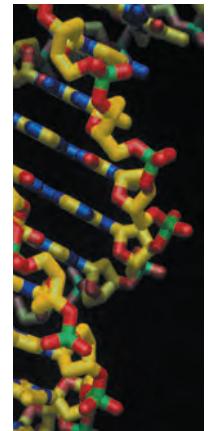
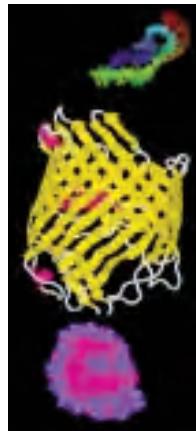


2016-2017

H A N D B O O K

Department of Nutrition



School of Public Health

School of Medicine

*University of North Carolina
at Chapel Hill*



Master of Science in Nutritional Biochemistry

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Handbook for the Master of Science in Nutritional Biochemistry

I. Program Overview

The Division of Nutritional Biochemistry offers a MS degree in Nutrition (Nutritional Biochemistry) for those students who wish to increase their knowledge in nutrition and to acquire additional skills in laboratory research. This degree will be useful for students interested in research in industry, and those considering pursuit of a doctoral degree or eventually attending medical or another professional school. MS students will perform advanced research in nutritional biochemistry and take graduate nutrition courses that will provide the information and experience needed to help them choose their career path. Additionally, for those students who are uncertain about whether they wish to enter the Department's Doctoral program, the MS program offers an excellent opportunity to determine whether a more advanced degree would be appropriate. In summary, the MS program in Nutrition allows students the opportunity to explore nutritional biochemistry at an advanced level.

A. Admissions Requirements

Applicants must hold an appropriate baccalaureate degree from a four-year college or university, or its international equivalent with a 3.0 GPA or better. Applicants must have completed coursework in the following areas: **organic chemistry, anatomy/physiology, biochemistry, and basic human nutrition**. For students whose background is strong, the nutrition course may be taken after admission. Individuals with advanced degrees (such as the M.D., D.D.S. or equivalent professional degree) are also encouraged to apply. All applicants should have relevant laboratory experience. Applicants are required to submit Graduate Record Examination (GRE) scores. Physicians and dentists may submit Medical or Dental Aptitude Test scores in lieu of GRE scores. All international applicants — except those from countries where English is the SOLE OFFICIAL language of instruction (Australia, Bahamas, Barbados, Canada — except Quebec, England, Ghana, Ireland, India, Jamaica, Kenya, New Zealand, Nigeria, Scotland, St. Vincent and the Grenadines, Trinidad, Tobago, Uganda and Wales) OR those who have received or will receive a degree from a university in the United States — must submit an acceptable, official (reported directly from ETS) Test of English as a Foreign Language (TOEFL) score. If you are currently enrolled at a U.S. institution, you must submit an official transcript or verification of degree candidate status from that institution to qualify for a TOEFL waiver. If the degree or an official verification is not received, the TOEFL score will again be required. The minimum score accepted by the Graduate School is 550 for the paper-based total (a minimum score of 50 on each section), 79 for the internet-based, and a 7 on the IELTS exam.

In addition to satisfying the TOEFL requirement, all new international students must take the University's English Proficiency Test before registering for their first semester of study, unless they have been awarded a degree from a U.S. institution or are a resident of a country where English is the language of instruction. All international applicants must also complete a financial certificate.

We recommend that you submit your online COMPLETED application before **December 1, 2016**. The MS Committee begins to offer admission in early January on a rolling basis to applicants whose applications are complete and submitted early. Applications received after December 1, 2016 will be considered on a case-by-case basis until the admission period is complete. No applications will be accepted by the Graduate School or Department after **January 12, 2017**.

Applications received before **December 15, 2016** will be eligible for consideration for Graduate School fellowships and assistantships.

http://gradschool.unc.edu/fellowships_and_funding/index.html

The Division of Nutritional Biochemistry administers the program (admissions, evaluation, etc.) with admissions decisions made by the departmental Masters of Science Committee.

B. Time Required

A minimum of four semesters of "residence credit," at least two of which must be earned in continuous registration of at least 6-credit hours on the UNC campus is required. Registration for nine or more credit hours in a semester is considered full-time and earns a full semester of residence. Six to eight credit hours earn one-half semester of residence and three to five hours earn one-fourth semester of residence. Credits earned in any summer session count toward the residency requirement on the same basis as courses taken in regular semesters. The time needed to complete all requirements will ordinarily be two years, but may be shorter. A minimum of 30-credit hours must be earned in order to graduate.

C. In-State Residence Status

Students planning to stay in North Carolina for an extended period should apply for in-state resident status for tuition purposes; it is best to begin this process immediately. Students new to the state are highly encouraged to obtain a North Carolina driver's license and register to vote. After one year of residency, application is made to the Graduate School. Appeal procedures exist for applications that are denied. The Graduate School also maintains regularly scheduled workshops on the application process. See website for more information:

<http://gradschool.unc.edu/residency/index.html>

II. FINANCIAL SUPPORT

Financial assistance is rarely available through faculty members in the Nutrition Department. Ordinarily, funds for training at the Masters level are not available from the University.

