NUTRITIONAL BIOCHEMISTRY AND METABOLISM, BS

Degree: Bachelor of Science (BS)
Major: Nutritional Biochemistry and Metabolism

Program Overview

Nutritional Biochemistry and Metabolism is the study of nutrients and their metabolic functions. This degree program also prepares the students for graduate studies in nutrition or metabolic research or for further training for careers in medicine, dentistry, and other allied health professions.

The BS in Nutritional Biochemistry and Metabolism is easily combined with majors such as Psychology, Sociology, Chemistry, Biology or Communication Sciences. It will also easily accommodate the requirements of a pre-health curriculum.

Learning Outcomes

- Define nutrition and basic terms such as essential nutrients, vitamins, minerals, classes of nutrients, nutrient and energy density, Recommended Dietary Allowance and Adequate Intake.
- Describe the metabolic roles of carbohydrate, dietary fiber, lipids/fatty acids, protein/amino acids and minerals, and the interactions among them, and identify the clinical signs and symptoms of inadequacy, deficiency and toxicity.
- Discuss vitamins in detail, including classification, metabolic rates, functions, sources, implications of toxicity and deficiency, appropriate determination of human need, and requirements throughout the lifecycle.
- Apply the basis for digestion of food, gut microbiota and the absorption, transport, storage, and utilization of fuels in health and disease.
- Explain the basic and intermediate foundations of nutrition and metabolism in inorganic and organic chemistry, biology, and biochemistry.
- Demonstrate basic and intermediate laboratory techniques in chemical analysis, synthesis and characterization, thermochemistry chemical kinetics, and microscale operations.
- Discuss the science, rationale, and validity of various metabolic health and nutrition assessment tools, screens, and methodologies routinely used in clinical/research settings.
- Compare the strengths, weaknesses, and limitations of different validated (or not validated) metabolic health and nutrition assessment tools, screens, and methodologies.
- Examine data generated from validated metabolic health and nutrition assessment tools, screens, and methodologies to determine proper application, recommendation, or significance.
- Interpret nutrition science and utilize research outcomes to appropriately address food and nutrition problems in the clinical sector.
- Critique original research articles and communicate research findings to both academic and lay audiences.
- Demonstrate intermediate mathematical analysis and descriptive and evaluative statistical techniques used in academic and clinical research.

Didactic Program in Dietetics

Students interested in applying to dietetic internships must meet specific course requirements (Didactic Program in Dietetics) as required by the Accreditation Council for Education in Nutrition and Dietetics of the Academy of Nutrition and Dietetics. These requirements are met in the courses that comprise the Didactic Program in Dietetics (DPD). A department advisor should be consulted in the first year to plan the dietetics coursework.

The DPD at Case Western Reserve University is currently granted Accreditation by the Accreditation Council for Education in Nutrition and Dietetics of the Academy of Nutrition and Dietetics, 120 South Riverside Plaza, Suite 2000, Chicago, IL 60606-6995, 800.877.1600.

Undergraduate Policies

For undergraduate policies and procedures, please review the Undergraduate Academics section of the General Bulletin.

Accelerated Master's Programs

Undergraduate students may participate in accelerated programs toward graduate or professional degrees. For more information and details of the policies and procedures related to accelerated studies, please visit the Undergraduate Academics section of the General Bulletin.

Program Requirements

Students seeking to complete this major and degree program must meet the general requirements for bachelor's degrees and the Unified General Education Requirements. Students completing this program as a secondary major while completing another undergraduate degree program do not need to satisfy the school-specific requirements associated with this major.

Code	Title	Credit Hours
Required Courses:		
NTRN 201	Nutrition	3
NTRN 363	Human Nutrition I: Energy, Protein, Minerals	3
NTRN 364	Human Nutrition II: Vitamins	3
NTRN 397	Research Methods and Disciplinary Communications in Nutrition	3
NTRN 398	SAGES Senior Capstone Experience	3
NTRN 452	Nutritional Biochemistry and Metabolism	3
Nutrition Electives:		
Choose three (3 credit hour) NTRN electives at 300-level [a]		9
Additional Required Courses:		
MATH 121	Calculus for Science and Engineering I	4
MATH 122 or MATH 124	Calculus for Science and Engineering II Calculus II	4
MATH 223 or MATH 227	Calculus for Science and Engineering III Calculus III	3
MATH 224 or MATH 228	Elementary Differential Equations Differential Equations	3
CHEM 105	Principles of Chemistry I	3

CHEM 106	Principles of Chemistry II	3
CHEM 113	Principles of Chemistry Laboratory	2
CHEM 223	Introductory Organic Chemistry I	3
or CHEM 323	Organic Chemistry I	
CHEM 224	Introductory Organic Chemistry II	3
or CHEM 324	Organic Chemistry II	
CHEM 233	Introductory Organic Chemistry Laboratory I	2
CHEM 234	Introductory Organic Chemistry Laboratory II	2
BIOL 214	Genes, Evolution and Ecology	3
BIOL 215	Cells and Proteins	3
BIOL 216	Development and Physiology	3
or BIOL 340 & BIOL 346	Human Physiology and Human Anatomy	
BIOL 216L	Development and Physiology Lab	1
PHYS 115	Introductory Physics I	4
or PHYS 121	General Physics I - Mechanics	
or PHYS 123	Physics and Frontiers I - Mechanics	
PHYS 116	Introductory Physics II	4
or PHYS 122	General Physics II - Electricity and Magnetism	
or PHYS 124	Physics and Frontiers II - Electricity and Magnetism	
PHYS 221	Introduction to Modern Physics	3
BIOC 307	Introduction to Biochemistry: From Molecules To Medical Science	4
BIOC 334	Structural and Computational Biology	3
or BIOC 312	Proteins and Enzymes	
or NTRN 454	Advanced Nutrition and Metabolism: Investigative Methods	
STAT 201	Basic Statistics for Social and Life Sciences	3
or STAT 243	Statistical Theory with Application I	
or STAT 312	Basic Statistics for Engineering and Science	
or STAT 313	Statistics for Experimenters	
Total Credit Hours		**90**

