

Nutritional Sciences

College of Medicine

The impact of nutrition on health and disease has produced major clinical and public policy challenges that are shaping research and career opportunities for highly trained nutritional scientists in academia, industry and government. Disease prevention efforts, increased health consciousness and an aging population are further fueling the demand for nutritional scientists. The interdisciplinary Division of Nutritional Sciences enables students in its Ph.D. and Master's of Science programs to explore the interrelationship between environmental factors and nutrients and their effect on biochemistry, physiology and disease development. More than 50 faculty members provide teaching and individualized research guidance across over 20 departments and divisions in the University's Colleges of Medicine, Health Sciences and Agriculture, as well as the Colleges of Pharmacy, Nursing, and Education.

One of the Center's primary areas of research and training targets nutrition and chronic diseases, with a focus on obesity and associated disorders of cardiovascular disease, diabetes and cancer. Other specialty areas include nutrition and oxidative stress, nutrition and aging, clinical nutrition, animal nutrition and food science.

Further information may be obtained by writing to the Director of Graduate Studies, Division of Nutritional Sciences, 521 CTW Building, 900 South Limestone, University of Kentucky, Lexington, KY 40536-0200.

Applicants for the Ph.D. and Master's of Science programs must meet admissions requirements for the both the University of Kentucky Graduate School and for the Division of Nutritional Sciences.

Master of Science

Admission Requirements

1. A baccalaureate degree from a fully accredited institution of higher learning.
2. A minimum undergraduate grade point average of 2.9 on undergraduate coursework and a 3.0 on all graduate work.
3. An average Graduate Record Examination (GRE) score on the verbal, quantitative and analytical sections greater than the 30th percentile.
4. For international applicants, a minimum score of 550 on the paper-based Test of English as a Foreign Language (TOEFL), which has a maximum score of 667; score of 213 on the computer-based TOEFL (maximum 300), or 79 on the internet-based TOEFL. The minimum International English Language Testing Service (IELTS) score is a 6.5. All applicants must demonstrate proficiency in verbal and written English.
5. Admission for the M.S. in Nutritional Sciences with Clinical Nutrition Emphasis is limited to those with a B.S. in Dietetics, having an RD, or being RD eligible.
6. Course Prerequisites: you would need to have taken an undergraduate physiology course (PGY 206 at UK) and it is highly recommended that you have taken 1 year of general chemistry (CHE 105 and 107 at UK) and 1 semester of organic chemistry (CHE 236 at UK). Biochemistry is also a prerequisite course but it can be taken your first semester for graduate credit (BCH 401G). It has prerequisites of CHE 107 and CHE 236.

Admissions Process

All those interested in graduate study at the University of Kentucky Graduate School must apply online

via Hobson's ApplyYourself Application Network. There is a \$65 application fee for domestic applicants and a \$75 application fee for international applicants. Please note that the application cannot be submitted without paying this fee.

The following information must be submitted online to the Graduate School via ApplyYourself:

1. Transcripts from all higher education institutions attended. The Graduate School requires an overall grade point average of 2.9 on all undergraduate work, and a 3.00 on all graduate work
2. GRE scores are required for admission. GRE scores should be sent directly from Educational Testing Service (ETS); the Institutional Code for the GRE for the UK Graduate School is R1837.
3. TOEFL or IELTS scores are required for all applicants whose native language is not English. TOEFL scores should be sent directly from Educational Testing Service (ETS); the Institutional Code for the TOEFL for the UK Graduate School is R1837. IELTS scores should be sent directly from the International English Language Testing Service, specifying the University of Kentucky Graduate School, Lexington KY as the recipient institution.
4. Curriculum vitae.
5. A brief essay, no longer than two single-spaced pages, describing long-term career goals and how the M.S. Program in Nutritional Sciences would advance these goals.
6. Three letters of recommendation.
7. Research Assistantship Application Form (optional): <http://pharmns.med.uky.edu/pharmns-research-assistant-application-form>.