A. The Nutrition Department

The department does not offer support in the form of traineeships, or research or teaching assistantships for Master students. However, nutrition faculty members are involved in many research activities, and opportunities for employment on faculty research grants are sometimes available. Each student holding an appointment carrying either service or non-service financial support must be registered in order to hold that position.

B. Private and Public Sector

Information is available from the department's Student Services Manager regarding sources of agency funding. In addition, she can tell you how to access a list of external funding sources for which students may apply.

C. The University

Application for financial assistance may also be made to the University Scholarships and Student Aid Office.

<http://studentaid.unc.edu/>

The Resource Library at the Research Services Office offers a free computerized search service to UNC graduate students. The database includes private and public sources of research funding that can be searched by the student's area of research interest or by discipline of investigator, e.g., funding for nurses. Some agencies provide training support only, some dissertation support only and some both training and dissertation support. Some funding agencies provide dissertation support by means of competitive grant applications. Students should be aware that the deadline for applying for many of these grants might precede the funding date by as long as a year.

<http://research.unc.edu/grantsource/>

III. THE FACULTY ADVISOR

A. Assignment of Advisor

At the time of *acceptance* to the MS program, students will have already identified a faculty member with whom they plan to do their Masters research and the faculty member will have agreed to supervise the student's research. That faculty member will be the student's research advisor.

The selection of a research advisor should be based primarily on the interests of the student and the expertise that a member of the graduate faculty can provide in the research area. Students should inform the Division Director of Nutritional Biochemistry of their choice in writing, and provide a signed statement from the research advisor indicating willingness to serve in that capacity. The research advisor will serve as Chair of the Master's thesis committee, and must be a member of the Nutrition Department faculty and of the Graduate School faculty. The research advisor is responsible for conveying information about departmental expectations and procedures for the Master's thesis.

B. Student/Master Advisor Relationship

Student/faculty communication is viewed as a mutual responsibility. The research advisor will serve as the major source of guidance. The members of the division of Nutritional Biochemistry will review the progress of all MS students biannually.

C. Changing the Advisor

A student may wish to change advisors. To change advisor, the student should confer with the current and the intended advisor. A change in research advisor must be very carefully considered, as it is likely to delay significantly the student's progress through the MS program. Students may consult with the Nutritional Biochemistry Division Director or the department Chair for assistance in making such a change. A change in advisor form can be obtained from the Student Services Manager.

IV. COURSES

The student will improve his/her knowledge of nutritional biochemistry, learn research techniques in basic nutritional science, develop critical thinking skills, and perform original research. Ordinarily students will take the courses listed below; however, for those students with prior course work or experience, some courses may be exempted based on criteria established by the instructor of the course. Students are welcome to take other courses offered in nutrition and the School of Public Health.

A. Core A: Nutritional Biochemistry

Core A: Nutritional biochemistry. Graduates should understand basic principles of nutritional biochemistry and the biological mechanisms underlying the relationships between nutrient intakes, nutrient utilization, genetic factors and the development of disease and maintenance of health. This should include:

Nutritional biochemistry and physiology. Biochemical and physiological processes as affected by normal nutrition, including:

- the molecular bases for the actions of nutrients
- intermediary biochemistry and metabolism
- intracellular biochemistry: nutrients and gene expression, signal transduction
- homeostatic systems (endocrine and other)
- normal nutrient needs throughout the life cycle
- advances in knowledge of nutrient and non-nutrient components of foods.

Knowledge for this core also includes nutritional biochemistry as related to disease, including:

- relationship of nutrition to disease etiology and pathogenesis
- understanding of consequences of malnutrition, including undernutrition and overnutrition
- knowledge and understanding of the biological basis of multi-factorial chronic diseases with strong nutritional associations, such as hypertension, cardiovascular disease, diabetes mellitus, cancer, and osteoporosis, and specific nutrient deficiency diseases, such as the anemias, and vitamin and mineral deficiencies
- effects of drug-nutrient interactions

Core courses:

- | | |
|----------|--|
| NUTR 600 | Human Metabolism: Macronutrients (3 credits) |
| NUTR 620 | Human Metabolism: Micronutrients (3 credits) |
| NUTR 845 | Advanced Nutritional Metabolism (3 credits) |

B. Core B: Research Methods

Core B: Research Methods. Graduates should understand methods used in the design and implementation of nutrition research, including the basics of epidemiology and biostatistics. Basic elements of research design will be tested in the doctoral comprehensive exam.

Core courses:

- | | |
|----------|--|
| BIOS 600 | Principles of Statistical Inference (3 credits) –or– |
| BIOS 610 | Biostatistics for Laboratory Sciences (3 credits) |
| EPID 600 | Principles of Epidemiology (3 credits) |
| SPHG 600 | Introduction to Public Health (3 credits) |

Note: These three courses are required for all graduates of the School of Public Health. To exempt a School of Public Health required course, the student must make a formal request to the Department teaching the course. Exemption forms may be obtained from the Student Services Manager.

