



Curriculum Overview

There are four distinct categories of coursework requirements that must be met by all Certified Nutrition Specialist® candidates.

1. Nutrition Courses at the Graduate Level (9 semester credit hours)
2. Biochemistry Courses at the Graduate/Undergraduate Level (6 semester credit hours)
3. Physiology/Anatomy Courses at the Graduate/Undergraduate Level (3 semester credit hours)
4. Clinical or Life Science Courses at the Graduate/Undergraduate Level (12 semester credit hours)

Courses cannot fulfill multiple curriculum requirements; however, excess nutrition science courses can fulfill the Life Sciences requirement.

Credits are recorded on the standard semester hour basis. Candidates should calculate accordingly if their school records on a quarter hour or other basis.

The following defines each category and provides examples of courses that would be accepted to fulfill each category:

1. Nutrition (9 semester credit hours at the graduate level)

Nutrition is the science that interprets the interaction of diet, macronutrients, micronutrients and other bioactive components in food in relation to maintenance, growth, reproduction, health and disease in humans. It includes dietary patterns, food intake, absorption, assimilation, biosynthesis, catabolism and excretion.

Courses that fulfill the nutrition coursework requirement include, but are not limited to:

- Pathophysiologic Basis of Metabolic disease: A study of the underlying mechanisms of disease and the complex interrelationships between critical systems including respiratory, urinary, cardiovascular, digestive, nervous and endocrine. Lectures will include fluid and electrolyte imbalances, acid and base imbalances, inflammation, hypersensitivity, infection, necrosis, and neoplasms. The influence of various nutrients on systemic function will be stressed.
- Functional Medicine Nutrition: Advanced biochemical assessment using critical analysis of client history with clinical testing from a functional medicine perspective. Functional lab testing will be evaluated in detail with case studies. Topics will be relevant to preventive as well as therapeutic nutrition care.
- Macronutrients: Carbohydrates, Fats and Proteins: Explores the physiologic mechanisms of carbohydrate, fat and protein metabolism, the function of macronutrients in the body, how each macronutrient (alone and when combined) undergoes integrated metabolism in tissue, and how the ingestion of combined macronutrients affects overall metabolism as well as disease risk and recovery. Suggestions for client counseling on these issues will be presented.
- Developmental Nutrition: Nutritional considerations and health-related concerns throughout the life cycle are explored. Pregnancy, lactation, fetal, infancy, childhood, and adolescent growth and development are addressed in detail, in this context. Also considered is the etiology of nutrition-related disorders of adulthood and the elderly.



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- Therapeutic Nutrition: Focus is on the use of nutrition therapy in the management of health and disease. Specific nutrition intervention including diet, vitamins, minerals, botanicals, essential fatty acids and amino acids are explored for a wide variety of diseases commonly encountered in clinical practice. The biochemistry of each intervention is discussed for a full understanding of how to integrate nutrition therapy into patient care.
- Nutritional Aspects of Disease: Advanced study of pathophysiological aspects of disease states and the relation to nutrition.
- Human Nutrition II: Micronutrients: This course covers structure, function, and food sources of the micronutrients (vitamins, minerals, trace minerals, and various phytochemicals). The complex function of each nutrient is reviewed, along with interactions, excesses, deficiencies, supplementation, and nutrient synergy. The effects of food processing, fortification and agricultural practices on micronutrient density of foods will be explored. Students use a variety of methods to compare the micronutrient content of diets and will review safety and toxicology of dietary supplements, drug-nutrient, and nutrient-nutrient interactions.
 - Nutrition Oncology: The process of carcinogenesis will be reviewed to provide the foundation needed to address the role of nutrition in the prevention and treatment of cancer. The course will provide challenging discussions about controversies in dietary exposure assessment using questionnaires and biological markers in cancer risk assessment. The course will also explore the biology of nutrition and cancer including nutrigenomics, nutrigenetics, epigenetics, and energy balance. Further, the evidence from specific foods, macronutrients, micronutrients, dietary trace metals, and other food constituents will be explored.

