

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

NUTRITION 255 – SCIENCE OF NUTRITION

3 hours lecture, 3 units

Catalog Description

Establishes the relationship between foods and science through the study and integration of chemistry, biology and nutrition science. The metabolism and functions and sources of nutrients will be covered in detail to correlate the role they have in promotion of health and disease prevention. The challenges that occur during the human life cycle and how nutrient needs change will be studied. Includes evaluation from a scientific perspective of current concepts, controversies, and dietary recommendations. Nutritional issues as they relate to weight maintenance, eating disorders, food labeling, food safety and special needs at various stages in the life cycle will be thoroughly examined.

Prerequisite

“C” grade or higher or “Pass” in BIO 130, 131 and CHEM 120 or equivalent

Entrance Skills

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Classify a substance as a type of element, metal or nonmetal, or as a type of compound, ionic or covalent, using the Periodic Table.
- 2) Write the chemical formula, draw the electron dot structure, and predict and draw the geometry of a molecule or polyatomic ion using the Periodic Table.
- 3) Determine the melting and boiling point of a substance from its heating or cooling curve.
- 4) Predict the products and write balanced chemical equations for ordinary chemical processes and reactions including the following specific types: combination, decomposition, single replacement, double replacement, combustion, oxidation-reduction, and acid-base.
- 5) Predict the affect of concentration, temperature, or catalysts on the rate of a chemical reaction.
- 6) Recognize the goals, methods and limitations of science.
- 7) Design an experiment and interpret the data.
- 8) Compare and contrast cellular structures and functions.
- 9) Explain the concepts of chemical bonding, acids and bases, and redox reactions.
- 10) Compare the structures and functions of biological macromolecules.
- 11) Explain how the cell pays for energy-requiring reactions and the role of enzymes in this regard.
- 12) Understand the nature, functions and mechanisms of anabolic and catabolic metabolism.
- 13) Recognize how the laws of thermodynamics affect energy metabolism and how cells pay for endergonic reactions.
- 14) Explain the mechanisms and functions of anabolic and catabolic metabolism and how they are interconnected.

Course Content

- 1) Review of basic biological functions and structures, from the smallest units of matter in the cell up to extensive systems including discussing of cell organelles and the different types of transport as they relate to nutrition
- 2) Review of chemistry as it pertains to atoms, three types of bonds, electron charges, pH balance, hydrogen, and carbon. The importance of water and solvents in interactions such as condensation and hydrolysis and the implications to nutrition

- 3) Review and discussion of metabolic pathways and biochemical structures (e.g., glycolysis, TCA cycle, electron transport chain, energy production for glucose oxidation, fatty acid oxidation, synthesis of ketone bodies, urea cycle, ethanol metabolism, etc.) to include basic mathematical equations to determine the energy value of various nutrients and foods
- 4) Nutrient classifications and their food sources (protein, lipids, carbohydrate, vitamins, minerals, water, alcohol) through understanding the biochemical structure, unique physiology and energy each contains and the effect on human health
- 5) Digestion and absorption of nutrients
- 6) The major dietary guidelines and recommendations to include discussion of Healthy People 2010 national goals
- 7) Nutrients involved in a strong immune system, blood health and bone health
- 8) Other components of food which contribute to good health (phytochemicals, antioxidants), their food sources, and their relationship to diseases like cancer and heart disease
- 9) Disordered eating patterns that promote obesity and metabolic syndrome, as well as severe eating disorders such as anorexia nervosa, bulimia nervosa, binge/compulsive eating and pica
- 10) Current and controversial developments in nutrition biotechnology, food safety, fat and sugar substitutes, and additives
- 11) Nutritional needs across the life cycle from pregnancy through old age
- 12) Nutritional concerns of malnutrition and food supply around the globe
- 13) Scientific principles to analyze and evaluate nutrition information

Course Objectives

Students will be able to:

- 1) Describe the relationship between optimal nutrition and optimal health, citing examples of the unique nutritional needs of various population groups and various examples of disordered eating.
- 2) Identify the nutrients essential for optimal health and describe their physiological functions, chemical interactions, and food sources for bone health, blood health, immunity, fluid and electrolyte balance, and energy metabolism.
- 3) Design healthy diet plans for a variety of population groups using the various dietary planning guides available (e.g., food guidance systems, recommended dietary intakes, Dietary Guidelines for Americans, etc.).
- 4) Demonstrate proper methods of recording dietary intake for purposes of making comparisons to appropriate nutritional standards and goals.
- 5) Describe the special life cycle nutritional needs at various stages from conception through old age, and provide examples of proper and improper nutritional practices, including information regarding the digestion and absorption of various nutrients throughout the lifespan.
- 6) Evaluate a variety of "diets" for their content and sufficiency (e.g., cultural and ethnic comparisons, vegetarianism versus omnivores, weight control issues including the athlete and sedentary obese individuals, global nutrition concerns, extensive use of artificial ingredients and bioengineered foods), as compared to the guidelines set by the United States Department of Agriculture (USDA).
- 7) Students will demonstrate use of scientific principles in analyzing and evaluating nutrition information as evidenced in nutritional analyses.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system

- 1) Quizzes and exams that measure students' ability to define the unique nutritional needs of various groups (athletes, elderly, etc.) and identify the physiological function of the various required nutrients.
- 2) Written case study measuring students' ability to utilize a food record in accordance with standard nutritional guidelines, culminating in a specialized diet plan for an individual with special dietary needs or concerns (e.g., vegetarian).

- 3) Research paper in which students are required to investigate, analyze and discuss current standards for optimal nutrition throughout the lifespan.

Special Materials Required of Student

None

Minimum Instructional Facilities

Smart classroom

Method of Instruction

- 1) Lecture and group discussions
- 2) Individual and group projects

Out-of-Class Assignments

- 1) Assigned reading
- 2) Nutrition log analysis
- 3) Research paper
- 4) Review of nutrition websites for reliability and accuracy of information

Texts and References

- 1) Required (representative example): Blake, Munoz, and Volpe. Nutrition: From Science to You. San Francisco, Pearson Education, 4th edition, 2020.
- 2) Supplemental: None

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Demonstrate knowledge, skills and appreciation of the scientific scope of the field of nutrition.
- 2) Identify the six classes of nutrients by name, function, caloric energy in a gram, food source, range of caloric amount in total diet.
- 3) Understand human behavior that results in an imbalance in metabolism leading to obesity, diabetes, and heart disease.
- 4) Identify the basic principles for achieving and maintaining energy balance through healthy lifestyle practices.