DOCTORAL SEMINAR (NUTR 885) also contributes to the development of research methods core competency. MS students are required to participate for four semesters in the weekly Doctoral Seminar that serves as a forum to discuss current, controversial topics appearing in the nutrition literature and to present students' research in progress. It is also a forum for regular interaction among doctoral students and faculty. The topics covered, and the development of *critical thinking skills* through discussions will help students to prepare for the masters comprehensive exam, and for the continued reading of the scientific literature required of scholars. In addition to the Doctoral Seminar, MS students will attend all Nutritional Biochemistry seminars.

C. Critical Thinking

In addition to core research methods learned in basic biostatistics and epidemiology courses (as well as other core nutrition courses), MS students will perform independent research that expands the boundaries of knowledge in basic nutrition science. Independent research includes:

- Formulating an original research question.
- Understanding alternate research designs, and methods, including sample selection methods. These methods are unique to the analysis of nutritional factors as either exposures or outcomes, be they in laboratory, clinical or population-based small or large group settings.
- Carrying out a research project, including appropriate skills for collecting data and/or using secondary data.
- Using statistical and analytic skills to test hypotheses and interpret results.
- Reporting the research findings in an original thesis and in papers for scholarly journals.

Students will develop competency in research methods through advanced courses, individual mentoring, and hands-on experience as they conduct their own research.

D. Other Nutritional Biochemistry Courses

MS students specializing in nutritional biochemistry must take at least two (2) of the following 2-credit seminar courses. At least one of the listed courses will be taught each semester.

- NUTR 861 Advanced Nutritional Biochemistry: Nutrition and Immunology
- NUTR 863 Advanced Nutritional Biochemistry: Microenvironments: Inflammation In Obesity, Atherosclerosis and Cancer
- NUTR 864 Advanced Nutritional Biochemistry: Oxidative Stress and Nutritional Antioxidants in Human Health and Disease
- NUTR 865 Advanced Nutritional Biochemistry: Nutrigenetics and Nutrigenomics
- NUTR 866 Advanced Nutritional Biochemistry: Nutrition and Population Genetics
- NUTR 867 Advanced Nutritional Biochemistry: Vitamins and Disease
- NUTR 868 Advanced Nutritional Biochemistry: Nutrition and Cancer

E. Electives

A student specializing in nutritional biochemistry may take additional courses from those offered by departments such as Biology, Cell and Developmental Biology, Biochemistry and Biophysics, Genetics, etc., as well as biological science courses offered by the Department of Nutrition. Such courses might enhance the student's grasp of molecular biology techniques, advanced genetics, cell biology, or biochemical endocrinology

F. Typical Program

The MS curriculum will focus on courses that enhance understanding of nutrition, biochemistry, and physiology, as well as build on prior coursework (prerequisite NUTR 400 or equivalent). An illustrative set of courses follows:

Example of a Typical Course Load for the MS degree:

Year 1

<i>Fall</i>		<i>Spring</i>	
NUTR 600 Human Metabolism: Macro	(3)	BIOS 600/BIOS 610 Biostatistics	(3)
NUTR Elective	(2)	NUTR 620 Human Metabolism: Micro	(3)
NUTR 885 Doctoral Seminar	(1)	NUTR 885 Doctoral Seminar	(1)
NUTR 910 Research	(3)	NUTR 910 Research	(3)

Summer

NUTR 910 Research	(3)
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(Research can be started in the summer before year 1, depending on arrangements with preceptor)

Year 2

<u>Fall</u>		<u>Spring</u>	
NUTR Elective	(2)	Elective	(3)
NUTR 885 Doctoral Seminar	(1)	NUTR 885 Doctoral Seminar	(1)
EPID 600 Epidemiology	(3)	NUTR 845 Nutritional Metabolism	(3)
NUTR 910 Research	(3)	NUTR 993 Master Thesis	(3)
SPHG 600 Intro. to Public Health	(3)		

MS students should plan to spend 20 hours/week in the laboratory during the first semester. They will attend the weekly Doctoral Seminar with nutrition doctoral students and participate in end-of-semester lab presentations and departmental seminars.

UNC-CH BSPH Students in Nutrition. Students in the UNC BSPH program can apply to the MS degree program. Their previous course work may allow them to finish the MS in one and a half years, including summers. Thus, a student could earn a BSPH and MS in approximately five years. Students beginning research during the summer after graduation, may be able to finish the MS requirements by the end of the following summer.

G. Timing of Activities to Meet Requirements

Students should plan to meet all of their course and research requirements in two years of graduate study. The comprehensive exam should be taken by March of the second year and the Masters thesis completed by the date set by the Graduate School so that the student will be eligible to graduate in May of the second year.

V. OTHER DEPARTMENT REQUIREMENTS**A. Seminar Presentation**

Each MS student must present one scheduled seminar to the Nutritional Biochemistry division before graduation. This seminar, typically presented during the semester before graduation, reports the results of the student's MS research. Each MS student should schedule the seminar in consultation with his/her advisor.