Research Assistantships

Applicants who have been accepted into the M.S. program and can also apply for a Research Assistantship with individual faculty. Interested applicants should submit a completed Research Assistantship Application Form with their application materials to the Center's Director of Graduate Studies by the application deadline listed below.

Degree Requirements

Prerequisites-200 level or equivalent physiology course. Recommended a 400 level biochemistry course

| Core Courses | Total credits required for degree (30) | |
|----------------|------------------------------------------|---------------|
| NS/CNU 601 | Integrated Nutritional Sciences Part I | 3 credits |
| NS/ASC/CNU 602 | Integrated Nutritional Sciences Part II | 3 credits |
| NS/CNU/FCS 603 | Integrated Nutritional Sciences Part III | 2 credits |
| NS/CNU/NFS704 | Current Topics | 1 credit |
| STA 570 | Basic Statistical Analysis | 4 credits OR |
| IBS 611 | Practical Statistics | 1 credit |
| NS 771 | Seminar in Nutritional Sciences | 0-1** credits |
| NS/CNU/NFS 782 | Special Problems | 1-6* credits |
| NS/CNU 609 | Ethics | 1 credits |

Core Credits = 15 *Plan B Only **Plan A Only

Courses for Emphasis in Clinical Nutrition Prerequisite- B.S. in Dietetics and/or meeting ADA Dietetics requirements for internship

| | | |
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| CNU 501 | Nutraceuticals and Functional Foods | 2 credits OR |
| CNU 502 | Obesity: Cell to Community | 2 credits |
| NS/CNU 702 | Clinical Nutrition Problem Based Case Studies | 1-3 credits |

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|-------------------------------------------------------------------------|--------------------------------------------------|-----------|
| CNU 611 | Advanced Medical Nutrition Therapy | 2 credits |
| CNU 612 | Examination Skills for the Clinical Nutritionist | 2 credits |
| Emphasis Credits = 8-10 Electives to equal a minimum of 30 credit hours | | |

Courses for Emphasis in Wellness and Sports Nutrition

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|-----------------------------------------------------------------------|------------------------------------------|-----------|
| NS/CNU 605 | Wellness and Sports Nutrition | 3 credits |
| KHP 600 | Exercise Stress Testing and Prescription | 3 credits |
| KHP 620 | Advanced Exercise Physiology | 3 credits |
| CNU 501 | Nutraceuticals and Functional Foods | 2 credits |
| Emphasis credits = 14 Electives to equal a minimum of 30 credit hours | | |

Courses for Emphasis in Community Nutrition

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|----------------------------------------------------------------------|----------------------------------------|-----------|
| CPH 605 | Epidemiology | 3 credits |
| DHN 603 | Advanced Community Program Development | 3 credits |
| DHN 607 | Food Related Behaviors | 3 credits |
| Emphasis credits= 15 Electives to equal a minimum of 30 credit hours | | |

Courses for Emphasis in Molecular and Biochemical Nutrition

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| BCH 607 (IBS 601) | Biomolecules & Metabolism | 3 credits |
| BCH 608 | Biomolecules and Molecular Biology | 3 credits OR |
| IBS 602 | Molecular Biology & Genetics | 3 credits |
| NS/CNU 606 | Molecular Biology Applications in Nutrition | 2 credits |
| Emphasis Credits= 8 Electives to equal a minimum of 30 credit hours | | |

Approved Electives

The student must successfully complete a minimum of 6 credit hours in electives. Elective courses are recommended by the DGS and/or the Advisor.

Suggested elective courses include:

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|------------|--------------------------------------------------|-------------|
| IBS 604 | Cell Signaling | 3 credits |
| IBS 605 | Experimental Genetics | 2 credits |
| IBS 607 | Seminar in Integrated Biomedical Sciences | 0 credit |
| IBS 609 | Research in Integrated Biomedical Sciences | 1 credit |
| NS/CNU 606 | Molecular Biology Applications in Nutrition | 2 credits |
| CNU 501 | Nutraceuticals and Functional Foods | 2 credits |
| CNU 502 | Obesity: Cell to Community | 2 credits |
| CNU 611 | Advanced Medical Nutrition Therapy | 2 credits |
| CNU 612 | Examination Skills for the Clinical Nutritionist | 2 credits |
| CNU/NS 604 | Lipid Metabolism | 3 credits |
| CNU/NS 605 | Wellness and Sports Nutrition | 3 credits |
| CNU/NS 702 | Problem-Based Case Studies | 1-5 credits |
| ASC 681 | Energy Metabolism | 3 credits |
| ASC 683 | Protein metabolism | 3 credits |
| ASC 689 | Physiology of Nutrient Digestion/Absorption | 3 credits |
| ASC 684 | Advanced Ruminant Nutrition | 3 credits |
| ASC 686 | Advanced Non-ruminant Nutrition | 3 credits |
| FSC 638 | Food Proteins | 3 credits |
| FSC 640 | Food Lipids | 3 credits |
| FSC 434G | Food Chemistry | 4 credits |

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|----------------|----------------------------------------------|-----------|
| BCH 610 | Biochemistry of Lipids and Membranes | 3 credits |
| BCH/BIO/MI 615 | Molecular Biology | 3 credits |
| CPH 605/PM 620 | Epidemiology | 3 credits |
| CPH 645 | Food Systems, Malnutrition and Public Health | 3 credits |
| EDP 661 | Counseling Techniques II | 3 credits |
| GS 610 | College Teaching | 3 credits |
| KHP 420G | Physiology of Exercise | 3 credits |
| KHP 621 | Advanced Exercise Physiology | 3 credits |
| KHP 621 | Exercise and Coronary Heart Disease | 3 credits |
| KHP 720 | Sport Medicine | 3 credits |
| KHP 781 | Theory and Methodology of Body Composition | 3 credits |
| MI 685 | Advanced Immunology | 3 credits |
| MI 710 | Molecular Cell Biology | 3 credits |
| PGY 604 | Advanced Cardiovascular Physiology | 3 credits |
| PGY 607 | Hormonal Control Mechanisms | 3 credits |
| BCH 609 | Plant Biochemistry | 3 credits |

Doctor of Philosophy

Admission Requirements

There are two ways to be admitted into the PhD program:

- Direct Admission <http://pharmns.med.uky.edu/pharmns-phd-application> or
- IBS Program <http://www.mc.uky.edu/ibs/default.asp>

Direct Admission Requirements for the Ph.D. Program

Applicants must meet the following requirements for admission to the University of Kentucky Graduate School and the Graduate Center for Nutritional Sciences:

1. A baccalaureate degree from a fully accredited institution of higher learning.
2. An M.S. degree with a Grade Point Average (GPA) of 3.2 or above on a 4.0 scale, or a B.S. degree with a GPA of 3.0 or above on a 4.0 scale.
3. An average Graduate Record Examination (GRE) score on the verbal, quantitative and analytical sections that is greater than the 50th percentile.
4. For international applicants, a minimum score of 550 out 667 maximum possible is required on the paper-based Test of English as a Foreign Language (TOEFL), a minimum 213 score on the computer-based TOEFL (maximum 300), or 79 on the internet-based TOEFL. The minimum International English Language Testing Service (IELTS) score is 6.5. All applicants must demonstrate proficiency in verbal and written English.
5. Course Prerequisites: an undergraduate physiology course (PGY 206 at UK), 1 year of general chemistry (CHE 105 and 107 at UK), and 1 semester of organic chemistry (CHE 236 at UK).

Application Process

All those interested in graduate study at the University of Kentucky Graduate School must apply online via Hobson's ApplyYourself Application Network. There is a \$65 application fee for domestic applicants and a \$75 application fee for international applicants. Please note that the application cannot be submitted without paying this fee.

The following information must be submitted online to the Graduate School via ApplyYourself:

1. Transcripts from all higher education institutions attended. The Graduate School requires an average of 2.9 on all undergraduate work, and a 3.00 on all graduate work. Please note: the Graduate Center for Nutritional Sciences requirements are higher. GRE scores are required for admission. GRE scores should be sent directly from Educational Testing Service (ETS); the Institutional Code for the GRE for

the UK Graduate School is R1837.