- Ayurvedic Nutrition
- (Applied) Clinical Nutrition
- Clinical Strategies in Nutrition
- Cooking With Whole Foods/Labs
- Culinary Herbs in the Kitchen and Beyond
- Detox & Cleanse
- Diabetes Education
- Diet & Nutrition Therapy
- Energetics of Foods
- Evidence Based Nutrition
- Food Science
- Healing Foods
- Lifecycle Nutrition
- Mindful Eating
- Nutrigenomics
- Nutritional Assessment
- Nutrition and Digestive Health
- Nutrition/Herbal Therapeutics
- Public Health Nutrition
- Redefining Nutrition
- Sports Nutrition



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- Vitamins & Minerals

Nutrition-Related Coursework

2. Biochemistry (6 semester credit hours)

Biochemistry is the study of the structure, function and interactions of cellular components such as proteins, carbohydrates, lipids, nucleic acids, and other biomolecules and the chemical processes that these biomolecules undergo in living organisms. Biochemistry focuses on how these biological molecules give rise to the processes that occur within living cells, which in turn relates greatly to the study and understanding of whole organisms. By controlling information flow through biochemical signaling and the flow of chemical energy through metabolism, biochemical processes give rise to the complexity of life.

Topics to be included in courses that fulfill the biochemistry coursework requirement include:

- Chemical composition and classification of carbohydrates, proteins, and fats
- Biochemical principles as they relate to nutrition
- Energy production and regulation
- Normal regulation of fluid and electrolyte balance and the metabolic implications arising from disturbances in fluid/electrolyte balance
- Regulation of acid-base balance and the metabolic implications arising from acid/base disturbances
- Mechanisms of gluco-regulation, free radical generation and inflammatory pathways and their relation to nutrition
- Concepts of nutrigenomics and epigenetics and the impact on nutrition and health

Please note: Organic chemistry and microbiology do not fulfill this requirement. However, these courses can fulfill the life sciences curriculum requirement.

Examples of Biochemistry Courses include, but are not limited to:

- **Biochemistry of Nutrition:** Reviews the static and dynamic aspects of the biochemistry of carbohydrates, lipids, amino acids, proteins, nucleic acids, hormones, and vitamins in the healthy individual. Cations, anions, enzyme kinetics, and integration and control mechanisms of the various metabolic pathways are discussed.
- **Clinical Biochemistry:** The biochemistry of disorders arising from acid/base imbalance and the abnormal metabolism of the carbohydrates, lipids, proteins, amino acids, nucleic acids, bile pigments, vitamins, and hormones.
- **Nutrition: A Biochemical and Physiological Basis:** Digestion, function, and metabolism of proteins and amino acids, carbohydrates, and lipids. Regulatory mechanisms, developmental changes and species differences that influence the requirements and metabolism of nutrients. Effect of nutrient supply on metabolism at the molecular, cellular, and systemic levels, including special metabolic needs during growth, reproduction, stress, and senescence in animals and man.
- **Medical Biochemistry:** Provides a strong foundation of the biological concepts of metabolism, cellular signaling, DNA replication, transcription and translation, and molecular genetics. Links this foundational material to explain how the human body functions in health and disease.



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- Nutritional Biochemistry and Physiology: Mechanisms of nutrient digestion, absorption, transport, utilization, and excretion will be reviewed with emphasis on the role of specific nutrients in maintaining biochemical and physiologic integrity in body systems.
- Advanced Nutritional Biochemistry, Pathophysiology, and Assessment: This course explores more advanced and complex issues surrounding normal and abnormal metabolism of nutrients. Students will view a variety of pathological states at the molecular and biochemical level, including impaired detoxification, cancer, neurodegenerative diseases, and autism. The impact of dietary additives and environmental toxins on human health will be explored. Students will demonstrate competence in the selection and interpretation of laboratory assessments for nutrients, enzyme assays, abnormal metabolites, loading tests and challenge tests.

3. Physiology or Anatomy/Physiology (3 semester credit hours)

Anatomy is the study of the structure of the human body and its parts. **Physiology** is the study of how organisms, organ systems, organs, cells and biomolecules carry out the chemical or physical functions that exist in a living system. Developing a foundational knowledge of these sciences is essential for understanding the role of nutrition in health and healing.