B. Comprehensive Examination

MS students will take the Nutritional Biochemistry written and oral comprehensive exam. The comprehensive examination covers core knowledge material from Nutrition 600, NUTR 620, and NUTR 845. The exam will also test the students' critical thinking skills gained in Doctoral Seminar and from the students' own reading.

The exam is developed, administered and graded by Nutritional Biochemistry members of the Department of Nutrition Doctoral Committee. MS students should plan to take the exam in the spring semester of their second year. If NUTR 845 is only offered in the spring semester of a MS student's second year, the student will take the comprehensive exam by March 15th of his/her second year. Research design and methodology issues are integrated into the exam. Basic understanding of biostatistics and epidemiology from required SPH courses may be tested. Students will be given some choice in the selection of essay questions to be answered on the exam.

The oral component of the MS comprehensive exam is given after the doctoral committee has reviewed the student's written exam responses (ordinarily within 2 weeks of the written exam). It covers the same core material as the written exam, but allows for more in-depth probing of the student's understanding of issues tested in the written exam. For MS students, the Nutritional Biochemistry members of the Department of Nutrition Doctoral Committee will administer the oral exam. The oral exam may take up to 1 hour.

The Doctoral Committee judges whether the student has passed the exam based on evaluation of the student's performance on both written and oral components of the exam. Students who fail are entitled to retake the exam. If a student does not pass the exam on the second try, he or she must petition the Graduate School to take the exam for a third time. A supporting letter from the Doctoral Committee must accompany the petition.

VI. SELECTION OF THE MASTERS COMMITTEE

A. Composition

By the beginning of the second year, the student and his/her research advisor will choose an MS committee. The MS committee must have three members, one of whom (the faculty advisor) serves as the chair. The chair and at least one other member must hold a primary or joint appointment in the Department of Nutrition. At least two committee members must be full members of the Graduate Faculty. Committee members who are not full members of the Graduate Faculty (for example, individuals from other institutions or firms who may hold adjunct appointments at UNC-CH) may be appointed with approval of the Graduate School. Members are selected because their fields of expertise are particularly relevant to the student's research.

B. Functions

MS students are responsible for consulting with members of their committee at intervals throughout the second year of their research. At a minimum, students should submit a progress report and meet with each committee member at least once during each semester of the second year.

The first formal meeting of the student and his/her committee may be held during the second academic year. The agenda usually includes a review of the student's previous educational and working experiences, courses taken while in the MS program, and plan for completion of the research.

The second formal meeting would be the oral defense of the Masters thesis.

VII. MASTERS RESEARCH

A. Research

The research proposal includes a survey of the research literature, a statement of the testable hypotheses and research objective(s), and a detailed description of the research methodology and significance of the proposed research. Before any data are collected, research involving animal or

human subjects must have the approval of the student's faculty adviser and the IACUC or the Institutional Review Board for the Protection of Human Subjects, as appropriate.

Each MS student together with his or her research advisor should develop a research project that enhances both independent thinking and technical achievement. The student cannot assume that the research advisor is expert in a wide range of topics or that the research advisor will become expert in whatever topic the student chooses. Generally, the closer a student's topic to the research advisor's area of expertise, the more the student will learn.

B. Masters Research

The MS research should indicate that the candidate has mastered the research methodology, has a grasp of the historical aspect of the research topic, and has contributed new knowledge. Through the conceptualization, planning and execution of research and the experience of writing the Master's thesis, the MS student will learn skills that scientists need in order to succeed in almost all research settings.

The level of independence that a student has in research execution usually depends on the level of the experience of the student. Students should become more independent as they progress through the MS program. The student and research advisor should discuss and agree upon the level of independence that is appropriate. Policies for defining authorship on papers that may result from their work together should also be discussed. It is impossible, and probably not very profitable, to attempt to define the Master thesis too closely. Latitude remains to fit a variety of circumstances. Ultimately, the student's MS committee is best able to make decisions on the acceptability of an individual student's work.

C. Final Oral Exam

When the student has completed a final draft of the Master thesis, and the MS committee has certified that all other degree requirements have been met, the final oral examination may be scheduled. The oral examination is held only after all members of the MS committee have had an adequate opportunity to review the Master thesis. Committee members should be given a completed draft at least two weeks before the scheduled oral defense date.

At the final oral examination, the student will present a 40-45 minute seminar, in which he or she discusses the background, methods, results and significance of the research. After this presentation, which is open to all members of the community, the general audience may ask the student questions. The MS committee will then meet in closed session with the student to ask further questions. This meeting will constitute the final oral examination. The committee may, at the time of the final oral, but not later, require revisions to the Master thesis.

D. Format of the MS Thesis

Two formats are acceptable for the Master thesis. The first is the traditional "book-style" document with separate chapters which typically take the form of (1) a literature review or background, (2) methods, (3) results, which may be in multiple chapters depending on the subject matter, (4) discussion, (5) conclusions, and (6) references.

