including (a) the importance of eating a variety of foods and (b) no naturally occurring food supplies all nutrients.

HELPFUL TEACHING IDEAS

1. Ask students to identify the factors that influence their food choices. Do they consider the nutritional contents of foods before they choose to eat them?
2. Have students collect clean, empty food and beverage containers and bring them into class. The food packages will be used when MyPlate is discussed later in the course. (The instructor will need to store the packages until they are used for the class activity.)
3. To demonstrate the concept of energy density, display examples of various foods that contain similar amounts of calories. For approximate 100-Calorie examples, show 1 tablespoon of stick butter or margarine, $\frac{1}{4}$ of a 4 inch-diameter doughnut with chocolate icing, 1 cup of green grapes, 1.5 cups of canned green beans, and $\frac{3}{4}$ cup French fries (fast food). Ask students to explain why a person has to eat 1.5 cups of green beans to get the same amount of energy that's in a quarter of a doughnut.
4. Ask students to identify important nutrition-related health problems facing people who live in the United States and other countries. What are possible ways to alleviate the hunger and obesity problems in these countries? What kinds of barriers interfere with implementation of these solutions?
5. Have students choose one government or private food assistance program in their community (e.g., WIC, "Food Stamps," local food pantry) and research the program's history, kinds of services provided by the program, and documented health outcomes.
6. Ask students to prepare a family tree that shows dates of birth and death (if applicable) of parents, grandparents, and great-grandparents. The family tree should also indicate chronic diseases and causes of death of the family member, if applicable. Does this activity highlight any health risks for each student? Ask students to consider whether they are interested in changing their present lifestyle, if it would extend their healthy life span. If they are not interested, why not?
7. Use the *What is That?!* feature to generate class discussion.

UNIT OUTLINE

- I. **Why Learn About Nutrition? (Module 1.1)**
 - A. Introduction
 1. Food is more than just "something to eat."

2. Your body needs **nutrients**, the life-sustaining chemicals in food, to function properly and maintain good health.
 3. **Nutrition** is the scientific study of nutrients and how the body uses these chemicals.
 4. A **diet** is your usual pattern of food choices.
 - a. Numerous factors influence a person's food choices. Refer students to **Figure 1.1**.
 5. In the United States, poor eating habits contribute to several leading causes of death, including heart disease, some types of cancer, stroke, and diabetes.
- B. Personal characteristics can increase your chances of developing a chronic disease
1. Heart disease, cancer, and diabetes are chronic diseases that can take many years to develop and have complex causes. Refer students to **Figure 1.2** for the major causes of death in the United States.
 2. Family history is an important **risk factor** for heart disease.
 3. Your lifestyle may increase or reduce your chances of developing chronic diseases or delay their development.
 4. **Lifestyle** is a person's way of living, which includes diet, physical activity, habits, use of drugs such as tobacco and alcohol, and other typical patterns of health-related behavior.
 - a. In the United States, cigarette smoking is the leading cause of preventable deaths.
 5. You may be able to increase your chances of living a long and healthy life by taking the following steps:
 - a. Consume more fruits, vegetables, unsalted nuts, and fat-free or low-fat dairy products.
 - b. Exercise regularly.
 - c. Reduce intake of fatty meats, sugar-sweetened foods, and refined grains.

II. Nutrition Basics (Module 1.2)

- A. Introduction
1. There are six classes of nutrients:
 - a. Carbohydrates
 - b. Lipids, which include fat
 - c. Proteins
 - d. Vitamins
 - e. Minerals
 - f. Water
 2. **Organic nutrients** have the element carbon in their chemical structures.
 - a. Carbohydrates
 - b. Lipids
 - c. Proteins
 - d. Vitamins
- B. Nutrients and their major functions

1. You need certain nutrients for energy, growth and development, and regulation of cellular function, including the repair and maintenance of cells.
 2. **Table 1.1** presents major roles of nutrients in your body.
 3. Review **Figure 1.3** to compare body composition of nutrients in a healthy young male and female.
 4. A **cell** is the smallest functional unit in a living organism, including a human.
 5. Cells do not need food to survive; they need nutrients in food to carry out metabolic activities that support life.
 6. **Metabolism** is the total of all chemical reactions or changes that occur in a living cell.
- C. Food energy
1. As long as you are alive, you are constantly using energy.
 2. Foods and beverages that contain fat, carbohydrate, protein, and/or alcohol supply energy to your body.
 3. The amount of energy in food is reported in 1000 calorie units called **kilocalories** or **Calories**.
 4. The term kilocalories or **kcal** is interchangeable with “food energy” or “energy.”
- D. Macronutrients and micronutrients
1. **Macronutrients** are nutrients needed in gram amounts daily and provide energy. They are carbohydrates, proteins, and fats.
 2. **Micronutrients** are vitamins and minerals; the body needs very small amounts of them to function properly, and they do not provide energy for cells.
 3. Commonly used metric prefixes including kilo- and milli- are used to report amounts of nutrients. Refer students to **Table 1.2**.
 4. A gram of carbohydrate and a gram of protein each supply about 4 kcal; a gram of fat provides about 9 kcal; and pure alcohol furnishes about 7 kcal/gram.
 5. If you know how many grams of carbohydrates, proteins, fat, and/or alcohol are in a food, you can estimate the number of kilocalories it provides.
- E. What's an essential nutrient?
1. Approximately 50 nutrients must be supplied by food because the human body does not make the nutrient or make enough to meet its need.
 2. **Essential nutrients** must be supplied by food. Refer students to **Table 1.3**.
 3. Water is the most essential nutrient.
 4. A **deficiency disease** results if an essential nutrient is missing from the diet.
 - a. A deficiency disease is a state of health characterized by certain abnormal physiological changes that result in signs and symptoms of disease.
 - b. A sign is a measurable disorder, such as a fever or skin rash; a symptom is not measureable but is reported by the person. Symptoms include headache and numbness.
 - c. Treatment of a nutrient deficiency is usually simple—add the missing essential nutrient to the diet.
- F. What's a nonnutrient?