Examples of courses that will fulfill this requirement include, but are not limited to:

- Anatomy and Physiology I, II: Detailed study of the structure and function of cells, tissues, and organ systems, control systems of the human body, homeostatic mechanisms, and the interrelations between these systems.
- Anatomy: The course provides students with a detailed examination of all structural aspects of the human body with a special emphasize on the anatomy and anatomical relationships significant to common clinical cases.
- Medical Physiology: The focus is human medical physiology as it pertains to human health. A virtual laboratory, highly focused on health problems, accompanies the course.
- Nutritional Biochemistry and Physiology: Mechanisms of nutrient digestion, absorption, transport, utilization, and excretion will be reviewed with emphasis on the role of specific nutrients in maintaining biochemical and physiologic integrity in body systems.
- Health and Wellness Physiology I: Students will learn the physiological theories supporting the practice of competent, safe, and effective nutritional medicine within the context of a biopsychosocial health and wellness model. Students will become familiar with foundational physiological processes and relevant anatomy including: digestion and assimilation, biotransformation and elimination, circulation, protection and defense, tissue repair and maintenance, and information flow. Physiological processes will be understood in relationship to behavioral and environmental inputs such as physical activity, social networks, diet, and sunlight. Circadian and seasonal patterns in physiology also will be discussed along with a review of the life cycle.

4. Clinical or Life Sciences (12 semester credit hours)

Life sciences encompass any science that deals with living organisms, their organization, life processes, and their relationships with each other and their environment. They are also referred to as biosciences.



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The life sciences are helpful in improving the quality and standard of life. They have applications in health, agriculture, medicine, and the pharmaceutical and food science industries. There is considerable overlap between many of the topics of study in the life sciences.

Social or behavioral science courses do not fulfill the requirement for clinical or life science.

Examples of courses that will fulfill this requirement: include, but are not limited to:

- Techniques in Epidemiology and Biostatistics: Epidemiology techniques used for analysis of population data from surveys, as well as case control retrospective and prospective studies will be reviewed. Bio statistical techniques including cross tabulation, scatter diagrams, histograms and line plots, regression and correlation analysis, analysis of variance, discriminant analysis, factor and spectral analysis will be applied to clinical and experimental data to illustrate techniques available for data analysis and interpretation.
- Introductory Organic Chemistry: Examines the compounds that comprise most living mass. Following an introduction to covalent bonding and isomerism, moves into a detailed discussion of the molecular structures and properties of various classes of organic and other biologically important compounds.
- Research Methods and Applied Statistics: Typical methods in analyzing biomedical data using descriptive and inferential statistics. Provides competence in developing research studies, conducting statistical analyses and literature reviews.
- Body in Health and Disease: Microbiology and infectious disease, immunology, cardiology, pulmonology, nephrology, endocrinology, neural science, gastroenterology and hepatology, hematology, oncology and rheumatology.
- Molecular Metabolism: This module of the Foundations in Biomedical Sciences curriculum focuses on the biochemical, cellular and molecular mechanisms that regulate cell and tissue-specific fuel metabolism. The course will present an integrated view of biochemistry and the control of cellular and organismal functions with regard to nutrient utilization. Mechanisms that allow cells to survive variations in nutrient supply (starvation, feeding, and nutrient stress) and metabolic derangements that contribute to disease pathogenesis (e.g. diabetes, obesity, cancer) will be discussed.
- Cells, Molecules, and Genes: This course integrates molecular and cell biology, biochemistry, and medical genetics by using clinical cases to illuminate the material. The course includes the following topics: gene expression, signal transduction, cell cycle regulation, organization of cytoplasm, membrane traffic and cell motility, protein structure and function, energy production and utilization, and intermediary metabolism. Basic genetic concepts and the role of genes in disease processes and susceptibilities incidence and broad spectrum of human genetic disease, the importance of taking a family history, and the procedures used for diagnosing genetic diseases.
- Principles of Functional Medicine: Presents the fundamental concepts of functional medicine, including genetic predisposition to illness, biochemical individuality, environmental factors (nutrition/diet, xenobiotics, exercise, physical trauma, psychosocial changes), physiologic functions and imbalances, triggers and mediators of illness, and common clinical imbalances.
 - Behavioral Genetics
 - Biological Sciences
 - Biostatistics
 - Epidemiology



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- Foundations of Health & Wellness
- Herbal Pharmacology & Phytochemistry
- Human Reproductive Biology
- Information Literacy
- Macrobiology
- Microbiology
- Pharmacognosy
- Practitioner Skills
- Research Methods & Informatics

Additionally, any nutrition courses in excess of those already applied to the nutrition-specific coursework may be applied to the life sciences requirements.