The second approach is to write the Master thesis as an extended manuscript suitable for publication. The faculty recommends this format. Thus, the body of the Master thesis would consist of a manuscript that has been supplemented by additional sections of introduction/background, synthesis, discussion of significance, and direction for future research. This style has the advantages of teaching students how to write for publication and of producing manuscripts ready for submission.

Other pertinent points regarding the manuscript:

1. The manuscript should be of the quality and length usually expected for publication in a peer reviewed scientific journal.
2. The thesis should present major, substantive, and original research results.
3. The expanded methods section should not reiterate methods described in the thesis. Instead, it should present those issues that are deemed appropriate for evaluating the research, but that one might not present in as great detail when writing for a journal. To avoid repetition, it is recommended that additional details of methods be placed as more lengthy footnotes to articles or as appendices.
4. Additional detailed results (for example, results from full regression models, replicates of experiments, etc.) may be presented in appendices.
5. The synthesis chapter should provide:
 - (a) an overview of the major research findings;
 - (b) a discussion of significance: how the research contributes to the field, how it confirms previous work or breaks new ground, the context in which the research should be placed and/or where appropriate, a discussion of the health/nutrition/public health/policy significance of the work;
 - (c) a discussion of the major strengths and weaknesses of the work,
 - (d) directions for future research.
6. Each reference should include all authors, the title, volume, page numbers (first-last), year.

E. Application for Graduation

When a student nears the end of his or her research and can anticipate final approval of the Master thesis, he or she must complete an online application for graduation. The student must file a new application for the degree if he/she does not graduate as planned. Such applications must be filed by the deadline given in the "Calendar of Events" of the Catalog. Students will notify the Graduate School of their plan to graduate by applying online through the ConnectCarolina student portal.

F. Time Limitation

All requirements for the degree must be completed within five-years from the date of first registration in the Graduate School. An extension of the degree time limit may be granted upon petition to the Dean of the Graduate School.

VIII. COURSE DESCRIPTIONS

NUTR 175 INTRODUCTION TO FOOD STUDIES; FROM SCIENCE TO SOCIETY (3)

Introduction to food studies covering a variety of topics including how food was consumed over history, land use and aquaculture, food in the arts, food and culture in the American South, food politics and nutrition science. Fall. Beck and Faculty.

NUTR 240 INTRODUCTION TO HUMAN NUTRITION (3)

Prerequisites, BIOL 101/101L and CHEM 102/102L. Relationships of human nutrition to health and disease. Integration of biology, chemistry, and social sciences as related to human function. Nutrient composition of foods and safety of the food supply. Fall. Beck and Faculty.

NUTR 245 SUSTAINABLE LOCAL FOOD SYSTEMS: INTERSECTION OF LOCAL FOODS AND PUBLIC HEALTH (3)

Examines the intersection of local foods and public health in respect to nutrition, environmental, economic, and community issues. Students explore impacts of the increasingly industrialized and centralized food system, as well as, potential solutions, while assisting community partners increase opportunities for farmers, local food marketers, distributors, and entrepreneurs. Spring. De Marco and Ammerman.

NUTR 295 UNDERGRADUATE RESEARCH EXPERIENCE IN NUTRITION (3)

Permission of the instructor. For undergraduates enrolled in the department's baccalaureate degree program. Directed readings or laboratory study on a selected topic. May be taken more than once for credit. Fall, Spring, Summer. Faculty.

NUTR 400 INTRODUCTION TO NUTRITIONAL BIOCHEMISTRY (3)

Prerequisites, BIOL 101, CHEM 101, 102 and NUTR 240. Permission of the instructor for students lacking the prerequisites. Function of the human body focusing on chemical properties, function and metabolism of nutrients. Biochemistry of nutrients with a limited focus on medical aspects of nutrient metabolism. For advanced undergraduates and graduate students needing to enhance background prior to NUTR 600. Spring. Styblo and Krupenko, S.

NUTR 600 HUMAN METABOLISM: MACRONUTRIENTS (3)

Prerequisite, NUTR 400. Permission of the instructor for students lacking the prerequisites. Cell biochemistry and physiology emphasizing integration of proteins, carbohydrates and lipids in whole-body metabolism, regulation of energy expenditure, food intake, metabolic adaptations, and gene expression, and macronutrient-related diseases (atherosclerosis, obesity). Fall. Coleman.

NUTR 611 NUTRITION ACROSS THE LIFE CYCLE (3)

Prerequisite, NUTR 400. This course covers nutrition during the life cycle. Units include women during preconception, pregnancy, and lactation; infancy; childhood; adolescence; and older adults (65+). Nutrient and energy needs, assessment of nutritional status, and cultural and socioeconomic barriers are discussed for each phase. Fall. Holliday, Samuel-Hodge, and Wasser.

NUTR 620 HUMAN METABOLISM: MICRONUTRIENTS (3)

Prerequisite, NUTR 400 and 600. Permission of the instructor for students lacking the prerequisites. Cell biochemistry and physiology emphasizing metabolism of vitamins and minerals including antioxidant protection, immune function, nutrient control of gene expression and disease states induced by deficiencies (e.g., iron-deficient anemia). Spring. Krupenko, N. and Makowski.