2. TOEFL or IELTS scores are required for all applications whose native language is not English. TOEFL scores should be sent directly from ETS; the Institutional Code for the TOEFL for the UK Graduate School is R1837. IELTS scores should be sent directly from the IELTS, specifying the University of Kentucky Graduate School, Lexington, KY as the recipient institution.
3. Curriculum vitae
4. A brief essay, no longer than two single-spaced pages, describing long-term career goals and how the Ph.D. Program in Nutritional Sciences would advance these goals.
5. Three letters of recommendation
6. Completed Research Assistant Application Form (<http://pharmns.med.uky.edu/pharmns-research-assistant-application-form>).

Research Assistantships and Laboratory Rotations

Ph.D. applicants are required to apply for a Research Assistantship, which represents an integral part of the Ph.D. program. Applicants accepted into the Ph.D. program also may apply to participate in a Laboratory Rotation Program. This program enables students to work four to nine months in as many as three laboratories before selecting an advisor.

Degree Requirements

Doctoral Degree Requirements

Students are required to complete the core curriculum. Elective courses to be taken will be recommended by the advisory committee.

Academic Course Prerequisites to Program:

Biology (2 semesters)

General Chemistry (2 semesters)

Organic Chemistry (1 semester)

Undergraduate Biochemistry and Physiology

Some courses are cross-listed with other units and departments, but for clarity only the “NS” prefixes are listed below.

Core Curriculum

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|-----------|-------------------------------------------------------------|--------------|
| NS 601 | Integrated Nutritional Sciences I | 3 credits |
| NS 602 | Integrated Nutritional Sciences II | 3 credits |
| NS 603 | Integrated Nutritional Sciences III | 2 credits |
| NS 704 | Current Topics in Nutrition | 1 credit |
| NS 771 | Graduate Seminar in Nutritional Sciences | 1 credit** |
| NS 609 | Ethics in Clinical Research | 1 credit OR |
| TOX 600 | Ethics in Scientific Research | 1 credits |
| STA 570 | Basic Statistical Analysis | 4 credits OR |
| IBS 611 | Practical Statistics | 1 credit |
| IBS 601 | Biomolecules & Metabolism | 3 credits OR |
| IBS 602 | Molecular Biology & Genetics | 3 credits |
| IBS 603 | Cell Biology | 3 credits |
| IBS 606 | Integrated Medical Sciences | 3 credits OR |
| PGY 502 | Principles of Systems, Cellular and Molecular Physiology OR | 5 credits |
| PGY 412G | Principles of Human Physiology | 4 credits |
| Electives | Electives | 7-12 credits |
| Total | | 36 credits |

****All Ph.D. students must register for 0 credit (except for the one semester registered for 1 credit) and attend all GCNS seminars during their residency at the University of Kentucky. Minimum of 1 credit is required before qualifying examination. In addition, all GCNS doctoral candidates will present a seminar once/year post-qualifying exam.**

Electives The student must successfully complete a minimum of 7 credit hours in electives. Elective courses are recommended by the Advisor and approved by the Advisory Committee.

Suggested courses are listed below:

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|----------------|-----------------------------------------------------------|-------------|
| IBS 607 | Seminar in Integrated Biomedical Sciences | 0 credit |
| IBS 608 | Special Topics in Integrated Biomedical Sci. | 2 credits |
| IBS 609 | Research in Integrated Biomedical Sciences | 1 credit |
| IBS 610 | Critical Readings/Small Groups | 2 credits |
| NS/CNU 606 | Molecular Biology Applications in Nutrition | 2 credits |
| NS 790 | Research in Nutritional Sciences (before qualifying exam) | 1-6 credits |
| CNU 501 | Nutraceuticals and Functional Foods | 2 credits |
| CNU 502 | Obesity: Cell to Community | 2 credits |
| CNU 611 | Advanced Medical Nutrition Therapy | 2 credits |
| CNU 612 | Examination Skills for the Clinical Nutritionist | 2 credits |
| CNU/NS 604 | Lipid Metabolism | 3 credits |
| CNU/NS 605 | Wellness and Sports Nutrition | 3 credits |
| CNU/NS 702 | Problem-Based Case Studies | 1-5 credits |
| ASC 681 | Energy Metabolism | 3 credits |
| ASC 683 | Protein metabolism | 3 credits |
| ASC 689 | Physiology of Nutrient Digestion/Absorption | 3 credits |
| ASC 684 | Advanced Ruminant Nutrition | 3 credits |
| ASC 686 | Advanced Non-ruminant Nutrition | 3 credits |
| FSC 638 | Food Proteins | 3 credits |
| FSC 640 | Food Lipids | 3 credits |
| FSC 434G | Food Chemistry | 4 credits |
| BCH 610 | Biochemistry of Lipids and Membranes | 3 credits |
| BCH/BIO/MI 615 | Molecular Biology | 3 credits |
| CPH 605/PM 620 | Epidemiology | 3 credits |
| CPH 645 | Food Systems, Malnutrition and Public Health | 3 credits |
| EDP 605 | Counseling Techniques | 3 credits |
| GS 610 | College Teaching | 3 credits |
| KHP 420G | Physiology of Exercise | 3 credits |
| KHP 620 | Advanced Exercise Physiology | 3 credits |
| KHP 621 | Exercise and Coronary Heart Disease | 3 credits |
| KHP 720 | Sport Medicine | 3 credits |
| KHP 781 | Theory and Methodology of Body Composition | 3 credits |
| MI 685 | Advanced Immunology | 3 credits |
| MI 710 | Molecular Cell Biology | 3 credits |
| PGY 604 | Advanced Cardiovascular Physiology | 3 credits |
| PGY 607 | Hormonal Control Mechanisms | 3 credits |
| BCH 609 | Plant Biochemistry | 3 credits |

Residency Requirement

| | | |
|--------|--------------------------------------------------------------------|---------------|
| NS 767 | Residency Credit in Nutritional Sciences (post-qualifying exam) | 2 hr/semester |
|--------|--------------------------------------------------------------------|---------------|

Course Descriptions

NS 601 INTEGRATED NUTRITIONAL SCIENCES I. (3)

The material covered in CNU/NS 601 consists of three major emphasis areas: (1) review of carbohydrate, lipid, and protein structure, synthesis, absorption, and metabolism, (2) the impact of nutritional influences on macronutrient metabolism to health and disease, (3) the influence of macronutrient metabolism on the regulation of energy balance. Prereq: IBS 601, PGY 206. (Same as CNU 601.)

NS 602 INTEGRATED NUTRITIONAL SCIENCES II. (3)

Integrated study of the properties, metabolism, biochemical and physiological functions and interactions of vitamins and minerals, and their relationships to chronic diseases, deficiency symptoms and toxicity. Prereq: IBS 601, PGY 206. (Same as ASC/CNU 602.)

NS 603 INTEGRATED NUTRITIONAL SCIENCES III. (2)

This course is aimed at providing medical and health professional students with a working knowledge of dietary requirements and guidelines, nutritional assessment and nutritional requirements, food safety issues and nutritional needs throughout the lifecycle. Prereq: Health Professional Graduate Status. (Same as CNU/FSC 603.)

NS 605 WELLNESS AND SPORTS NUTRITION. (3)

Emphasis is directed toward nutrition as applied to prevention of disease through lifestyle management and the application of nutrition in exercise and sport. Targeted focus areas are: body composition and energy expenditure, the metabolic basis of weight management, nutrient needs throughout the lifecycle, the metabolic changes associated with obesity, behavioral management of obesity, nutrient metabolism and exercise, water and electrolyte balance during exercise, nutritional ergogenic aids, nutrition-strength and performance enhancement. Prereq: PGY 412G, and BCH 401G or equivalent or consent of instructor. (Same as CNU/PT 605.)