Didactic Program in Dietetics (DPD) [b]

Code	Title	Credit Hours
Required Courses:		
NTRN 201	Nutrition	3
NTRN 337	Nutrition Communication, Counseling and Behavior Change Strategies	3
or NTRN 437	Nutrition Communication, Counseling and Behavior Change Strategies	
NTRN 342	Food Science	3
NTRN 342L	Food Science Lab	2
NTRN 350	Community Nutrition	3
NTRN 351	Food Service Systems Management	3
or NTRN 451	Food Service Systems Management	
NTRN 363	Human Nutrition I: Energy, Protein, Minerals	3-4
or NTRN 433	Advanced Human Nutrition I	
NTRN 364	Human Nutrition II: Vitamins	3
or NTRN 434	Advanced Human Nutrition II	
NTRN 365	Nutrition for the Prevention and Management of Disease: Pathophysiology	4
BIOC 307	Introduction to Biochemistry: From Molecules To Medical Science	4
BIOL 216	Development and Physiology	3
or BIOL 340 & BIOL 346	Human Physiology and Human Anatomy	
BIOL 343	Microbiology	3
CHEM 223	Introductory Organic Chemistry I	3
SOCI 101	Introduction to Sociology	3
ANTH 215	Health, Culture, and Disease: An Introduction to Medical Anthropology	3
or SOCI 311	Health, Illness, and Social Behavior	
Choose one of the following:		*3*
ANTH 319	Introduction to Statistical Analysis in the Social Sciences	
STAT 201	Basic Statistics for Social and Life Sciences	
PSCL 282	Quantitative Methods in Psychology	
PQHS 431	Statistical Methods I	
STAT 243	Statistical Theory with Application I	
STAT 312	Basic Statistics for Engineering and Science	
STAT 313	Statistics for Experimenters	
UGER Experience Portfolio		
Nutrition Electives:		
Choose two NTRN courses at 300-level [c]		6
Total Credit Hours		**55-56**

a Excluding NTRN 370.
b Please contact DPD Director in Department of Nutrition to confirm DPD courses and other requirements.
c Excluding NTRN 341 and NTRN 370.

Sample Plan of Study

First Year		
Fall		**Credit Hours**
BIOL 214	Genes, Evolution and Ecology	3
CHEM 105	Principles of Chemistry I	3
CHEM 113	Principles of Chemistry Laboratory	2
MATH 121	Calculus for Science and Engineering I	4
Academic Inquiry Seminar, Breadth, or Elective course [a]		3
	Credit Hours	**15**
Spring		
BIOL 215	Cells and Proteins	3
CHEM 106	Principles of Chemistry II	3
MATH 122	Calculus for Science and Engineering II	4
NTRN 201	Nutrition	3
Academic Inquiry Seminar, Breadth, or Elective course [a]		3
	Credit Hours	**16**
Second Year		
Fall		
BIOL 216	Development and Physiology	3
BIOL 216L	Development and Physiology Lab	1
CHEM 223	Introductory Organic Chemistry I	3

CHEM 233	Introductory Organic Chemistry Laboratory I	2
MATH 223	Calculus for Science and Engineering III	3
Breadth, or Elective course [a]		3
	Credit Hours	**15**
Spring		
CHEM 224	Introductory Organic Chemistry II	3
CHEM 234	Introductory Organic Chemistry Laboratory II	2
MATH 224	Elementary Differential Equations	3
Breadth, or Elective course [a]		3
Elective		6
	Credit Hours	**17**
Third Year		
Fall		
BIOC 307	Introduction to Biochemistry: From Molecules To Medical Science	4
NTRN 363	Human Nutrition I: Energy, Protein, Minerals	3
PHYS 115	Introductory Physics I	4
Breadth, or Elective course [a]		3
Elective		3
	Credit Hours	**17**
Spring		
NTRN 364	Human Nutrition II: Vitamins	3
NTRN 397	Research Methods and Disciplinary Communications in Nutrition	3
PHYS 116	Introductory Physics II	4
STAT 201	Basic Statistics for Social and Life Sciences	3
Breadth, or Elective course [a]		3
	Credit Hours	**16**
Fourth Year		
Fall		
NTRN 398	SAGES Senior Capstone Experience	3
NTRN 452	Nutritional Biochemistry and Metabolism	3
PHYS 221	Introduction to Modern Physics	3
Breadth, or Elective course [a]		3
NTRN Elective		3
	Credit Hours	**15**
Spring		
NTRN 454	Advanced Nutrition and Metabolism: Investigative Methods	3
NTRN Electives		6
Breadth, or Elective course [a]		3
Elective		3
	Credit Hours	**15**
	Total Credit Hours	**126**

a Unified General Education Requirement.