NUTR 630 NUTRITION COMMUNICATION, COUNSELING AND CULTURE (3)

Prerequisite, NUTR 240. Permission of the instructor for students lacking the prerequisite. Course teaches the future nutrition professional the art and science of communicating with individuals, groups, and the public. Students will enhance cultural awareness, practice counseling individuals and facilitating groups, and frame nutrition messages for mass media including social media. Fall. Sommers.

NUTR 640 MEDICAL NUTRITION THERAPY I: CHRONIC DISEASE MNGT. (3)

Prerequisite, NUTR 630. Course designed to examine the rationale and implementation of diet therapy and nutrition support in the prevention or treatment of chronic diseases. Spring. Holliday.

NUTR 642 MEDICAL NUTRITION THERAPY II: ACUTE DISEASE MNGT. (3)

Prerequisite, NUTR 640. Course designed to examine the rationale and implementation of diet therapy and nutrition support in the prevention or treatment of acute diseases. Fall. Holliday.

NUTR 650 FOOD SCIENCE AND CULINARY ARTS (2)

Prerequisite, NUTR 400. Introduction to foods, chemical and physical properties, nutritional composition, food safety, production, and regulation. NUTR 650 Lab required. Spring. Jenks.

NUTR 650L FOOD SCIENCE AND CULINARY ARTS LAB (1)

Concurrent with NUTR 650. Classes illustrate biochemical processes and food properties covered in lecture. Introduction to new foods and food ideas. Critical evaluation of recipes. Lab fee required. Three lab hours per week. Spring. Jenks.

NUTR 692H HONORS RESEARCH IN NUTRITION (3)

Permission of instructor. Directed readings or laboratory study of a selected topic. Requires a written proposal to be submitted to and approved by BSPH Committee and faculty research director. A written report is required. May be taken more than once for credit. Six laboratory hours per week. Fall, spring, summer. Faculty.

NUTR 695 NUTRITION RESEARCH (VAR. 1-9)

Permission of the instructor. Individual arrangements with faculty for bachelor and master students to participate in ongoing research. Fall, spring, and summer. Faculty.

NUTR 696 READINGS IN NUTRITION (VAR. 1-9)

Permission of the instructor. Reading and tutorial guidance in special areas of nutrition. Fall, spring, and summer. Faculty.

NUTR 700 NUTRITION IN MEDICINE (2)

Prerequisite, BIOL 252 and NUTR 600 or equivalent. Comprehensive review of nutrition basics with strong clinical perspective. Integrates nutrient biochemistry and metabolism into a framework of nutritional assessment and dietary intervention. Fall. Kohlmeier.

NUTR 720 PUBLIC HEALTH NUTRITION MANAGEMENT I (2)

Prerequisites, NUTR 630 and 640, HBEH 600. Focuses on the roles and functions of the public health nutritionist in providing nutrition services at the community level that includes domestic and international nutrition programs, essential public health services, community assessment methods, and community engagement. For the MPH-RD student, it includes the 336 hours of field experience. Summer. Sommers and Samuel-Hodge.

NUTR 725 PUBLIC HEALTH NUTRITION MANAGEMENT II (3)

Prerequisite, NUTR 720. An overview of the planning and management of local, state, federal, and voluntary public health nutrition programs. Examines legislative and administrative structures. Fall. Sommers.

NUTR 728 NUTRITION TRANSLATIONAL RESEARCH AND APPLICATION (2)

Prerequisite, EPID 600, NUTR 725, and NUTR 813 recommended. Permission of instructor for non-majors. Designed to focus on translational nutrition research and application, including grant writing, to prepare students in clinical, public health, and policy arenas. Spring. Mayer-Davis.

NUTR 735 NATIONAL NUTRITION ISSUES (1)

Prerequisite, NUTR 725 or permission of the instructor. Three-day in-depth seminar held in Washington, DC on national nutrition issues, policy formulation and program development with key congressional staff, federal agencies staff, and pertinent public interest/consumer advocacy groups. Paper required. Field fee required. Fall. Ng.

NUTR 745 INTERNATIONAL NUTRITION (3)

Provides a broad overview of international nutrition research issues, programs, and policies. Topics will include micronutrient deficiencies, child feeding and growth, determinants of under- and over-nutrition, chronic disease and nutrition, food fortification and supplementation, and nutrition intervention programs and policy. Fall. Adair and Bentley.

NUTR 746 TAXES, BANS, & BURGERS: DIRECTED READINGS IN GLOBAL FOOD POLICY (1)

Prerequisite, permission of the instructor for non-majors. Course will explore the social, historical, and political context of how individuals make decisions about what to eat; how this context shapes food policy; and how these policies in turn shape individual behavior, by employing a comparative framework over three countries (China, Mexico, and the U.S.) Spring. Smith-Taillie

NUTR 785 GRADUATE TEACHING EXPERIENCE (1)

Prerequisite, permission of the instructor. Individual arrangements with faculty for a graduate student to serve as a teaching assistant for a Nutrition course. Fall and Spring. Beck.

