

Nutrition Science Learning Objectives

1. General Research Skills
 - Evidence of and for causality; developing hypotheses
 - Research design including selection of appropriate experimental models; design of experimental diets for animals and human subjects
 - Statistical methods
 - Ethics, approval from review boards, laboratory safety, issues in individual and community trials
2. Structure and biochemical and metabolic functions of nutrients and other dietary constituents
 - Physiological and biochemical basis for nutrient requirements
 - Chemical structure and biochemical and metabolic functions of essential and nonessential nutrients
 - Motifs of absorption and transport of nutrients
 - Integration, coordination, and regulation of macro- and micronutrient metabolism
 - Regulation of nutrient metabolism and nutritional needs by hormones and growth factors
 - Interaction of nutrients with the genome; nutrient control of gene expression; DNA stability
 - Cellular basis of chronic diseases and degeneration
 - Dietary bioactive components (functional foods); nontraditional roles of nutrients; prebiotics and probiotics
3. Food, diets, and supplements
 - Food sources of nutrients and factors affecting nutrient bioavailability
 - Effect of food processing and handling on nutrient content and bioavailability
 - Nutritional toxicology including upper limits of intake; nutrient-nutrient and drug-nutrient interactions
 - Planning and assessing adequacy of diets, including under- and overnutrition
 - Cultural and social factors affecting food intake and choices
 - Dietary Reference Intakes (DRI); food guide pyramid
 - Nutrient supplements including risk/benefit ratios; life stage issues; component bioavailability
4. Nutritional status assessment
 - ABCD: anthropometry, biochemistry, clinical, dietary
 - Specificity and sensitivity of common tests; receiver operating characteristic (ROC) curves
 - Functional assessments including immunological, cognitive, and pregnancy outcomes

- Molecular markers of nutrient intake including gene arrays and analytical chips
 - Nutritional epidemiology
5. Nutrition and disease
- Clinical nutrition
 - Impact of disease and genetics on nutrient function and requirements
 - Interactions of etiologies of chronic diseases with nutrition
 - Genetic basis of inherited metabolic disease
 - Design of diets for treatment and management of disease (diet therapy)
6. Nutrition interventions and policies

ASSESSMENT

- Situation assessment including screening, prevalence, at-risk groups, hunger, malnutrition, overnutrition
- Determinants: economic, supply/demand, medical, cultural, care-giving, intrahousehold and community food distribution
- Food supply, seasonality, security, dietary quality, preservation
- Surveillance and monitoring

INTERVENTIONS

- Program development planning and evaluation with quantitative and qualitative methods
- Nutrition education and behavior change theories and approaches
- Sustainability, community decision-making and involvement
- Fortification and supplementation
- Food-based approaches including food systems, agriculture, breeding, genetic modification of plants
- Programs of government, nongovernmental, and private sector organizations
- Economics including taxes, subsidies, cost-benefit analysis

7. Analytical skills

- Principles and techniques for determining biologically and nutritionally important macromolecules and small molecules, including detection limits and analytical specificity and sensitivity
- Basic techniques of molecular biology including polymerase chain reaction, recombinant DNA, blotting
- Gene arrays, microchips, metabolomics
- Isotope tracer methodology including stable and radioactive isotope methodology
- Kinetic modeling