NS 606 MOLECULAR BIOLOGY APPLICATIONS IN NUTRITION. (2)

Focus will be on the use of the most recently developed techniques and model systems in molecular biology for studying nutrient regulation of gene expression. Examples include current problems in nutrition such as models for engineering plants containing more desirable nutrient sources (fats); for studying effects of various nutrients in transgenic mice on tumor suppressor genes and oncogene expression, that are important in cancer prevention; and for studying nutrient effects on genes that modulate obesity. Prereq: BCH 501 and 502 or equivalent; or BCH 401G and consent of instructor. (Same as CNU 606.)

NS 608 NUTRITIONAL IMMUNOLOGY. (3)

Theories and mechanisms of immunity will be introduced. The effects of nutrition on immunity will be discussed from experimental and clinical perspectives. A lecture and problem-based learning approach with incorporation of student presentations, three hours per week. Prereq: PGY 412G and CNU 601, or consent of instructor. (Same as CNU 608.)

NS 609 ETHICS IN CLINICAL SCIENCES RESEARCH. (1)

Students will examine ethical issues in biomedical research using a case-study approach. Representative issues addressed may include data selection and retention, plagiarism, scientific review of grants and manuscripts, scientific misconduct, and informed consent. Prereq: Graduate student status. (Same as CNU 609.)

NS 623 PROFESSIONAL DEVELOPMENT FOR SCIENTISTS IN TRAINING. (3)

The purpose of this course is to introduce graduate students to useful topics in their quest to attain and retain a tenure track researcher position (or equivalent) at some point in their scientific future. These

subjects are not always taught by mentors or through a traditional curriculum, but they are of utmost importance in a successful career. A breadth of issues will be presented that many principal investigators would say they wished they learned in graduate school and should give students the resources to become competitive scientific professionals. (Same as PHA 623.)

NS 640 HUMAN NUTRITION: ASSESSMENT. (3)

Assessment of dietary, anthropometric and biochemical parameters of nutritional status in health and disease. Lecture, two hours; laboratory, three hours per week. Prereq: NFS 510, NFS 511 or equivalent. (Same as NFS 640.)

NS 701 NUTRITION AND CHRONIC DISEASES. (4)

Selected topics in nutritional sciences as related to health and chronic diseases, e.g., gastrointestinal disease, cancer, AIDS, diabetes, cardiovascular disease, obesity, including drug-nutrient interactions. Prereq or concur: NS/CNU 601, NS/ASC 602. (Same as CNU 701.)

NS 702 CLINICAL/WELLNESS NUTRITION PROBLEM-BASED CASE STUDIES. (1-3)

A problem-based learning approach to case studies is integrated with a traditional didactic approach to offer options in therapeutic nutrition, and/or health promotion. Efforts are directed toward patient, worksite and laboratory data interpretation as well as patient education. Students are directed to develop independent critical thinking related to class presentations including case studies regarding rotations through various medical or health services e.g. surgery, pediatrics, nutrition support and health promotion. Prereq: NS/CNU 601, NS/ASC 602, NS/CNU 701, NS/NFS 610 and graduate status or consent of instructor. (Same as CNU 702.)

NS 704 CURRENT TOPICS IN NUTRITIONAL SCIENCES. (1)

This course is designed to develop the student's independent thinking and critical analysis related to various nutritional sciences issues. These skills will be developed through reading assignments and group discussion related to current topics in nutrition. Prereq: Consent of instructor. (Same as CNU/NFS 704.)

NS 748 MASTER'S THESIS RESEARCH. (0)

Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed. (Same as NFS 748.)

NS 749 DISSERTATION RESEARCH. (0)

Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams

NS 767 DISSERTATION RESIDENCY CREDIT. (2)

Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

NS 782 SPECIAL PROBLEMS. (1-6)

Independent advanced work on a special problem in nutritional sciences. Prereq: Consent of graduate advisor. (Same as CNU/NFS 782.)

NS 790 RESEARCH IN NUTRITIONAL SCIENCES. (0-6)

Research work involving original investigation. May be repeated to a maximum of 18 credits. Prereq: Consent of graduate advisor. (Same as CNU/NFS 790.)