NUTR 803 ADVANCED NUTRITION INTERVENTION RESEARCH SEMINAR (1)

Prerequisite, permission of instructor. Development and application of critical thinking skills in the analysis of important nutrition and policy interventions. The course will examine conceptual models, research designs, intervention strategies, and measures of effectiveness in historical and innovative nutrition research. Fall, Spring. Faculty.

NUTR 810 PHYSICAL ACTIVITY EPIDEMIOLOGY AND PUBLIC HEALTH (3)

Prerequisite, EPID 600 or equivalent. Course provides an overview of major issues in physical activity measurement, population distribution, correlates, impacts (physically and economically), and public health recommendations. Interventions, including relevant theories, will be reviewed. Spring. Ward and Hales.

NUTR 811 DEVELOPMENT OF HEALTH PROMOTION AND DISEASE PREVENTION INTERVENTIONS (VAR. 1-3)

Prerequisite, permission of the instructor. Understanding of the role and application of both theory and empirical data in the design and development of effective behavior change interventions, with particular focus on changing nutrition behaviors. Fall. Tate.

NUTR 812 INTRODUCTION TO OBESITY: CELL TO SOCIETY (3)

Prerequisite, permission of the instructor. This course provides a broad survey of obesity research including measurement issues, biological, social and economic etiologies, health and economic consequences, and prevention and treatment of obesity. Spring. Voruganti and Poti.

NUTR 813 NUTRITIONAL EPIDEMIOLOGY (3)

Prerequisites, EPID 600 or 710 and BIOS 600 or equivalent. This course introduces basic methods of dietary assessment, reviews various topics in nutrition epidemiology and teaches the skills needed for critical evaluation of the nutritional epidemiologic literature. Spring. Mendez and Albrecht.

NUTR 814 OBESITY EPIDEMIOLOGY (3)

Prerequisites, BIOS 600, EPID 710, EPID 715, and NUTR/EPID 813. Examines epidemiology research on the causes, consequences, and prevention of obesity. Emphasis on methodological issues pertinent to obesity research. Spring, alternating years. Stevens and Poti.

NUTR 818 ANALYTICAL METHODS IN NUTRITIONAL EPIDEMIOLOGY (3)

Prerequisites, EPID 600 or 710, NUTR 813 and BIOS 545, or permission of the instructor. Skills and techniques to study how dietary exposures, physical activity and anthropometric status relate to disease outcomes. Focus is hands on data analysis using STATA, and interpretation of results from statistical analysis. Fall, alternate years. Adair and Meyer.

NUTR 845 NUTRITIONAL METABOLISM (3)

Prerequisite, NUTR 600 or equivalent. A problem-based approach to examine current topics in biochemistry relevant to nutrition and metabolism. Students interpret data and design experiments related to recent advances in nutritional biochemistry. Spring. Coleman and Makowski.

NUTR 861 ADV. NUTRITIONAL BIOCHEMISTRY: NUTRITION & IMMUNOLOGY (2)

Prerequisites, NUTR 600 and 620 or equivalent. Presents an understanding of basic immunology and the role of nutrition in modifying the immune response. Fall, alternate years. Beck.

**NUTR 863 ADV. NUTRITIONAL BIOCHEMISTRY: MICROENVIRONMENTS:
INFLAMMATION IN OBESITY, ATHEROSCLEROSIS AND CANCER (2)**

Prerequisite, NUTR 600. Permission of the instructor for students lacking the prerequisite. Will examine the interaction of cells in the microenvironment and recent advances in the role of metabolism and inflammation. Fall, alternate years. Makowski.

**NUTR 864 ADV. NUTRITIONAL BIOCHEMISTRY: OXIDATIVE STRESS AND
NUTRITIONAL ANTIOXIDANTS IN HUMAN HEALTH AND DISEASE (2)**

Prerequisite, BIOL 101, CHEM 102, NUTR 400 (or equivalent). Permission of the instructor for non-majors. Provide basic information about the cellular and molecular mechanisms that are responsible for generation of reactive oxygen and nitrogen species, about key cellular structures targeted by these species, and about the role of oxidative stress and antioxidants in etiology and prevention of human diseases. Fall, alternate years. Styblo.

**NUTR 865/GNET 865 ADV. NUTRITIONAL BIOCHEMISTRY: NUTRIGENETICS AND
NUTRIGENOMICS (2)**

Permission of Instructor. Course focuses on nutrigenetics and nutrigenomics with an emphasis on the genetic and dietary interactions predisposing one to increased risk of disease. Spring. Bennett and Voruganti.

NUTR 867 ADV. NUTRITIONAL BIOCHEMISTRY: VITAMINS AND DISEASE (2)

Prerequisites, NUTR 600 and 620, or permission of the instructor. An advanced graduate seminar course focusing on the molecular processes involving B and D-group vitamins, mechanisms of pathologies caused by their deficiency, as well as, the latest studies on the nutritional requirements, population consumption levels and use of the vitamins for treatment and prevention of human disease. Special emphasis will be given to the role of individual genetic polymorphisms in the specific vitamin status. Fall, alternate years. Krupenko, N.