1. Nonnutrients are substances that are not nutrients, yet they may have healthful benefits.
 2. Alcohol is an example of a nonnutrient. It supplies energy and can have harmful as well as beneficial effects on your health.
 3. Phytochemicals are made by plants. Caffeine, which is made by coffee plants, has a stimulating effect on the body.
 4. Many nonnutrient phytochemicals have **antioxidant** activity in the body. Such activity may reduce risks of heart disease and certain cancers. Refer students to **Table 1.4**.
 5. An antioxidant protects cells and their components from being damaged or destroyed by chemically unstable factors called free radicals.
- G. What are dietary supplements?
1. A **dietary supplement** is a product (excluding tobacco) that contains a vitamin, a mineral, an herb or other plant product, an amino acid, or a dietary substance that supplements the diet by increasing the total intake.
 2. Results of scientific testing also indicate that many dietary supplements are not helpful and may even be harmful.
- H. What's malnutrition?
1. **Malnutrition** is a state of health that occurs when the body is improperly nourished.
 2. Nutritionally inadequate (poor) diets cause malnutrition.
 3. Low-income people may be at risk because they lack money to purchase nutritious foods.
 4. People with severe eating disorders or those addicted to drugs and alcohol may be at risk.
 5. Malnutrition is generally associated with undernutrition and starvation.
 6. Overnutrition, long-term excess of energy or nutrient intake, is also a form of malnutrition. Overnutrition is often characterized by obesity.

III. Key Nutrition Concepts (Module 1.3)

A. Introduction

1. Each section of this module focuses on a key nutrition concept.
2. These key nutrition concepts can help you make more informed choices concerning your dietary practices.

B. There are no "good" or "bad" foods

1. All foods have nutritional value, so no food deserves to be labeled "bad" or "junk."
 - a. In some instances, foods containing a lot of fat and sugar also add small amounts of protein, vitamins, and minerals to diets.
2. A food is bad for you if it contains toxic substances or it is contaminated with bacteria, viruses, or microscopic animals that cause food-borne illness.
3. A food that's high in **empty calories** supplies a lot of calories from unhealthy types of fat, added sugars, and/or alcohol.
4. A **nutrient-dense** food contains more vitamins and minerals in relation to total calories, especially calories from unhealthy fats, added sugars, and/or alcohol.

- a. A healthy diet contains a variety of nutrient-dense food and limits foods that contain a lot of empty calories.
- 5. **Energy density** describes the energy value of a food in relation to the food's weight.
 - a. High-fat foods such as doughnuts are energy dense because they're concentrated sources of energy.
- 6. Most fruits are not energy dense because they contain far more water than fat.
- 7. Not all energy-dense foods are rich sources of empty calories.
- 8. Nuts are nutrient dense and are high in fat, but they generally contain healthy kinds of fat.
- C. Variety, moderation, and balance are features of healthy diets
 - 1. Choose a variety of food from each food group and consume them in moderation. (Refer students to **Figure 1.8.**)
 - 2. Balance your caloric intake with enough physical activity to maintain a healthy weight.
- D. Food is the best source of nutrients and phytochemicals
 - 1. The most natural, reliable, and economical way to obtain nutrients and beneficial phytochemicals is to base your diet on a variety of "whole" and minimally processed foods.
 - a. Processing plant foods often removes some of the most healthful parts.
 - b. Replacing refined grain products with 100% whole-grain products increases the likelihood of obtaining a wide variety of nutrients and phytochemicals.
 - 2. Your body is designed to obtain nutrients from foods.
 - a. You can develop health problems by taking high doses of dietary supplements that contain vitamins and/or minerals.
 - b. Nutrients and phytochemicals may need to be consumed together in foods to provide desirable effects in the body.
- E. There's no "one-size-fits-all" approach to good nutrition
 - 1. You can individualize your diet using the food guides presented in Unit 3.
 - 2. Nutritional needs of healthy people vary during different stages of their lives.
 - 3. Physicians often prescribe nutrient supplements or special diets for people who are in certain life stages (e.g., pregnant women) and who are chronically ill.
- F. Foods and nutrients aren't cure-alls
 - 1. Nutrients can cure nutrient deficiency diseases; they don't cure other ailments.
 - 2. Diet is only one aspect of yourself that influences your health.
 - 3. Other lifestyle factors as well as genetics and environment also play major roles in determining your health status.
 - 4. Functional foods are often manufactured for specific health-related purposes. They may boost nutrient intakes or help manage specific health problems.
 - a. Margarine substitutes, for example, contain phytochemicals that may lower the risk of heart disease.
 - b. Many yogurt products contain specific bacteria that may relieve diarrhea.