NUTR 868 ADV. NUTRITIONAL BIOCHEMISTRY: NUTRITION AND CANCER (2)

Prerequisites, NUTR 600 or equivalent. The course will cover the biology of cancer as well as the metabolic and physiological functions of nutritional factors and how they impact the cancer process. The course will focus on aspects of current research that are relevant to links between nutritional factors, with emphasis on mechanism-based cancer prevention approaches. Spring, alternate years. Hursting and S. Krupenko.

NUTR 875 NUTRITION POLICY SEMINAR (1)

Prerequisite, permission of the instructor for undergraduates. Graduate seminar addressing current public health nutrition policy challenges and controversies including school lunch standards, sugar sweetened beverages, the Farm Bill, federal food programs, the Affordable Care Act, and policies affecting local food systems such as food policy councils, farm to school programs, and good agricultural practices (GAP) certification. Fall. Ammerman.

NUTR 880 ELEMENTS OF BEING A SCIENTIST (3)

Prerequisites, for doctoral students permitted by instructor/prepared with PHD aims/focus. Course focuses on key elements that contribute to a successful career as a scientific researcher. These include scientific presentations, NIH proposal grant writing, evaluating published manuscripts, sources of funding, peer review, use of animals and humans in research, and scientific ethics. Fall. Zeisel, Ward, and Gordon-Larsen.

NUTR 885 DOCTORAL SEMINAR (1)

This course is designed for doctoral and master of science students only. Critical review of current literature in nutritional biochemistry, intervention and policy, and population-based nutrition science. Focuses on the development of skills in reviewing and criticizing articles. Fall/Spring. Faculty.

NUTR 910 NUTRITION RESEARCH (VAR. 1-9)

Individual arrangements with faculty for doctoral students to participate in ongoing research. Fall, spring, and summer. Faculty.

**NUTR 920 RESEARCH ROTATIONS FOR NUTRITIONAL BIOCHEMISTRY
DOCTORAL STUDENTS (VAR. 1-3)**

Two laboratory or research group rotations supervised by nutritional biochemistry faculty. Provides a breadth of research experience for students prior to selecting dissertation adviser. Up to six laboratory hours per week. Fall, spring, and summer. Sheridan.

NUTR 992 MASTER'S PAPER (3)

Fall, spring, and summer. Faculty.

NUTR 993 MASTER'S THESIS (3)

Fall, spring, and summer. Faculty.

NUTR 994 DOCTORAL DISSERTATION (3)

Fall, spring, and summer. Faculty.

**IX. NUTRITION MS IN NUTRITIONAL BIOCHEMISTRY COURSE CHECKLIST
FOR 2016-2017**

MS Degree Requirement Worksheet				Student's Name/PID # _____	
Course Number	Course Title	Semester Completed	Credits	Grade(s)	Pertinent notes: all substitutions and exemptions.
SPH CORE					
BIOS 600/ BIOS 610	Principles of Statistical Inference/ Biostatistics for Laboratory Scientists		3.0		
EPID 600	Principles of Epidemiology		3.0		
SPHG 600	Introduction to Public Health		3.0		
DEPT CORE					
NUTR 600	Human Metabolism: Macronutrients		3.0		
NUTR 620	Human Metabolism: Micronutrients		3.0		
NUTR 885	Doctoral Seminar		1.0		
NUTR 885	Doctoral Seminar		1.0		
NUTR 885	Doctoral Seminar		1.0		
NUTR 885	Doctoral Seminar		1.0		
NUTR 910	Nutrition Research		3.0		
NUTR 910	Nutrition Research		3.0		
NUTR 910	Nutrition Research		3.0		
NUTR 910	Nutrition Research		3.0		
MS Comprehensive Examination			Required		
NUTR 993	Master Thesis		3.0		
BIOCHEMISTRY DIVISION COURSE REQUIREMENTS (NUTR 845 plus two of the other courses listed:					
NUTR 845	Nutritional Metabolism		3.0		
NUTR 861	Advanced Nutritional Biochemistry: Nutrition and Immunology		2.0		
NUTR 863	Advanced Nutritional Biochemistry: Microenvironments: Inflammation in Obesity, Atherosclerosis and Cancer		2.0		
NUTR 864	Advanced Nutritional Biochemistry: Oxidative Stress and Nutritional Antioxidants in Human Health and Disease		2.0		
NUTR 865	Advanced Nutritional Biochemistry: Nutrigenetics and Nutrigenomics		2.0		
NUTR 867	Advanced Nutritional Biochemistry: Vitamins and Disease		2.0		
NUTR 868	Advanced Nutritional Biochemistry: Nutrition and Cancer		2.0		
Any Other Elective Approved by Division			2.0		
Total Course Credits for Graduation:			41		
ELECTIVE(S)					
NUTR 910	Nutrition Research (optional)		3.0		