- c. Functional foods may help people improve their health, but more research is needed to determine their benefits as well as possible harmful effects on the body.
- G. Some closing thoughts
 - 1. By applying what you learn about nutrition and the role of diet in health, you may be able to live longer and healthier as a result.
 - 2. You may become a more careful consumer of nutrition-related information by studying the content of this textbook.

ANSWERS TO FIGURE QUESTIONS

Figure 1.1: What influences your eating practices?

Answers will vary but should include most of the factors in Figure 1.1.

Figure 1.2: Are any of these diseases in your family history?

Answers may vary but are likely to include heart disease, cancer, and diabetes.

Figure 1.5: How can you estimate the amount of calories in a serving of food?

If you know how many grams of carbohydrate, protein, fat and/or alcohol are in a serving of food, you can estimate the number of kilocalories it provides.

Figure 1.7: What distinguishes an “energy-dense” food from a food that’s not energy dense?

Energy density describes the energy value of a food in relation to the food’s weight. High-fat foods such as doughnuts are energy dense because they contain a lot of fat and little water. Fat is a concentrated source of energy. Most fruits aren’t energy dense because they contain far more water than fat.

Figure 1.9: Why is it important to choose a variety of foods, especially those that are whole or minimally processed?

Many foods undergo some form of processing, such as peeling, refining, and heating, before they are eaten. These processes, however, may remove some of the most nutritious parts. By replacing refined grain products for example with 100% whole-grain products, you can increase the likelihood of obtaining a wide variety of nutrients and phytochemicals.

RESPONSES TO “CONSIDER THIS ...” QUESTIONS

1. Answers will vary but should include the factors noted in the unit opener and Figure 1.1.
2. Answers will vary but should include key concepts of “variety, moderation, and balance”; including nutrient-dense foods; limiting foods that are high in empty calories; and using the MyPlate food guide.
3. Answers will vary but may include a discussion of personal health concerns, such as family history of chronic nutrition-related diseases, and the student’s level of motivation to improve his or her diet—if the diet needs to be improved.
4. Answers will vary but should include the key concept that a variety of foods needs to be consumed, in reasonable amounts, to obtain a nutritionally adequate diet and avoid consuming excess of energy.
5. Answers will vary but the student should categorize foods as energy dense, nutrient dense, or high in empty calories according to the definitions provided in Section 1.3a. An energy-dense food may also be classified as being high in empty calories, such as a doughnut. Nutrient-dense foods should not be classified as also being high in empty calories.

STUDENT ASSIGNMENTS

1. Have students use a dietary analysis software program such as Nutrition CalcPlus or Food Tracker (<https://www.supertracker.usda.gov/foodtracker.aspx>) to estimate the caloric content of a meal that contains the following items: fried chicken (one medium breast, including skin and breading); 1 cup of mashed potatoes with milk (homemade recipe); ¼ cup chicken gravy, made without fat; ½ cup of cooked, frozen peas (no added fat); 12 ounces of a sugar-sweetened, cola-type drink; and ½ cup of chocolate ice cream (regular).

Answer: About 900 kcal

2. Have students calculate the number of calories in a serving of food that contains 20 g carbohydrate, 15 g protein, 4 g fat, 25 ml water, 1.8 mg iron, and 8 mg vitamin E.

Answer: 176 kcal

Explanation: In this serving of food, the only nutrients that supply calories are carbohydrate, fat, and protein. Each gram of protein provides 4 kcal; each gram of carbohydrate supplies 4 kcal; and each gram of fat provides 9 kcal.

Solution:

Carbohydrate: $4 \text{ kcal/g} \times 20 \text{ g} = 80 \text{ kcal}$

Protein: $4 \text{ kcal/g} \times 15 \text{ g} = 60 \text{ kcal}$

Fat: $4 \text{ g} \times 9 \text{ kcal/g} = 36 \text{ kcal}$

$80 \text{ kcal} + 60 \text{ kcal} + 36 \text{ kcal} = 176 \text{ kcal}$